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The American Architect and Building News

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ILLUSTRATIONS.

[*The figures refer to the number of the journal, and not to the page.*]

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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JULY 5, 1884.

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CONTENTS.

EVERY one remembers the Grand-Street accident in New York, two years ago, by which a building fell upon its inmates, killing and injuring several. Last week another building on the same street, a few rods away, fell in nearly the same manner, burying three women in the ruins, one, at least, of whom was instantly killed. The immediate cause of the collapse seems to have been the excavation of a deep cellar on the adjoining lot, and the insecurity of the wall was observed, and the inmates ordered to abandon the house through the agency of the Bureau of Buildings, on the very morning of the accident, the last tenant being on the point of leaving the building when it fell. The transformation which Grand Street, like Bleecker Street, and the other cross streets which come nearest the elevated-railway stations, is now undergoing is very favorable to accidents of this kind. Unlike Bleecker, Eighth and Fourteenth Streets, which were once fashionable, and are occupied by buildings of considerable size, and of reasonably good construction, Grand Street is filled for the most part with three-story houses, wretchedly built, and far advanced in decay. The erection in the midst of such structures of the huge and costly stores which are rapidly supplanting them is, at the best, a dangerous operation for the weaker buildings, and it is only surprising that more catastrophes should not have occurred. The main element of danger is, of course, the risk of undermining the miserable rubble foundations of the small houses in excavating the cellars of the stores. Under the New York law any person is entitled to dig out his own land to a depth of ten feet below the curbstone, without regard to the effect of the excavation on his neighbors, who, if the footings of their cellar walls do not happen to be set so low as that, must shore up and underpin them at their own expense, or allow them to fall, if the earth should escape from beneath them. It is hardly necessary to say that the proprietors of small tenement houses, who are not usually the most prudent or the most liberal of mankind, are much disposed to trust to luck in such cases, rather than incur the expense of making their property certainly secure; and the Bureau of Buildings has no more difficult or disagreeable task assigned to it than that of compelling the owners of such houses to take the simplest precautions against accident. The present statute allows obstinate persons to interpose so many delays in the execution of the orders of the Inspector of Buildings that a cellar may be dug down many feet below the adjoining wall before any official action can be taken; and so long as the new cellar does not exceed ten feet in depth below the curb, the law gives no authority for hindering or stopping the work of excavation; so that the fact that so few accidents of the kind have occurred is good evidence, both of the promptness of the Building Bureau in endeavoring to have the necessary precautions taken, and of the forbearance of the builders and owners of the large buildings, who must in many cases have submitted voluntarily to delays and inconveniences which the law does not require from them, rather than expose the neighboring proprietors to the consequences of their own folly.

WE are sorry to learn that the subscription list for contributions to the work of excavating the city of Tanis in Egypt, opened by the Rev. W. C. Winslow in Boston, contains as yet less than a hundred names. The sum suggested as a suitable one for subscribers, five dollars, is so modest that a very small amount of antiquarian zeal would be indicated by the sacrifice, but even this seems to be more than the average man can claim. Perhaps the response to Mr. Winslow's invitation may be quickened by the news that already, before the ground has been much more than scratched, an enormous statue of Rameses the Great has been discovered; in fragments, it is true, but so disposed as to be easily restored. The figure is of granite, and, placed in its original position, would be one hundred and fifteen feet high. Whether it was originally made of a single block we do not learn, and perhaps its broken state will prevent us from ever knowing, but if so, the quarrying of the block, and the transportation and placing of the statue, must have been a far more difficult task than the erection of the obelisks, the tallest of which exceeded this statue very little, if at all, in height. It is hardly necessary to say that no other statue in Egypt approaches the scale of this. The two Memnon figures, which are said to have been cut from rocks existing naturally on the spot where they stand, were barely half as high in their original condition, and even the largest rock-cut bas-reliefs of the same king in Nubia are far inferior in size. If the other architectural and artistic ornaments of Tanis corresponded to this specimen, the world, or at least that small part of it which takes an interest in archæology, has some lively sensations in store for it.

ARCHITECTS will be interested in the programme of the Fifth International Sanitary Congress, which we find in the *Builder*. In 1882, the Fourth Congress was held at Geneva, and adjourned to meet two years after at the Hague. Independent of the attractions of a visit to the Hague, one of the pleasantest cities in Europe, the Congress of this year promises to be more important and useful than any that have preceded it. Everything in the way of private and public hygiene comes within its scope, and a great variety of papers are to be presented by persons of the highest distinction. The renowned Pasteur is to read a discourse upon the attenuation of virus, which, although particularly intended for medical men, will attract the attention of all who know anything of its famous author and his investigations. One of the most distinguished of architects, M. Emile Trélat, is to read an essay upon the temperature and condition of the air within dwelling-houses, and many similar subjects are appointed for discussion. It is very easy to obtain admission to the Congress, by subscription, which is set at ten Dutch florins; and this subscription entitles the applicant to a copy of the printed Proceedings. More than five hundred persons subscribed to the Congress at Geneva, and of these nearly four hundred attended the deliberations; and the committee which has the matter in charge suggests that if the Congress of this year is equally favored, members who wish to be comfortable during their stay at the Hague will do well to make early application for accommodation, since the hotels at the Hague are neither large nor numerous. The sessions of the Congress open on Thursday, August 21, and continue until the following Wednesday. The general Secretary is Dr. Van Overbeck de Meijer, Professor of Hygiene at the University of Utrecht, Holland.

THE plan for disposing of that part of the sewage of Paris which is not now utilized at Gennevilliers by irrigating the plain of Achères and St. Germain seems to be on the point of execution; or at least, the inhabitants of St. Germain are so far convinced that it will be carried into execution unless they do something to prevent it that they have chosen a committee to resist the project, and have held formal discussions with the city officials. The argument which the Committee of Defence of the Forest of St. Germain presents in opposition to the irrigation scheme consists mainly in the assertion, which certainly has a basis of truth, that the result of the compulsory and unceasing discharge upon the fields of Achères of the three hundred thousand cubic metres of foul water a day which the new sewers are intended to deliver there will be very different from that obtained at Gennevilliers, where irrigation is under the discretion of the farmers, who can, and do, shut the gates of the irrigating canals in rainy or frosty weather, or when for any other reason they think that their crops have had enough of the sewage. The channels at Gennevilliers are provided with overflows, leading directly into the Seine, so that the stoppage of the conduits does no harm; but at Achères it will be impossible to dispose of the surplus flow in this way, and the land must take the sewage, whether it can absorb it or not. The consequence of this, according to the committee, will be the destruction of the fertility of the soil, "which will grow nothing but typhoid fevers," and the formation of a filthy swamp in what is now the most beautiful suburb of Paris.

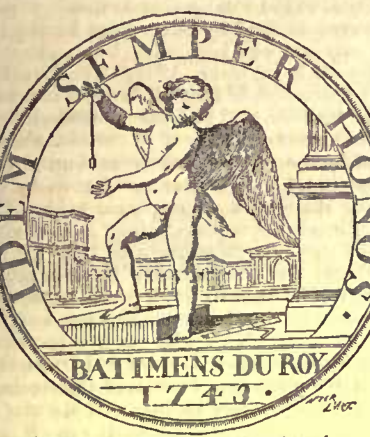
TO all this M. Planat, the editor of *La Semaine des Constructeurs*, makes reply that so far as regards irrigation simply, there is no reason why the application of sewage to land should not be as profitable at Achères as at Gennevilliers. In the latter town the introduction of irrigating conduits was at first resisted, as now at St. Germain; but the utilization of the flow, which was entirely voluntary, proved so advantageous to the farmers who tried it that now the entire region is regularly irrigated, and, we may add, so many farmers have flocked to the place from all parts that the value of land capable of receiving the sewage has more than doubled within a few years. That at Gennevilliers the surplus flow can be turned into the Seine at the discretion of the gardeners is true; but as a substitute for this at Achères the engineers of the city have provided for setting apart a large tract expressly to receive surplus sewage, which can be turned from the cultivated fields upon it in the same way that it is turned into the river at Gennevilliers. Just how much of this waste land will be needed to absorb the sewage not used on the farms it would be difficult to say; but the city intends to take all the land necessary for carrying out the system in the best possible manner. Under the present plan, the irrigated tract is to comprise about twenty-five hundred acres, but if better results would be obtained by treating a larger territory, land suitably situated for receiving the flow can be had to an indefinite amount along the river valley. Although the plan of setting apart waste land to absorb the surplus flow of an irrigation system is a costly one, since a much larger tract must be acquired, there can hardly be a question of its real economy in enabling those who use the fertilizing elements of the sewage to do so to the best advantage; and it must be remembered that unless the experience of Gennevilliers is exceptional, the privilege of receiving the sewage in such a convenient way would soon be so highly prized that even the waste lands would be brought up to an equal value with the rest.

ARCHITECTS and engineers who have to do with constructions exposed to the action of the sea will be interested in the description given in the *Builder* of the new Eddystone light-house, just completed at the side of the famous structure erected by Smeaton, which, although still practically perfect, has been undermined by the action of the waves upon the rock on which it rests, and is now dismantled. Every one remembers the peculiar profile of the Eddystone light-house, which, by its great expansion at the base, converts the flow of the waves which attack it into a vertical impulse, greatly lessening its force, while presenting at the same time a large mass of solid stone to meet it; and most architects know, also, something of the ingenious dovetailing by which Smeaton connected the blocks of granite of his structure into an inseparable mass. Both these precedents have been followed in the new light-house, and some improvements have been made on Smeaton's design. It was found, for instance, that in the old light-house the waves, thrown upwards by the curvature of the tower-walls, struck with such force upon the under side of the gallery around the lantern, sixty feet above high-water mark, as to lift it away from the tower, and during the severest storms the lantern itself was so overwhelmed by the upward rush of the water as to obscure the light. Both these difficulties have been met in the new light-house. To diminish somewhat the tendency of the waves to climb up the curved sides of the tower, an obstacle has been interposed in their course, in the shape of a cylindrical base, forty-four feet in diameter, and twenty-two feet high, against which they will dash directly. The force of the sea striking in this way is enormous, a "marine dynamometer," made for the purpose, having registered an actual wave-pressure of six thousand pounds upon every square foot of the surface receiving the impact; and the base of the new tower is of solid granite, in blocks dovetailed together, both vertically and horizontally, and laid in Portland cement. Above the base the light-house takes the conoidal form of the old one, but is carried up without cornices or projections to a height of one hundred and thirty-three feet, bringing the lantern nearly twice as far above the sea as in Smeaton's building, and well out of reach of the highest waves. For about twenty-two feet above high-water mark the tower is solid; above this the walls gradually diminish in thickness from eight and one-half to two and one-half feet. Considering the extreme difficulty of the undertaking, the cost has been very moderate, only three hundred thousand dollars having been spent upon the work; while Smeaton's light-house, half as high, and containing barely one-fifth the material, cost two hundred thousand.

AS a useful illustration of the work which serves to form the taste of the great French architects, we would like to call the attention of our younger readers to the account in *La Semaine des Constructeurs* of the drawings exhibited at the Paris Salon of 1884 by M. Henri Nénot, now just past his student days, but already famous as having carried off the highest prize in two of the greatest competitions of the time, — that for the Victor-Emmanuel Memorial at Rome, and for the enlargement of the Sorbonne at Paris. The subject chosen by M. Nénot for his Salon drawing was a restoration of the sacred enclosure of Apollo at Delos, and M. Périer, the critic, speaks of it as a work "which it is impossible to pass without lingering long before it." This alone would be praise from so careful a writer, but the merit of M. Nénot's work is much increased by the fact that the ruins at Delos are in the most fragmentary condition, even the trace of the foundations of the sixteen buildings which occupied the enclosure being in many places lost, while all details must be recovered from the comparison of small pieces of capitals, columns and entablature. The labor involved in this, which would have deterred any ordinary student, seems rather to have attracted M. Nénot, and his devotion was rewarded by an inspiration which seems to have given to his work a singular interest.

THERE are many persons, no doubt, in this practical country, who will fail to see the value, to an architect, of such labors as that which M. Nénot is justly proud to have accomplished; and we are glad to be able to point out his extraordinary professional success in justification of our opinion, that the restoration of antique monuments is one of the most profitable and invigorating exercises which the student of architectural design can undertake; for the reason that, beyond any other, it leads him to try to trace the reasoning, and discover the methods of men who built at least sincerely and rationally; while it serves to develop his imagination by the effort to throw himself in spirit among the Greeks or Romans whose works he is endeavoring to reproduce, at the same time that, by the necessity which it imposes upon him of following with exactness such details as he has, it keeps him always in the path of pure and elegant design. Of these three advantages which practice in restorations from the antique offers, the greatest, perhaps, is to be found in the opportunity which it gives for the exercise of the imaginative faculty. It is not unusual for persons who know no better to advise architectural students to choose for practice in design the more commonplace subjects, such as country-houses, railway-stations and the like, on the ground that these are "useful," while the unaccustomed subjects usually given in the good architectural schools are "not practical." The fact is that the exact converse of this is true. The function of schools of architectural design is not to multiply bad plans for two-story dwelling-houses, but to strengthen the mental powers of the students who attend them; while to encourage these students in the repetition of forms with which they are already familiar, and among which they cannot discriminate, is to paralyze instead of instructing them. We need not expatiate here on the value of imagination as a "practical" quality; every scientific man will testify to its importance; what we desire to point out is that in the study of architecture, whether in construction or design, the place which is occupied in other sciences by original investigation must be supplied, not by the preparation of feeble variations on familiar themes, but by the imposition of problems completely novel; of course arranged with proper care, but presenting questions which must be solved "out of the heads" of the students; that is, by that obscure, but difficult mental labor whose efforts we call imagination.

TERRA-COTTA.



MEDALLION DESIGNED BY EDME. BOUCHARDON

TERRA-COTTA is the name applied to architectural enrichments of brickwork. The clay of which this material is made is of a peculiarly plastic character, thereby making it susceptible of artistic finish, and allowing it to be moulded into pleasing delineations of animate forms, foliage, and conventional ornaments.

Terra-cotta has played an important part in the civilization of antiquity. The Chaldæans were obliged from the very nature of their surroundings, to employ clay for many purposes for which no other people have used it. The dwellers in that vast alluvial plain of the Tigris had constantly under their feet a clay that was naturally suitale for modelling.

This material, being easily obtainable and capable of conversion into great durability, was unequalled by any other for many of the purposes of civilized life. While in a plastic state it easily received the impression of any figure that it was desirable to impart to it; its yielding surface enabled characters to be impressed upon it very rapidly, in fact, almost as expeditiously as they could be traced upon papyrus, and certainly much more quickly than they could be cut upon wood by aid of the chisel. But in addition to the cheapness of clay, it possessed, as solid and fired terra-cotta, a duration greatly in excess of that of either wood or papyrus, for when once safely burned it was indestructible, except through sheer wantonness. It is in the shape of tablets of terra-cotta that the best history of Chaldæa comes to us, and although they are covered with strange cuneiform inscriptions, there is not the same tendency to doubt them that there is with some modern histories. Many of these early productions of terra-cotta, even while of less durability than that now made, are found in Chaldæan ruins in which the stone that was employed has been steadily disintegrating for many centuries, while the terra-cotta has been left as perfect, in many cases, as if recently produced.

In faithfully made and vitrified terra-cotta we have the great and only lasting triumph of man over natural productions; for timber will rot, stone — even granite — will disintegrate, iron will oxidize, these and all other materials will succumb to the action of fire and other destroying elements; but properly-made and thoroughly-burned terra-cotta will pass through centuries and be the last to yield to those influences to which all natural productions must give way, the material being not only absolutely fire-proof, but also, in all architectural employments, practically time-proof and indestructible.

I cannot pay a more eloquent tribute to terra-cotta than by making a free translation from a few sentences of the French of Jacquemart: —

"In the grandeur of the expiring Roman Empire, when the people were wrapped in fine silk and purple, and when to their sandals they were covered with rich embroidery, pearls and other precious stones, even when vessels of gold, jaspar, sardonyx, and onyx had superseded the earthen pottery for ornaments of the temples and with the powerful, and there was symmetry in every line of the commonest forms employed in architecture — when golden-grounded mosaics illumined the domes, and the rich columns were formed of many-colored spirals, and when magnificent veils of most costly silk were spread before the altar, then the humble terra-cotta introduced itself among all this splendor.

"The bold cupolas, which the eye hesitates to measure under their dazzling images, which if constructed of stone would have sunk of their own weight — these cupolas owe their existence still, to excite our admiration, to the judicious employment of terra-cotta in hollow form. The ceramic art was drawn upon in a way not usually employed, and the ingenious masonry of these masterpieces of architecture was formed by kinds of truncated bottles, strung one into the other, and disposed in parallel curves.

"Other branches of pottery had so entirely disappeared as to leave us no mark of their having been employed at all; but in the expiring civilization of the period, a grand and noble part is bequeathed to terra-cotta to perform in the often exacting positions of architecture, and help perpetuate the achievements of man to the far distant coming ages."

The term terra-cotta is of Italian derivation, and literally translated means cooked or baked clay. This term was more appropriate to the ancient terra-cotta, which was usually less burned, not so homogeneous, and coarser in texture than with us, but that is not a true description of the process as now employed in converting the artistically-moulded clay into finished terra-cotta.

From the definition cooked or baked clay, it might be supposed that terra-cotta did not receive so great a degree of heat as is applied to bricks during the process of burning; but this is not true, as terra-cotta requires a greater degree and a more regular distribution of heat during the firing than are either given or generally required for bricks. The reason for this is that less lime and alkaline fluxes are contained in terra-cotta clays than in brick clays, and the former being stronger and more refractory, naturally require greater heat to compel them to part with the water chemically combined with them.

Terra-cotta was largely used for architectural decorations in Greece, Etruria, Pompeii, Rome, and Mediæval Italy, and it was in the clay-plains of Northern Italy that terra-cotta was first predominantly employed over other materials in architectural construction and ornamentation, and the inspiration of modern designs in architectural terra-cotta is largely drawn from these works, especially those structures erected from the middle of the thirteenth until the commencement of the sixteenth century.

In England, the friezes, cornices, and other highly ornamental work in terra-cotta of the Manor House at East Barsham and the Parsonage House at Great Snoring, both in Norfolk, erected during the reign of Henry VIII, are worthy of particular notice, and the use of terra-cotta for decorative panels and bas-reliefs appears to have been popular during his time.

The gateway of York Palace, Whitehall, designed by Holbein, was decorated with four circular terra-cotta panels, which are still preserved at Hatfield Peveril, Hants.

The gateway of the rectory of Hadleigh Church, Suffolk, erected at the close of the fifteenth century, was very carefully restored about thirty-five years ago, the terra-cotta for the purpose being creditably reproduced at the Tyham Kilns, near Hadleigh.

From the latter part of the fifteenth century until after the reign of Elizabeth, terra-cotta was used only in large and expensive buildings; but at the beginning of the eighteenth century the use of terra-cotta was by no means uncommon in Great Britain, but soon after the reign of Queen Anne its use was discontinued, Its modern employment is but a revived taste, and is the result of laudable efforts on the part of a few architects to secure lasting and honest ornamentation in lieu of that sham and dishonest effect procured through the employment of stucco and galvanized sheet-iron, the latter material not being so common in Europe as in this country.

Some of the coats-of-arms seen over many of the shops in London are made of terra-cotta, and in those, having been properly vitrified in burning, the form is still good, and the exposure to the elements, often for more than a century, has in no way affected the lines.

Many buildings of recent construction in England and Germany, as well as in this country, have been effectively enriched through the judicious employment of terra-cotta. In England, the South Kensington Museum, the Charing-Cross railway-station and hotel, the Dulwich College, and the great Albert Hall; and in this country the United States Pension-Office Building at Washington, D. C., and many other recent buildings in the cities of New York, Philadelphia and Boston, offer admirable examples of the architectural effect produced by the blending of brickwork and terra-cotta, being generally both harmonious and attractive.

The matter of design and the manner of treating terra-cotta are subjects for much thought, and require not only artistic ideas, but the exercise of good judgment. Taste and expression are necessary, but this must not be accomplished at the cost of conveying a sense of weakness. Good construction, next utility, and last decoration, is the order in which the design should be carried out. The last requires an artist thoroughly versed not only in form and proportion, but who is inventive, in order to make the ornament harmonize with the purpose of the building, and also decorative in the place it is to occupy.

For special designs of this character the offering of premiums has been found to work well, as it stimulates ambition and thus develops the best ideas. The plan is worthy of a more extensive trial than it has yet received in this country, as we owe our progress in the production of architectural terra-cotta up to this date almost alone to the private designs of architects.

Truth is an absolute necessity in all terra-cotta designs, and as a desire for real in the place of sham materials is the cause of its revived use, why should the object of its employment be defeated? It is not considered an honest treatment of material to make painted and sanded wood take upon itself the appearance of stone, and when terra-cotta is made in imitation of that material, and for the purposes of deception, it is equally an error, and the responsibility for it should rest as heavily upon the architect who allows it as upon the manufacturer. All colors that naturally result from the mixtures and combinations of the clays are allowable, but there should be no effort to imitate other substances, as one of the greatest pleasures which arise from the use of terra-cotta in architecture is the satisfaction engendered by the simple merit of the material.

The ease and economy with which terra-cotta can be moulded into ornamental designs for mantels or finishings for fireplaces, as well as for finishings for chimney-shafts, have stimulated the production of a great variety of designs for these purposes, and especially for the latter. The chimney-caps produced in terra-cotta are of all suitable shapes and sizes; they are made with open as well as with protected tops. The stereotype designs are often good, but they just as often show a great poverty of ideas as regards proportion and ornamentation of the parts. The designs for chimney-shaft finishings vary from a small cap, with a low base and small beveled chamfer at the bottom, and a light astragal moulding encircling the upper portion and dividing the plain surface, to those in which the parts are of different shapes, variously proportioned and moulded, ornamented in low relief, and the top terminating in a gable roof ornamented with crockets and a finial. In many of these ornamental chimney-caps all the known and some of the undiscovered stages of Gothic architecture are brought out in incongruous confusion. In some of the simpler ones the designs are much more correct in form and ornament.

The production of objects in terra-cotta from models and reproductions from casts are chiefly mechanical, but oftentimes call for experience and skill. The clay, after being brought to the desired consistency, is formed in a mould, usually in several parts, the clay being pressed into them by the hand, and as soon as one section is finished another is added, and so the moulding of intricate pieces of terra-cotta progresses.

The making of moulds for terra-cotta, when the design is intricate, is a matter of great nicety, and requires careful fitting of the parts, which is not always easy, from the shrinkage of the parts not being the same. The making of the moulds is generally one of the chief delays in the manufacture of terra-cotta for buildings. These moulds cannot be changed at will, nor can alterations be made in the ornaments as the work proceeds, not only because the moulds cannot be changed, but because the pieces cannot be cut without ruining the design.

The first work of the architect, after his plans are accepted, should be the preparation of all the details for the terra-cotta portion, as each piece has its own place and no other will fill it in the building in that position for which it was designed. There can be none of that hurry and hasty preparation of details now so common on both sides of the Atlantic; there must be carefully matured working-details for this material, but the manner of joining the parts can best be left to the modeller, who can use locked, rebated, or flanged joints as may be best.

It is necessary to so arrange the moulds as to give an equal thickness to all parts of the body of the material, in order to lessen the chances of cracking in drying or warping in the kiln. When the shaped clay is withdrawn from the mould, or after it has been modelled, the object is usually dried by exposure to the sun or air, or near the hot kilns.

One of the hardest colors to obtain uniformity in the tint is buff, and to secure this rich, pleasing color in terra-cotta requires long burning and a highly experimental knowledge of firing, as well as a thorough acquaintance with the clay and its behavior in the kiln.

Coal should not be used in firing light-colored terra-cotta, as, although the usual products of combustion are separate from the ware, sulphurous fuel darkens and tarnishes the surface. Wood should be used in burning light-colored terra-cotta; but for red or darker-colored ware no objection can be urged against the use of coal.

MODERN HIGH EXPLOSIVES.[1]

"THE LION OF BELFORT" FRANCE COLOSSAL STATUE BY A. BARTHOLDI.

SOME years ago the steamer "Streeter," carrying amongst other freight eight thousand pounds of dynamite, caught fire from her furnaces when out on Lake Erie and — was burned to the water's edge without explosion. When we consider the consternation now so frequently caused by the finding of a single dynamite cartridge—or what is taken for such —near a London building, one cannot but picture the havoc that the explosion of four tons of this explosive might have occasioned even out on Lake Erie. Those ignorant of the properties of dynamite might be expected to exclaim against the criminality of the steamer's agents in shipping such dangerous freight, whereas it was as harmless a passenger as any one could wish, the fact of its burning quietly proving that it was properly packed for transport in paper packages, or wooden cases, and somewhat loosely at that; that it was perfectly dry, and was not so surcharged with nitro-glycerine as to allow this to exude in a free state, and drop onto the floor, where a chance step, the fall of some light article, or friction produced by the rolling of the vessel might have produced a slight initial detonation which would have exploded the whole mass; and, lastly, that it was not packed tightly in metallic cases which might have been exploded by direct or sympathetic concussion, or might have confined the gases of combustion until the heat of the conflagration had reached the explosive limit, 360° Fah.

Dynamite is not a good thing to be handled by the inexpert, or carelessly by the expert, but it is an amiable and useful ally of him who knows its peculiarities, and in this it differs from its progenitors, gun-cotton and nitro-glycerine, which are much more uncertain in their action, and will probably always be dangerous to use.

Nitro-glycerine was discovered in 1847 by Sobrero, at Paris; but it was not until 1863 that any one was bold enough to make it in large quantities; then the Swedish engineer, Alfred Nobel, took it up, and it is to his skill and persistence, in face of dangers and governmental opposition, that the manufacture and use of modern high explosives is due more than to any one else.

Nitro-glycerine is produced by the action of nitric acid on glycerine, the nitric acid being kept in a highly concentrated state by the synchronous admixture during distillation of sulphuric acid. The distillation of the acids continues about twenty-four hours, after which compressed-air is passed through the mixture to take up the nitrous acid. Roughly speaking, the acid mixture is then mixed with the glycerine in large vats of ice-cold water, a process attended with much danger, as the reaction developes much heat, and the inflow of the glycerine has to be regulated with the greatest care, the workmen attending to the process each keeping a thermometer constantly in his hand, and if too much heat is evolved the mechanical mixer or dasher is made to revolve more rapidly. If the rise of temperature cannot be checked the mixture is instantly run off into large vats of water and drowned. If the mixing is successfully completed the nitro-glycerine settles to the bottom of the mixing-tank, and is covered by six feet of water. It is then drawn off into other vats, and subjected to five different washings. It is next poured into crocks, allowed to stand for awhile, and after the impurities are skimmed off it is left a chemically pure, colorless liquid ready for packing. It is then put into tin cans and frozen, after which it is ready for storage in cold magazines, or for transport in very carefully devised packages.

For use nitro-glycerine must be thawed, and it is the careless thawing of cartridges by ignorant or forgetful workmen that caused the many disasters in early years which gave the mixture so bad a name, and led to prohibitory legislation against its use and manufacture, and, more happily, set inventors to devising mixtures of less harmful nature, in which its wondrous powers could be more or less fully utilized. These researches resulted in the discovery of dynamite or giant powder, forcite, lithofracteur, Brain's blasting-powder, Colonia powder, lignose, dualin and many others, and lastly explosive gelatine, which seems to promise to be the coming explosive for careful users.

Nitro-glycerine being a liquid has to be packed in metal cases, and thereby lies open to all the dangers of violent accidental concussion, which generally will produce an explosion, we say "generally," for a glass bottle of nitro-glycerine has been thrown against a rock without producing an explosion. On the other hand, at high temperatures, or with an impure compound which has begun to decompose, the dropping of a five-cent piece upon it is sufficient to cause a disaster. It was the impossibility of protecting nitro-glycerine in its liquid and, speaking broadly, non-compressible form that led to the invention of the dynamites and kindred compounds, the distinguishing common characteristic of which is a possibility of enduring a considerable amount of pressure without peril.

Dynamite is a mechanical mixture of *kieselguhr* or infusorial earth with from 30 per cent to 75 per cent of nitro-glycerine; the percentage of nitro-glycerine being greater according as the absorbent approaches complete saturation, and the compound in consequence, both more active in its effect and more dangerous to handle. As the infusorial earth is merely used as a container of the nitro-glycerine, and has no explosive properties of its own, this species of dynamite might be termed "safe nitro-glycerine." But there is another series of dynamites in which the nitro-glycerine is compounded with chemically-active absorbents, the effect of which is to retard the explosion slightly, accumulating the entire effect of the charge, and ensuring the explosion of every particle of the nitro-glycerine.

Dynamite is usually exploded by detonating caps of intensity varying with the grade of the dynamite used; it can also be exploded by concussion, by red-hot iron or by rapid heating to a high temperature in a confined space. In the open air a dynamite cartridge may be lighted safely, and will burn like a Roman-candle, but more slowly. It has been subjected to much rough usage in transport, and otherwise by men unconscious of what was passing through their hands; it has burned up in buildings — we remember one instance of a wagon-load of it catching fire in some way while passing through a Pennsylvania town, and while the inhabitants all scattered in dismay, the teamster, undisturbed, drove (very carefully, to be sure, so as to avoid any jar) out beyond the town limits, and then unharnessed his horse, and let the load burn up in peace; a mule loaded with it has fallen over a cliff, and though killed herself the shock did not produce an explosion, and in innumerable other ways it has stood such tests without producing explosion that should prove it to be absolutely safe, had not seemingly precisely similar adventures produced disastrous results. The best way is to treat dynamite with much respect, and to beware of any package containing it which exhibits any moisture — such moisture will be pure nitro-glycerine, and, consequently, an extremely perilous neighbor.

Wood-pulp is used as the principal absorbent in lignose, dualin, and several other explosives, but as it gives out very obnoxious gases when used in mines these compounds are less used than the more ordinary forms of dynamite.

Explosive gelatine is a gelatinous (when frozen) compound of collodion (dissolved gun-cotton), camphor and nitro-glycerine whose

[1] "*The Modern High Explosives,*" Nitro-Glycerine and Dynamite: their manufacture, their use, and their application to mining and military engineering. Pyroxyline or Gun-Cotton: the Fulminates, Picrates and Chlorates. Also the chemistry and analysis of the elementary bodies which enter into the manufacture of the principal nitro-compounds. By Manuel Eissler, mining engineer. New York: John Wiley & Sons, 1884. Price $5.00.

properties have not yet been fully investigated: but a report in the *Revue d'Artillerie* for 1879 states that it is insensible to shock, to friction or to the action of water, and does not decompose except at very high temperatures. To explode it an exceptionally powerful detonator is needed.

Apart from the general fascination which the subject of explosives exercises on the American mind — perhaps from recollections of the boyish delights of the early Fourth-of-July morning — this book is of a certain practical usefulness to the architect, especially to him who in the West has so often to act as engineer as well as architect. Much of practical use can be found in the chapters on "Big Blasts," and in those giving narratives of some of the most noted achievements of engineering where heavy blasting was necessary, and perhaps as useful as anything are the directions for blasting out piles and beams, and for throwing down buildings. The book is certainly interesting and well written, and seems to be complete and thorough.

PROFESSIONAL EDUCATION ABROAD.[1]

Lateral Entrance to the Panorama Building. Champs-Elysées, Paris. Chas Garnier: Architect

SO many years also have passed since I examined in detail the working of the schools of Berlin, Munich, Vienna and Stuttgart, that I may not be giving you the latest developments. The papers of the examinations held in Berlin for the degrees of *Baufuhrer* (building inspector) and *Baumeister* (architect) are published in our "*Transactions*" of 1859–60, and will show you the very high standard (much too high, I think, in mathematics) required there. I will only, therefore, explain generally the system of education in the above capitals of Germany and Austria.

German and Austrian Systems.— In Germany, or rather in Prussia, the student comes from the university or school with a good knowledge of geometrical drawing, or drawing from the cast, and of mathematics and physics. He first enters the office of an architect for one year, where he picks up what he can, as in England. He does not pay anything, his knowledge of drawing and of descriptive-geometry placing him in a position to be able to render assistance of value in return for the privilege of working there. He has then to pass a slight examination, and studies in the architectural school for two years. His attention there is turned to all the theoretical and practical points of the profession. He copies drawings made by well-known architects — if at Berlin, chiefly Schinkel's and Stüler's — and divides the time between making these copies and the composition of original designs (which are, of course, more or less adaptations of what he has learned in copying). He attends lectures on physics, mathematics, construction, ventilation and warming, sanitary science, and the principles and practice of estimating and writing specifications. At the end of the second year he passes an examination, and takes the title of *Bauführer*, or inspector. If he fails to pass he continues his studies. If he aims at a higher position he obtains an appointment on some Government building as an inspector or clerk (receiving a nominal salary) for three years, and then enters the school again in the first class to study for two years more, the studies being a very advanced kind. At the end of that time he passes an examination as *Baumeister* (literally "master of building,") and he then becomes a Government architect, or practices on his own account. At Munich and Stuttgart, the capitals of Bavaria and Wurtemburg, the practice still obtains, I believe, of studying one year in an architect's office before entering the architectural or polytechnic schools, as they are called. Two or three years are spent in the school, followed by examination. I am not aware whether the examination is recognized by the Governments of those countries.

In Germany, generally, architects and engineers study together in the same school; in France, architects, painters and sculptors.

In Vienna architects have their special academy; there are Classic and Gothic professors, with their respective *ateliers* or studios; in many cases the student passing from one to the other. There are complete courses of lectures, competitions in design, and examinations held at the end of each term, as in an English university or school. In 1863, or thereabouts, a new system of study was introduced which is worth notice. The senior students of the school, about twenty in number, make an excursion with their professor twice or three times in the year for a period of a fortnight or three weeks. They take up one or two important buildings and measure them, taking plans, sections, elevations and details (very similar to the work done in some of the series of excursions organized and carried out by the late Mr. Edmund Sharpe with the members of the Association). About £5 is allowed to each student by the Government, and his drawings become the property of the Academy. On returning to the school in Vienna, these drawings are worked out to a large scale, traced in lithographic ink, and reproduced, each student having a copy. Alternately with the making of these drawings they work out designs of their own, and naturally these designs are inspired with that feeling which they have imbibed when measuring and drawing the ancient edifices of the country.

So many years are spent in the German schools in training that comparatively few of the students make a Continental tour. In Vienna during one or two years after leaving the Academy the Austrian student travels through North Italy; and when the Quadrilateral was in their possession special facilities were afforded for the careful delineation of the finest works of the Italian Gothic and Renaissance styles. The superiority of modern architecture in Vienna to that in Germany generally I attribute to these Continental studies.

Before quitting the subject of foreign education it will be interesting to note that in Spain, throughout the length and breadth of the land, no one can practice as an architect who has not received the diploma of the Architectural School of Madrid. Except that the examination which follows after three or more years' studies in the school is preceded by a serious test in mathematics and physics I am unable to give you further information.

System of English Architectural Training.—May I venture to trespass a few minutes more to draw a parallel between English and foreign architectural training? The first great failing in England is that the student coming straight from school is not yet prepared to make that use of the practical training to be had in the office which is universally assumed. He has little or no knowledge of free-hand or geometrical drawing, of physics, mechanics, or any of the elements of architectural style; he flounders about, therefore, in the sometimes styleless design of the architect in whose office he may be placed, and acquires by the longest possible process a certain knowledge of a mixture of style and no style, second-hand; his powers of reasoning in design, as a rule, are not brought into play until his articles are terminated, and then want of time and absolute lack of training at once curtail his ideas and cramp his imagination. He has picked up an idea here and there in the office, and numerous details, but he finds himself unable to grasp the composition of a building of any size. In many cases he has never had an opportunity of visiting or studying any one of the buildings the drawings of which he has been continually at work on; and, therefore, supposing he has been thinking for himself, has never seen the results of his thoughts and inquiries (this observation applies more to London than to provincial students). He has, in fact, taken from three to five years to learn imperfectly what might have been learned in one or two if his mind had been previously properly trained to receive it.

French System.—If we turn now to France we find that foundation of knowledge laid which is wanting in England. Before the student enters any office his hand is trained to draw free-hand in the primary schools, and his mind developed with a knowledge of applied mathematics and descriptive-geometry. He enters an *atelier*, and the elements of style are learned in the *Ecole des Beaux-Arts*. Architectural drawing is carried to a high standard. Original designs are worked out, interspersed with instruction in construction of various kinds, and all the sciences cognate to architecture. The student works not so much in rivalry with his fellows as in *atelier* against *atelier*. This rivalry of the studios, which I described in the discussion following Mr. White's paper, is the most important feature in French architectural education. The isolated effort of one individual in rivalry with another may — nay, must — continually fail, because the development of style is not, and never can be, worked out entirely by one man. An original genius suggests a theory, a second carries it a little farther, by numerous others it is taken up, till at last this new idea becomes an established fact. A number of men working in one *atelier* form a school in friendly rivalry against others. Each student in it exerts himself to his utmost. The senior students advise the juniors in the study of their designs. The junior students in return work for the senior students, and acquire knowledge of style by so doing. The energies of both are brought into play, and this unison of feeling, this mutual co-operation enables the student to acquire great knowledge of style, rapidity of execution, and a serious study of design in a short time. In this we find the secret of the success of the French school, so far as it goes. Where, then, does it fail? It fails because a studio or *atelier* is not an office where work to be executed is drawn out, or a *chantier* where it is being carried out. Those students whose means necessitate their working for their living whilst their studies are continued from time to time at the school, do acquire that practical training which fits them for their vocation, and the most prosperous architects in the present day in France (and by prosperous I mean not those highest in rank, but who are the most sought after by clients), are not, as a rule, the past Grand Prix men, but those who commenced their practical training at an earlier period of their existence. On the other hand, it must not be forgotten that the high standard of design which exists in France is due to those architects who, in one sense, have sacrificed themselves and their prosperity (so far as a large income is concerned) by continuing their studies till they had

[1] From a paper by R. Phené Spiers, F. S. A., read at the recent Conference of Architects, London.

obtained the Grand Prix, and then devoting four years more to research and study in Italy and Greece. The important changes which have in late years been effected in the Ecole des Beaux-Arts show that the Government is fully alive to the defects in its system of education, and the practical character given to the *diplôme d'Architecte* may bring about an important change in the architecture of French buildings.

German System. — In Berlin this want of practical training is avoided by the student being obliged to study for one year in an architect's office before entering the school, and (if he aspires to the rank of *Baumeister*) by the spending of three years as inspector or clerk on Government buildings before he passes to his second and superior training in the school. Compared, however, with French education the German fails in art because he is linked with the engineer instead of with the painter or sculptor, and, further, by working in one *atelier* (viz. the school) and under one set of professors, the rivalry lies between student and student, and not between *atelier* and *atelier.* Add to this that the custom (whether it continues or not I do not know) of copying eternally the designs of Schinkel, his ceilings, staircases, cornices, etc., cramps the German architectural mind, and prevents its emancipation into a freer line of thought and imagination.

Educational Progress in England. — Of late years in England an immense progress has been made due chiefly to two causes: 1. The great development of the practice of drawing and measuring ancient buildings encouraged by the rewards of the Institute, of the Architectural Association, and of the Royal Academy, and the subsequent publication of such drawings in the *Architectural Association Sketch-Book* and other publications, and in the professional journals; and, 2. The extraordinary enterprise shown in the publication of drawings of actual modern buildings and of competitive designs in the professional journals of the day. Where all of them have been doing their best to supply a demand, it would be invidious to name specially any one of them, but there can be no doubt that the immense development and freedom of architectural design during the last ten years in England, and the rapid advance in draughtsmanship, is more or less due to the placing within the means of the poorest student a series of illustrations of the latest developments of architectural style. Two other educational sources must be here noted: 1. The meetings and classes of the Architectural Association, a society unique in its character, existing in no other country and in no other profession; and, 2. The Royal Academy, which, for obvious reasons, I should have refrained from mentioning, were it not to pay tribute to the services of those members of the Academy who, in late years as visitors, have given the students the advantage of their experience and of those other qualifications which have brought them among the elect. And here I venture to take this opportunity of rendering a personal tribute to the memory of one of our greatest artists whose loss we still deplore, the late Mr. George Edmund Street. The long experience I have had of architectural training enables me to judge, perhaps better than any one else, of the extraordinary value of the services which Mr. Street rendered in the Architectural School of the Royal Academy. The rapidity and range of his grasp of such subjects of design as were being worked out by the students, the wonderful fertility and originality of his mind, and the peculiarly happy way in which he (accepting the scheme of the student's work) turned it from bad into good architecture, and in a few minutes gave him the benefit of forty years' experience, promised to lay the foundation of a school of architectural designers in this country which would have left its mark in the architecture of this last quarter of the nineteenth century. His career as visitor in the Architectural School was, alas! too short, but the influence of his work remains with us; and among those who, in addition to his advice in the Academy, received their architectural training in his office, there are some who have already taken a foremost place in the profession, and others who are, I trust, destined to do so.

THE ILLUSTRATIONS.

CLUB-HOUSE OF THE PENINSULAR CLUB, GRAND RAPIDS, MICH. MR. B. L. GILBERT, ARCHITECT, NEW YORK, N. Y.

The site of the present club-house was purchased in August, 1882, the price paid being $13,000. The building as it now stands cost about $22,000. The site is 66′ x 99′ in size.

The structure is of dark-red brick, with Ohio-stone finish the wall up to the water-table being rock-faced. The roof is of slate. The third or attic floor is designed for members' rooms, but has not been finished. The vestibule is shut in from Fountain Street by an iron gate. The walls on either side are of enamelled brick, relieved by coloring of white and blue where the finished wall meets the dull brick of the main arch. The ceiling is of colored Tennessee marble, in panels of different shades. The staircase hall is finished in oak, and the decorations are principally in red and bronze, producing a warm, cozy effect. The walls are of a uniform shade of dull red. On the Fountain-Street side is a massive stone fireplace with swinging crane. Above the arch, in old English letters, is the old Scotch phrase, "Weal befall hearth and hall." Opening into the hall from the west is the reading-room. The general treatment here is more varied than that of the hall, there being a greater contrast of colors. The walls are finished in oil combed-work, the monotony being broken by simple uniform figures which differ sufficiently in tint from the main coloring to relieve the eye. The ceiling is panelled in solid relief, with a large oval centre-piece of blue. The frieze is more pronounced in tint. Three large windows, two with broad arches and all with transoms, stained in Moorish design admit the light. At the north end of the room is a huge fireplace. The hearth and arch are of brick, and the shelving top of the mantel reaches to the ceiling. The hearth extends across the entire width of the room, and benches with carved arms face it, except where the fireplace intervenes, on three sides. Above the arch are the words, in old English, "Good fire, good friends, good cheer," reading up and down. The chandeliers here, as elsewhere in the structure, are of cut-glass with opalescent globes. The rods and standards are of brightly-polished brass, and are neat yet plain in design. The doors are mounted on anti-friction rollers, and are not intended to be kept closed. Handsome *portières* with gold threads and rich borders are hung so as to be drawn across the entrance. Opening from the intermediate landing of the stairway is the reception-room. The colors here are principally blues and grays, the wood-work being of California redwood. To the east of the main hall and opening into it is the general dining-room, which is finished in olive tints. On the west end of the second floor are the parlors, finished in olive tints. Over a wide fireplace at the north end, in old English letters, are the words, "The Peninsular Club." Two card-rooms occupy the Fountain-Street side of the building on this floor next the parlors, both being finished in slate tints, trimmed with butternut. The billiard-room occupies the entire east half of the second floor. It is finished in warm chrome tints, with sufficient blue to produce a pleasing effect. The room is about 30′ x 32′ in size, and the ceiling, finely traced with vines and flowers, is 22′ high. It is lighted by five large windows opening on three sides. The upper hall is finished in dark colors, and contains a large eleventh-century mantel. The wainscoting is high here, as elsewhere in the house, especially in the billiard and dining rooms, and carved spaces in the border show a scarlet background.

Messrs. G. H. Davidson and F. C. Miller had the brick, stone and wood work contracts. The decorating was done by Mr. Wm. Wright, of Detroit. The heating apparatus and gas-fixtures were supplied by Shriver, Weatherly & Co.

THE "PLAZA" APARTMENT-HOUSE, NEW YORK, N. Y. MR. CARL PFEIFFER, ARCHITECT, NEW YORK, N. Y.

This family-hotel is now in course of erection, facing the square known as the Plaza, on the west side of Fifth Avenue, between Fifty-eighth and Fifty-ninth Streets, affording a fine view of Central Park and its Fifth-Avenue entrance. Its dimensions are 200′ on the Plaza, 125′ on Fifty-eighth Street, and 175′ on Fifty-ninth Street. It is owned by Messrs. John D. Phyfe and James Campbell, who are also the builders of it. The cost of the building will be about $1,200,000. The building is to be thoroughly fire-proof; it will have an under-cellar, basement, eight stories, and an attic for servants and other rooms. The greater part of the basement is to be occupied as stores and offices; the eight stories above the basement are arranged for thirty-six apartments and a restaurant, from which the occupants can be supplied with meals in their own dining-rooms. The apartments of the central portions of the Plaza front are two storied; the parlors, libraries and dining-room on the floor below that of the bed-rooms. Each apartment is also arranged to have a private kitchen. There are three elevators for the principals of the house, and three for the servants and baggage. There are three main stairways, and three for servants; the main stairs are to be of marble, and the servants' stairs of iron. All rooms have direct sunlight and air; there are no light-shafts. Provisions are made in the plans and in the construction of the building so that it can be changed to suit the requirements of a regular hotel. The basement and first story are faced with stone, the upper stories will be faced with the best of Philadelphia or Baltimore pressed-brick, relieved with stone, moulded brick and terra-cotta. The roof will be made of iron beams and brick arches, and be covered with brick pavings, so as to afford a promenade for the occupants of the house who, at the same time, can enjoy fine views of Central Park and the surroundings of the city. The roof, although 125′ above the sidewalk, will be easy of access, as all the elevators extend up and above it. The tower at the angle of the Plaza and Fifty-ninth Street terminates with a lantern, the floor of which is 170′ above the sidewalk.

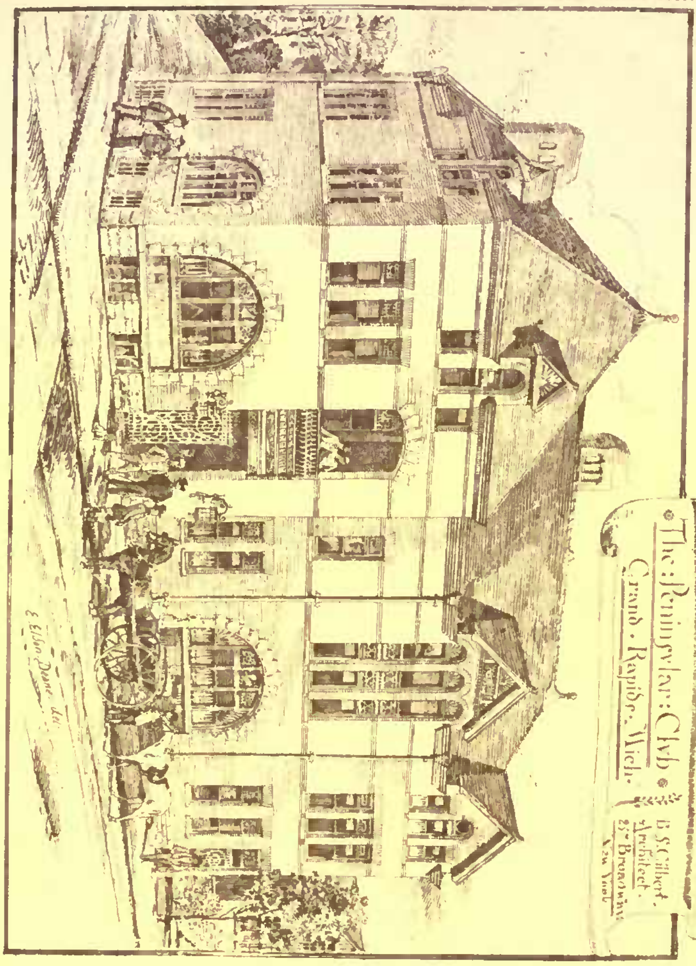
THE LUTHER MONUMENT, WASHINGTON, D. C.

This monument is set up in a little park in front of the Memorial Lutheran church, at intersection of Fourteenth Street with Vermont Avenue, and was unveiled on May 21, 1884. The statue is in bronze, and was cast at Lauchhammer, Germany, from the model of the colossal center figure of E. Rietschel's Luther monument at Worms. The pedestal, of solid granite blocks, is by Cluss & Schulze, of Washington, architects.

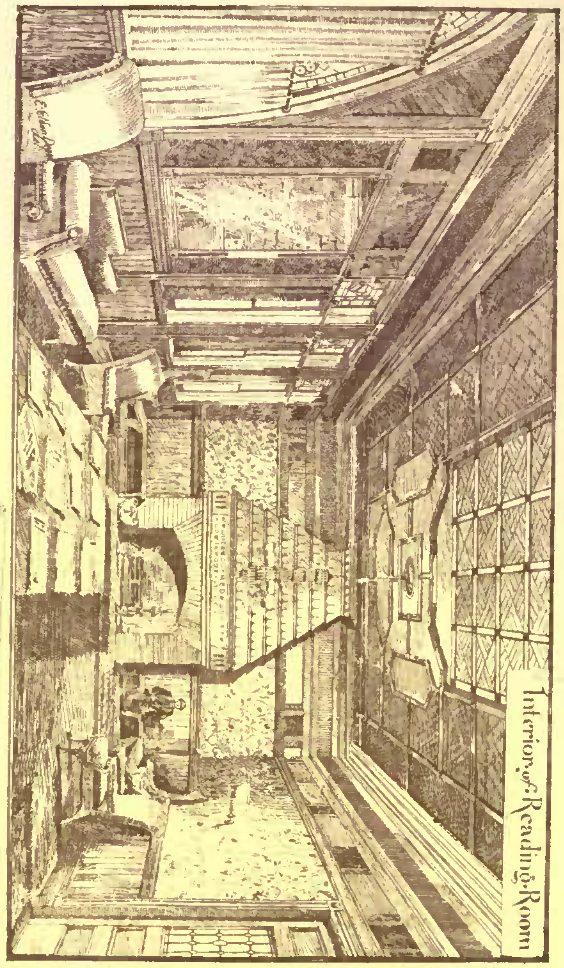
The cost of the monument was defrayed by the Luther Statue Association of New York, consisting of admirers of the great reformer.

COMPETITIVE DESIGNS FOR THE GARFIELD MONUMENT, CLEVELAND, O.

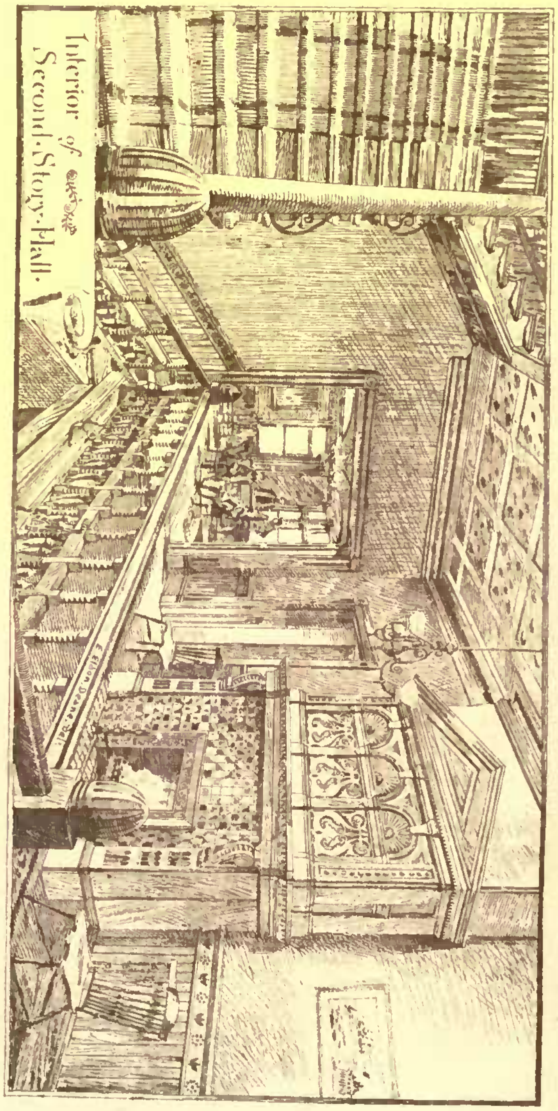
As we have seen no adequate description of the designs to which

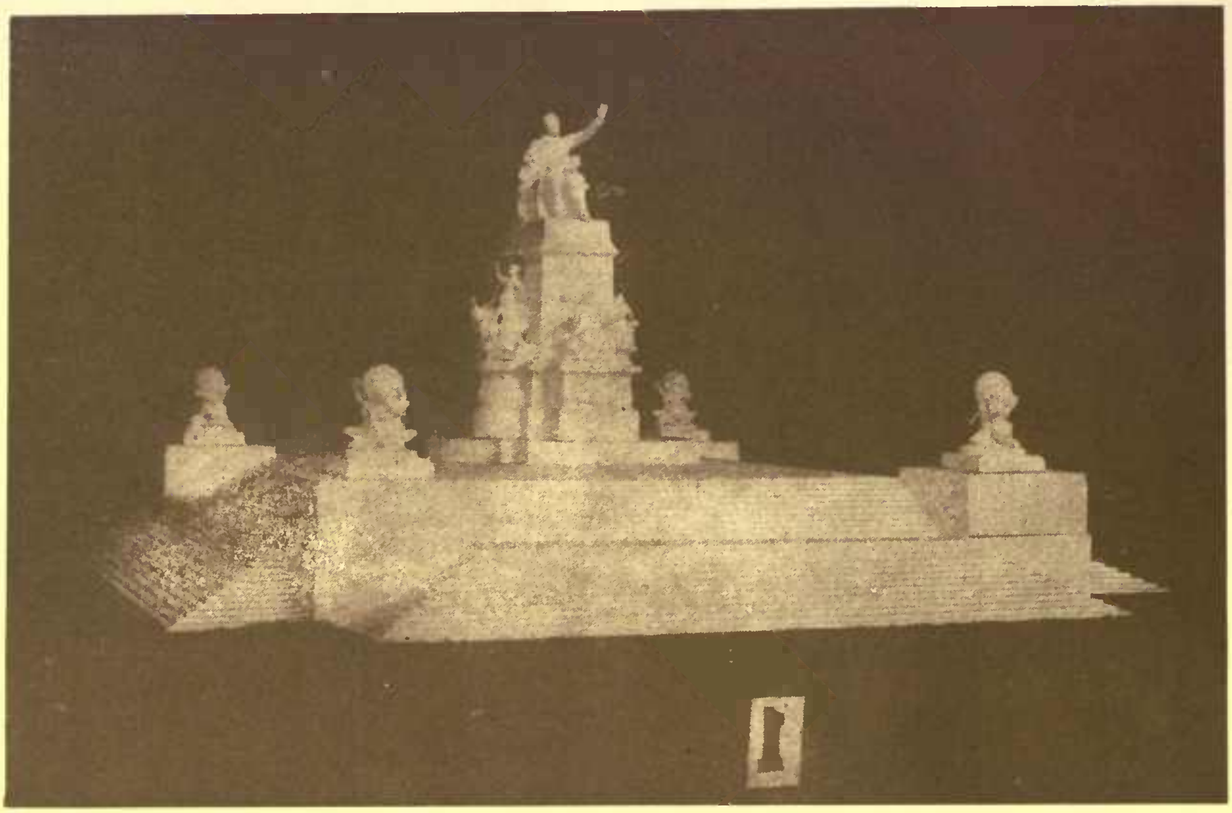


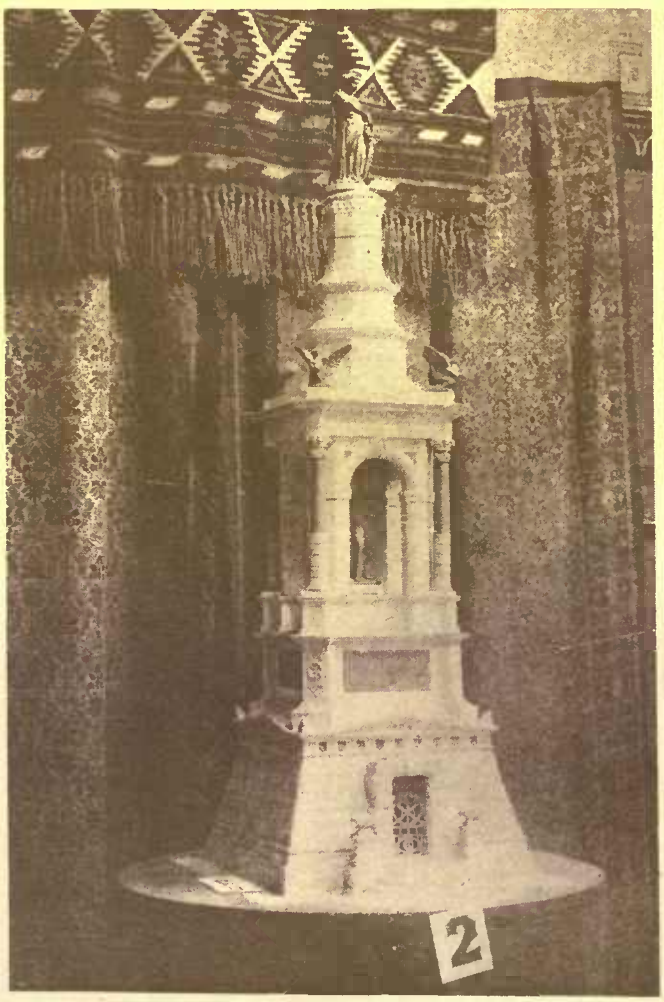
The Peninsular Club Grand Rapids Mich.


Interior of Reading Room


Interior of Main Hall

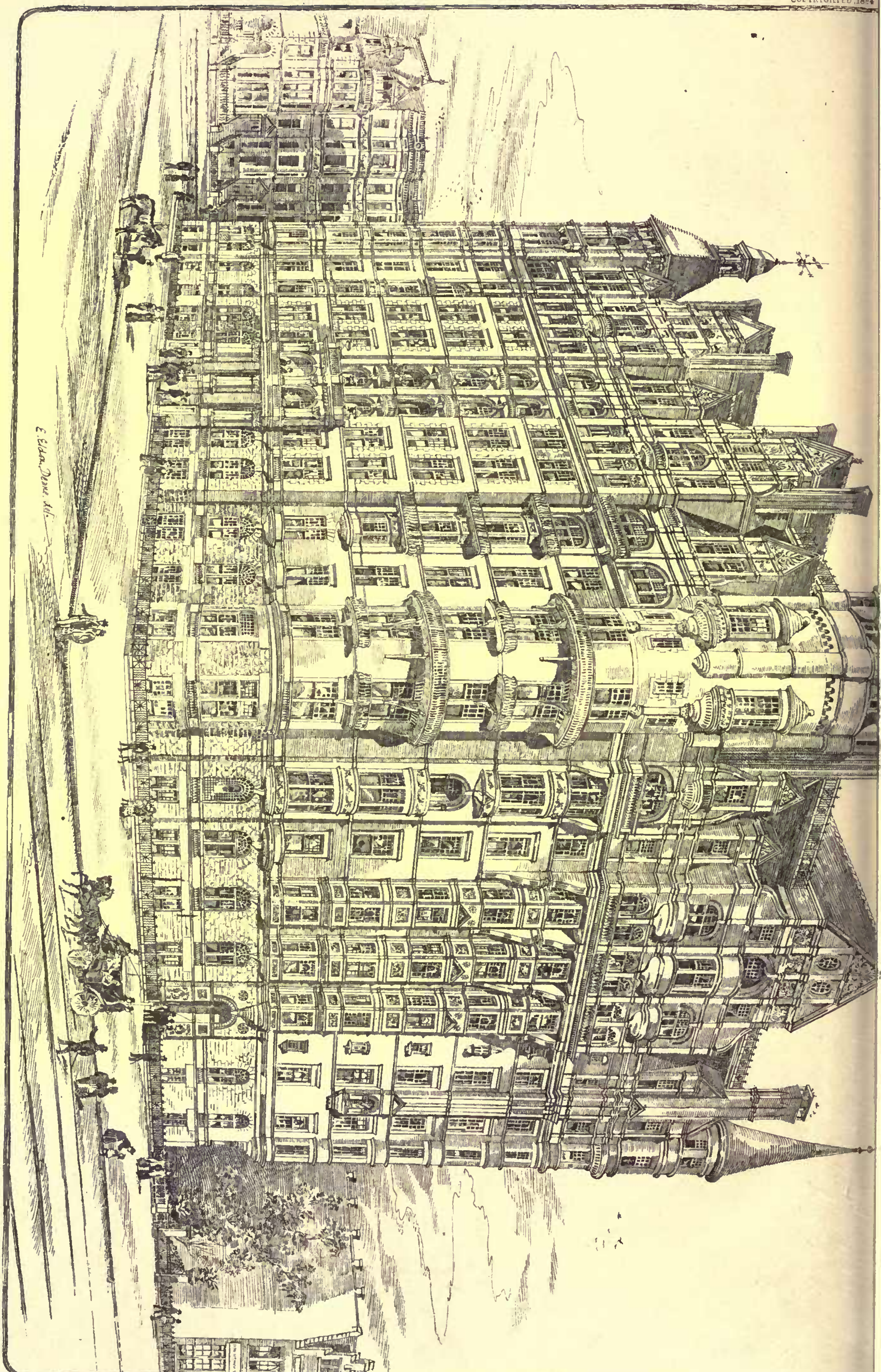

Interior of Second Story Hall



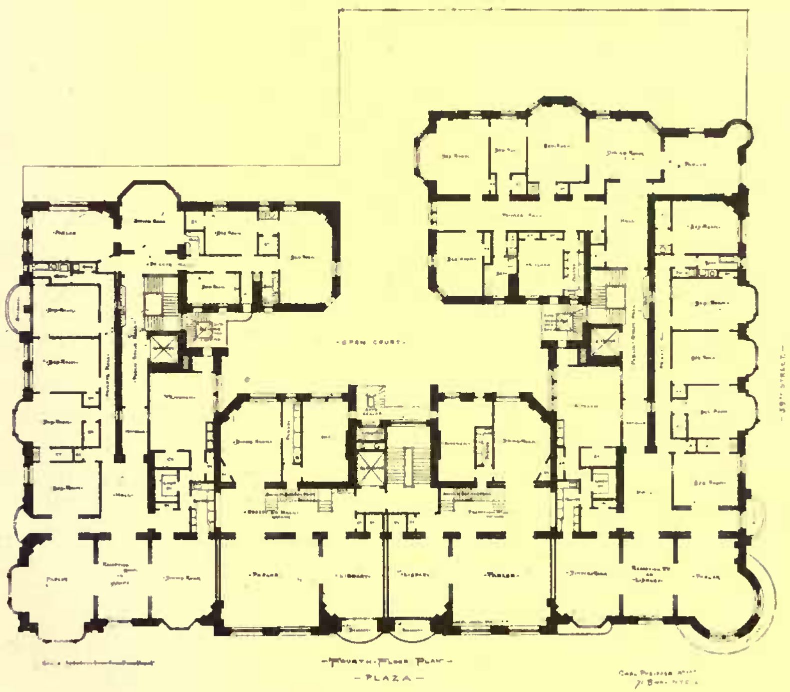


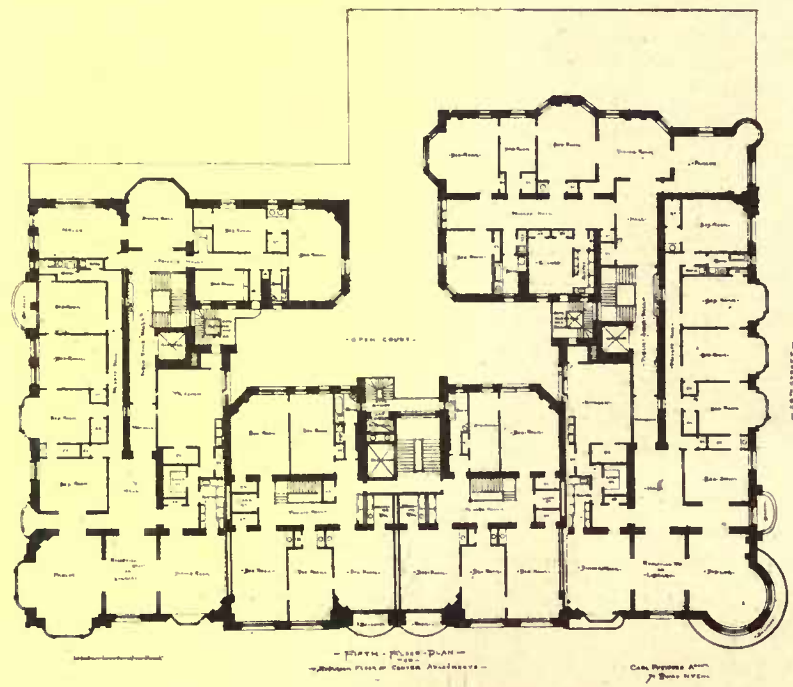
Competitive Models for the Cleveland Garfield Monument

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

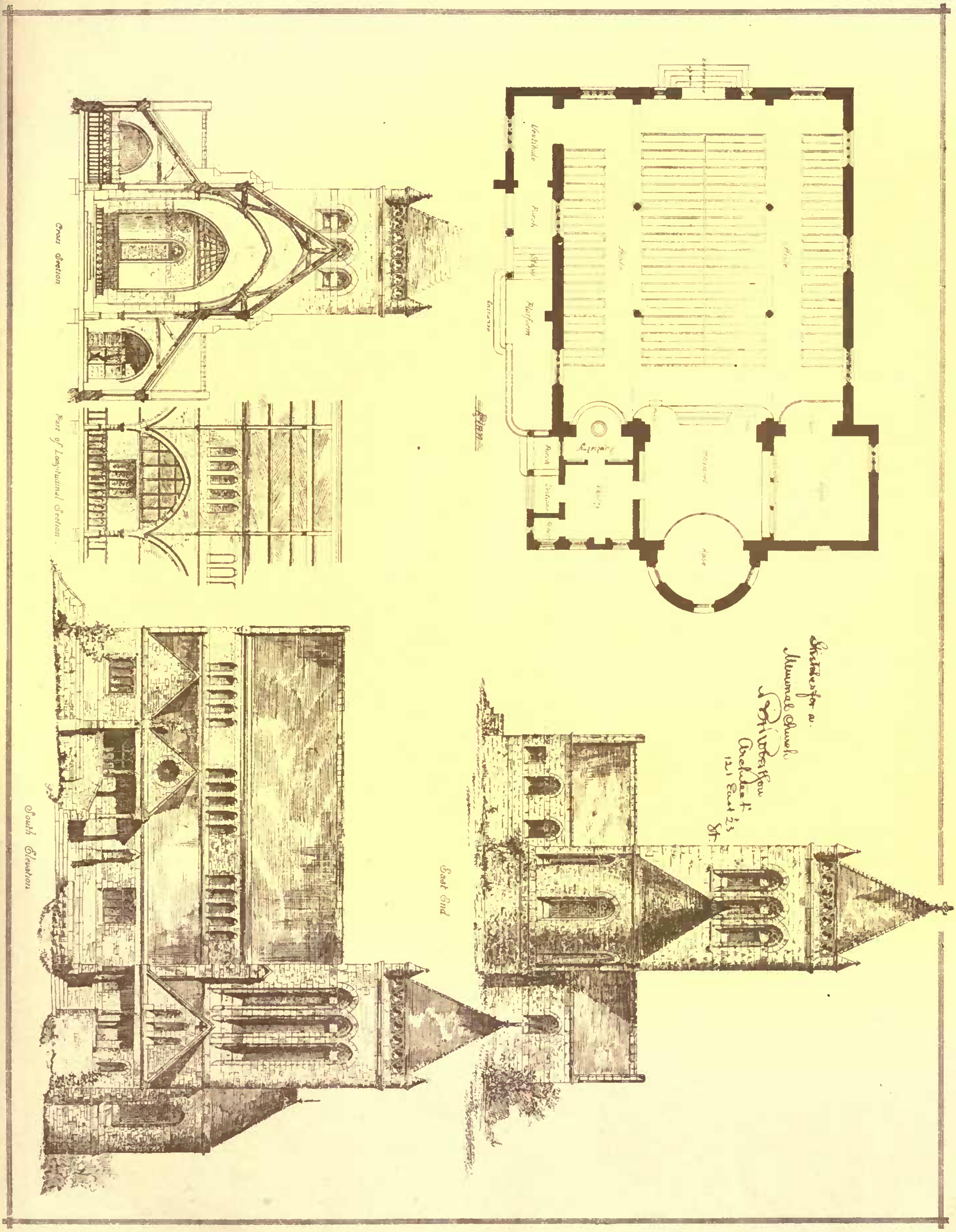


The Heliotype Printing Co. Tremont St. Boston.





The Plaza: Apartment: House:
1. Fifth Ave: between 58th and 59th Streets
New·York·City. Mr. Carl·Pfeiffer·Archt.
Messrs. Phyfe & Campbell: Owners:



The Heliotype Printing Co. Tremont St. Boston.

E. RIETCHEL, SCULPTOR.

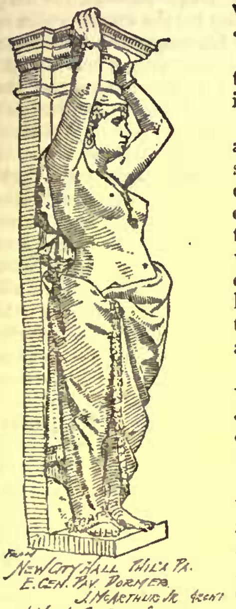
CLUSS & SCHULZE, ARCHTS.

The Heliotype Printing Co. 211 Tremont St. Boston.

have been assigned the prizes in this competition — which were awarded last week — we are unable to say whether either of them is included amongst the models published to-day, or in our last issue. The first prize was awarded to Mr. George Keller, of Hartford, Conn., the second to the Messrs. Schweinfurth, of Cleveland, O., and the third to Messrs. Moffitt and Doyle, of New York.

SKETCH FOR A MEMORIAL CHURCH. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

STRENGTH AND WEAR OF BUILDING MATERIALS.



THE question of the rapid crumbling and disintegration of mineral building materials, is one that architects and builders throughout the entire country should be interested in.

A sample of material may respond favorably to all the known tests to determine its strength and elasticity, and still show evidence of short life when placed in the walls or foundations of a building. Especially is this true as regards stone. To begin with, when we estimate the value of any variety of stone for any specific purpose, we must keep in mind the circumstances and conditions around and under which it is to rest, and do service :—

1st. In the average climate of America it will have to bear in the direct rays of a July sun, a heat of 120° Fahrenheit on the outside, while inside it may not be more than 70° Fahrenheit.

2d. In winter it may be exposed to an exterior temperature of 20° Fahrenheit below zero, and an interior heat of 70° Fahrenheit above zero, or 90° of difference; and though mathematics is of no aid in enabling us to determine and point out that fine point where these opposite forces of contraction and expansion meet, that we may partially provide for it in the upward and downward pressure, it amounts to the most gigantic force known, which has an effect in destroying the molecular cohesion of the particles constituting the stone. It must give to one side or the other under the enormous force applied on that side, and reversed on the other, besides the great pressure to which it is constantly subjected by the stone above, and the resistance afforded by every stone from the very foundation until it is reached.

3d. The great majority of building-stones show upon analysis traces of calcium, terrous oxides, etc. The larger number of buildings constructed of stone are located in cities and towns where coal is used for fuel, the fumes of which coming in contact with an atmosphere already impregnated with other elements, forms those acids and gases, which uniting with the elements of the stone cause disastrous results.

It is no wonder, then, that immense walls, apparently compact and homogeneous open in cracks, split off in layers, and burst in pieces.

4th. A stone newly taken from the quarry loses in weight by exposure by the evaporation of its natural moisture; this leaves all these minute interstices or pores invitingly open to rains and atmospheric moisture; hence when the frosts of our northern winters come, it is no wonder so many walls are out of line, and unsafe without repairing or renewal. This force of frost during the past winter, even in the South, puts to shame the power of a Corliss engine or hydraulic press.

The dilapidation produced by alternate freezing and thawing; the changes from protracted droughts to incessant moisture; from excessive heat to cold; the difference of temperature at the same moment between the opposite sides of the same block, the tendency to split off, and the lamination of unequal densities, and many more, are all grave obstructions to the use of building stone in this climate that would sink into comparative insignificance in other countries.

That many buildings become unsafe, and innocent persons get the blame, there is not the least doubt. A magnificent structure falls with a crash, the builder is berated, the architect censured, when if the truth was known, in many instances the silent, subtle influences mentioned above had been at work, and no one was to blame.

Before proceeding farther with our discussion, we will consider the condition of material under pressure, and subjected to tension.

If we take a piece of wood, and carefully estimate the force required to tear it asunder, we will notice that lengthwise of the grain requires the greatest force. If we subject it to pressure across the grain, for every degree we bend it we find this resistance increased 11.617 per cent (an average of thirteen varieties of wood tested), increasing in direct ratio until sufficiently bent to displace its molecules, when, of course, its strength decreases rapidly. Timbers, then, subjected to a certain tension in a building will outwear those not subjected to it. Again, a timber bearing a certain number of tons of weight for a certain length of time, will bear a much heavier weight without being unsafe, than if the timber having lain idle, as it were, should afterwards be loaded. This increase of strength is quite striking, as may be proved by the following experiment:—

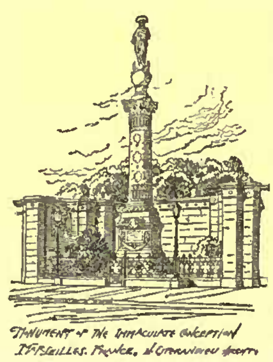
Three pieces of some brittle wood, carefully made of equal size, are placed side by side, with the ends resting on some firm base, and on one is placed 100 grams, and on another 500 grams, and they are then left for a week or more in a warm, dry situation. The one bearing the greatest weight will have bent the most, and will bear more added weight than the more lightly loaded piece, while the same weight placed on number three will break it. This proves conclusively that a certain weight placed on a timber, renders it capable of bearing one still greater subsequently. A timber with all it will bear without displacement, will actually bear more additional weight subsequently, and keep on increasing in both its wrenching and tensile strength than if it is laden one-half as heavily at the outset.

Viewed with the microscope we find that the instant wood is bent out of the true the fibres become closer at the bend or angle. Now if the pressure is continued just far enough to bring these in actual contact without force sufficient to mar or bruise them, they adapt themselves to the situation, and are absolutely *glued together* by the gummy substances liberated by the cells ruptured in the bending.

Furthermore, timbers subjected to pressure will decay less rapidly then when not. A stick of lancewood bent double, and the ends made secure, and the same exposed to the influences of decomposition will show the effects much sooner in those portions not bent, than where the sharp angle appears; moreover, a stick actually broken in bending will not rot so soon at the break as at some distance from it, and fungous growths rarely appear at the point of bending as soon as elsewhere.

At first sight it would appear that, subjected to constant pressure, wood would undergo the same change as iron, but experience has demonstrated the contrary. In some of the ancient ruins of Europe we notice this fact: that those portions which apparently sustained the greatest pressure, such as roof-trusses, gables, etc., were in a much better state of preservation than the joists which were merely supports for nailing, etc. All who have visited "Duckey Hall," in Lincolnshire, will recall, perhaps, in the east wing of those massive ruins, some bits of curved cornice apparently in an excellent state of preservation, while all around has long shown evidence of advanced decay. For a long time it was supposed that this round coping was of metal, but when a few years ago this wing or tower blew down it was found to be a species of deal, which had been forcibly bent and secured while green,— probably, at the time of the building of this castle, little if anything was known of steaming,— and when these boards were released from the pressure to which they had been submitted for centuries, they began to take their original or straight form; of course, but partially; nevertheless, the ends sprang apart nearly an inch when liberated, showing conclusively, that with all the influences which had been at work destroying the adjacent woodwork, these boards subjected to this pressure had not lost their power of attempting to return to their original shape. J. F. E.

INFECTIOUS DISEASE AND FURNISHED HOUSES: A LEGAL CASE.

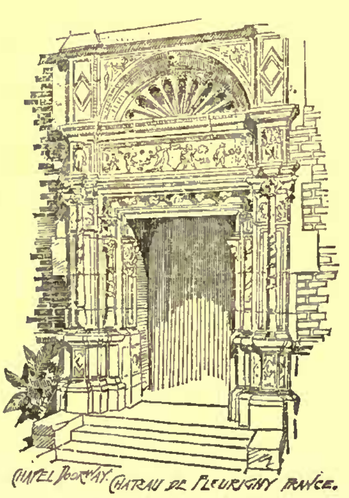


THIS was a case of great interest and importance to all persons taking furnished houses or apartments, as illustrating the risks of infectious disease occasionally incurred under those circumstances. The evidence was to the effect that in March, 1883, Lady Greville was desirous of taking a furnished house in town for the season, and entered into negotiations, through Mr. Elgood, a house agent in Wimpole Street, to take the plaintiff's house, No. 25 Montagu Square, the plaintiff being at that time on the point of leaving for America. After seeing the house, Lady Greville had a conversation with Mr. Elgood, in the course of which he stated that "he thought the house would suit her," and, on or about March 13 an agreement was signed by which Lady Greville agreed to take the house from March 28 to July 1 at fourteen guineas a week. On March 10 it was found that a child of the plaintiff's was ill. Dr. Sewell, who was called as a witness for the plaintiff, saw the child about half-past nine in the morning of that day, and pronounced the disease to be measles. No mention of the fact was made to Lady Greville, although it was on this very day (March 10) that Mr. Elgood wrote to her ladyship accepting her offer for the house. A day or two after the agreement was signed, Lady Greville again came to see the house, and finding the child in bed upstairs in a darkened room, according to her own evidence, asked the nurse what was the matter, adding, "nothing infectious, I hope." To this the nurse replied that it was "only a cold." Subsequently Lady Greville learned by accident that the child was ill with measles, whereupon, on March 20, she telegraphed to Elgood that, having heard that there was measles in it, she must decline to take the house. Mr. Bird himself had left for America on March 15, and nothing further passed between the parties until his return in August, when he wrote to Lady Greville, making a claim for £205 16*s*. as fourteen weeks' rent of the house, for which the present action was brought. The defence rested on the ground that it was an implied condition in the contract that the house was then in a habitable condition, and that the contract was avoided by fraudulent misrepresentation on the part of the plaintiff. Counsel for the plaintiff contended that it was sufficient if the house was in a habitable condition at the date of the commencement of the tenancy — namely, March 28 — and in support of this argument medical and other evidence was given to show that after the child was removed, on March 21, the room was thoroughly cleansed and aired, the curtains and other hangings removed, and the floor washed with disinfectants, and that by these precautions all risk of infection was at an end by March 28, if not earlier. This evidence was rebutted by medical evidence for the defendant, to the effect that, unless far more extensive precautions had been taken, the room would not be safe for occupation until a month after the child left it. It was an unfortunate feature in the plaintiff's case, on which the learned judge commented very strongly, that the house had been, in fact, let for a considerable portion of the time for which rent was claimed, though no notice was given of the fact to Lord Greville or his advisers until the plaintiff's counsel, in opening his case, were obliged to admit the greater portion of the claim to be untenable for this reason.

Mr. Justice Field, in giving judgment, expressed in very strong terms his disapproval of the conduct of the plaintiff in concealing the fact that there was infectious disease in the house down to and after the time when Lady Greville saw the child ill in bed. After reviewing the facts of the case, his lordship went on to say, with respect to the questions of law involved, that that relating to the alleged fraudulent misrepresentation was unnecessary for him to decide. It was well established by several cases (which his lordship cited) that it was an implied term in a contract of letting a furnished house that the house was in a fit state for occupation at the commencement of the tenancy. It followed from this that the question for a jury would be, Do you think that the premises were, on March 28, in such a state as to be fit for habitation? The learned judge then considered the evidence bearing on this question, the result of which, he said, was that it was uncertain how long the danger of infection would last, and that being so, he could not say, after the child had been ill in the room from March 10 to March 21, that on March 28 the house was in such a state that a person could live in it without risk. His conclusion, therefore, was that the defendant was entitled to judgment.

Judgment was given for the defendant accordingly.

THE BUILDINGS OF THE LATE DUKE OF PORTLAND, AT WELBECK.



LITTLE imaginative penetration is required to discover the reason why the traditions of the grand old forests of England are immemorially mingled with the associations of royalty. While Sherwood boasts of its Robin Hood, it can also lay claim to the patronage of King John, whose hunting palace in the woods partly exists to this day; and while the New Forest clings to its traditions of Rufus, Epping Forest remembers the royal lady who, above all preceding kings and queens, has so wisely and lovingly guided the destinies of this great nation. Around these arenas of sport we find the "stately homes of England," about which Mrs. Hemans sings so delightfully; and in Sherwood Forest especially is this the case. Its glorious leafy domain comprises the seats of the Dukes of Newcastle and Portland and the Earl of Manvers: while on the long line of contiguous forest which stretches from Mansfield to Nottingham is the beautiful ivy-adorned abbey where Lord Byron sighed and sung of his adorable Mary; and Beatwood Lodge, one of the seats of the Duke of St. Albans; with Hardwick Hall, "more glass than wall," (the seat of the Marquis of Huntington); and Bolsover Castle, the fantastic erections of the "ever-building" Elizabeth, Countess of Shrewsbury, skirting the forest as it merges into the corn-growing vales of picturesque Derbyshire. Few of the forests in this kingdom can claim to find room for palaces of such noble heritage, and in each case the ducal mansions, environed by gigantic oaks and undulating parks, are to the forefront for magnitude and beauty. Undoubtedly the oldest of the group is Welbeck Abbey, the seat of the Duke of Portland, a mansion constituting the wonder of which we wish to speak. It is the *chef d'œuvre* of human eccentricity, a palace as labyrinthine as Mount Ida, a gorgeous specimen of perverted ingenuity as perplexing as it is astonishing. Originally is was a monastery for monks of the Præmonstratensian Order, and, like all structures devoted to the "mortification of the flesh," it is situated in a goodly vale surrounded by a thickly-wooded barrier, with every forest luxury obtainable at a moment's notice. As a work of architectural art little need be said; but the proportions are ample, and what it lacks in external grace is compensated for by internal comfort. The great work of reconstructing Welbeck was undertaken by the "Invisible Prince," as the late Duke of Portland was called, and was far from complete at the time of the eccentric nobleman's death. For years he spent his princely income, amounting from land alone to upwards of £175,000 per annum, in the reconstruction of the Abbey, and enough of the work was finished at his death to make the house one of the most extraordinary buildings in the world. Five years ago Welbeck was like a "sealed book," and the fortunate visitor who had penetrated the mysterious region felt as elated as if he had discovered the Northwest Passage, and did not fail to retail his experiences on every favorable occasion. Shut up in his favorite library, the invisible Duke pursued his daily avocation of planning and plotting — planning for the construction of some ingenious marvel, or plotting to keep his magnificent mansion more completely secluded from the eyes of the vulgar world. At that time upwards of one thousand artificers were employed on the estate; so that to keep the Abbey from the rude gaze of even his own workmen required a stretch of genius which in its accomplishment has never been surpassed. Across the park the workmen were in the habit of passing to their homes at Creswell, Whitwell, and Worksop, and the occasional glances they gave at the ducal residence disturbed that feeling of seclusion which the owner desired, and consequently ingenuity was taxed, and cost disregarded, in the attempt to make the mile-and-a-half foot-path across the park as joyless as possible. Following a strange inclination for subterranean construction, the late duke hit upon the expedient of making a tunnel across the park, so that his army of workmen could pass to and fro without disturbing the serene repose which he longed for; and in the famous Welbeck Tunnel he created — what Mr. Gladstone has endorsed — one of the wonders of the world. The structure is as wonderful as it is gigantic. During the day it is lighted by enormous plate-glass bulls-eyes, superseded at night by hundreds of gas-jets. The floor is excellently asphalted, and the tunnel is high enough and wide enough for carriages to pass along. It was over this subterranean roadway that the Prince of Wales was conveyed when he honored the present Duke of Portland with a visit at the latter end of the year 1881. Nothing more effectual could have been designed for the object the eccentric nobleman had in view. Stepping into the tunnel during the hot days of summer, the traveller feels as if he had walked into an ice-house, and the whole length of its interior can be traversed without catching the slightest glimpse of the Abbey or the beautiful park under which it passes. Walking through the park, the pedestrian can trace the tunnel by means of the skylights referred to, as it passes under clumps of trees and groves of rhododendrons; and the same idea of burrowing is carried out in the well-appointed lodges scattered over the huge domain.

Under and about the Abbey, however, the Duke displayed the most brilliant capacity for subterranean construction. The private tunnels and underground apartments attached to the Abbey are indescribable specimens of costly thought and princely effort, and afford the most astonishing indication of the eccentricity which marked the career of the late Duke of Portland. In these labyrinths the noble owner could pass from one building to another in all sorts of weather, and appear at any moment at a required spot without giving warning of his approach. The perfectly constructed passages lead to an underground suite of rooms of extraordinary magnificence. Upwards of £20,000 to £30,000 were spent in draining and preparing the ground for this palace of Aladdin, and the work was carried out with a total disregard of the cost. A subterranean ball-room, 166 feet long, forms part of the number, and for festive delight it would be difficult to imagine a more perfect apartment. The walls are hung with mirrors of great value, with beautifully adorned alcoves wherein the "whirlers" can retire and seek seclusion from the arena of gaiety. The decoration is artistically pleasing, and the visitors can roam about from one underground conservatory to another, or be "lifted" without effort to the upper air. The doors are of enormous weight and size, and, like the famous Chatsworth "garden gate," are so perfectly hung that they respond to the lightest touch, and close with a precision accurate and astonishing. Through these subterranean apartments the visitor can roam until wonderment becomes entirely satiated; passing through a magnificent library into a spacious billiard-chamber, with reception-rooms and writing-rooms in proximity to these superb *salons* of delight. In every detail the most refined taste has been displayed, and the furniture compares favorably with the elegance of the decorations. The absence of fireplaces is a notable feature, the underground palace being warmed without visible flame or annoying draught.

Passing along one of the underground passages which honeycomb the foundations of the Abbey, the visitor reaches the handsome structure which is generally known as the Duke of Newcastle's riding-school. This Duke of Newcastle, a staunch Royalist during the Parliamentary struggles, lived to be richly rewarded for his loyalty to the Stuarts, and built a considerable portion of Welbeck, including the riding-school referred to. He was esteemed a cavalier *sans peur et sans reproche*, and produced a treatise on horsemanship which was considered a valuable addition to the equine knowledge of that time. The marriage of his granddaughter gave Welbeck to John Holles, Earl of Clare, subsequently created Duke of Newcastle. The only daughter of this nobleman was given in marriage to the second Earl of Oxford and Mortimer, whose only daughter married the second Duke of Portland, and brought the Welbeck estates to the already opulent Bentincks. The riding-school, with which the Cavendish Duke of Newcastle was associated, was not constructed on strict lines of architectural beauty, and was afterwards converted into a picture-gallery 182 feet long and well-proportioned. The four great glass chandeliers in this vast apartment, each weighing a ton, are perhaps the most noteworthy features, and it was in this awe-striking room that the last Duke of Portland piled his magnificent collection of paintings, the works of the most celebrated masters of the Flemish and Italian schools, against the wainscotting, to mildew and rot in their undignified oblivion. Beneath the oaken floor immense wine cellars were constructed, with cast-iron bins, and subterranean passages to connect the cellars with the principal rooms, and an underground railway to complete the display of ingenuity and eccentricity which everywhere abounds.

Another underground excursion through one of the most "inviting" tunnels, if such dark passages can be so termed, ends at the new riding-school, built by the "invisible nobleman" to supersede the one just described. Externally the edifice presents the appearance of a gigantic public hall, and is of massive and portentous aspect. Undoubtedly the building is the finest riding-school in the world, and an internal view is absolutely startling. A perfect forest of columns serves to support the finely arched roof, and the bewildered spectator would immediately come to the conclusion that he had been suddenly transported into a large railway station, if it were not for the artistic features which prevail throughout the interior. The roof is of glass and highly ornamented iron, with cornices beautifully decorated with foliage and fantastic groups of birds and beasts. The school is 379 feet in length by 106 feet in width, and 50 feet in height, so that some idea may be gained of its enormous capacity; and some fifty horses can easily be exercised within its area. Upwards of 8,000 gas jets are employed to illuminate the building, and when so illuminated a sight is presented which is truly marvellous. A little farther on are the stables, coach-houses, etc., and the covered "gallop" of 1,000 feet long — another of the wonders of Welbeck. Around these buildings are picturesque dwellings, forming a little village, and chiefly occupied by stablemen and others. The houses are models of elegance and comfort, and as much care has been bestowed in their construction as in any of the marvels which are everywhere present in the vast domain. Not less remarkable are the extensive kennels, the cow-yards, cow-houses and dairies, while the gardens of Welbeck, stretching down to the edge of the lake, with a peach wall a thousand feet long, and an avenue of fruit-trees of similar length, are features which no visitor would care to pass unnoticed.

The lake, which extends for a distance of four miles through the picturesque park, may be mentioned as affording an instance of the prodigality of labor and expense in the beautifying of the Norbertine monastery and its surroundings. Near the old portion of the Abbey, the lake dwindles to the proportions of a river, and an admirable asphalt skating-rink is constructed on one of its banks. The rink is about half a mile long and twenty feet wide, and during the lifetime of the "Prince" of Welbeck this pleasure resort was frequented only by the servants connected with the Abbey. In the centre for the rink is a model boat-house of rustic wood-work, with stores of skates, and rooms for dressing and refreshment.

Since the death of the eccentric nobleman, which took place a few years ago, to whose ingenuity and skill these marvellous achievements are mainly due, and the advent of the present Duke of Portland, a young man now about twenty-five years of age, and at the time of succeeding to the inheritance holding an important commission in the army, the palace of Welbeck has not been so effectually obscured from the eyes of the public. With a generosity which has earned its reward, the young Duke threw open the barred gates, and allowed the public to inspect a domain which for years had been invisible. The princes of the blood royal, and the scions of noble houses, who had stood at the gate like the Peri at the gate of Paradise, claiming impossible admission, were quickly invited to inspect the wonders of the place, and many availed themselves of the noble owner's proffered hospitality. The reception accorded to the Prince of Wales when he visited the Abbey was brilliant and imposing, and the Welbeck welkin rang with shouts of festivity such as had not been experienced for years before. The fine park was thrown open, and the public walked at will through the beautiful grounds, entering the hitherto sacred place with a wondering and astonished gaze.

The Abbey is associated with many traditions of festive splendor, and another era of hospitality seems to have dawned. In 1732, the owner of Welbeck appears to have been indiscriminate in his hospitality, for about that period, on one of the roads near the Abbey, was placed this curious notice: —

> "Whoso is hungry and liste to eate,
> Let him come to Welbeck to his meate;
> And for a night and for a day
> His horse shall have both corn and hay;
> And no man shall ask him when he goeth way."

In 1619 James I, while the guest of Sir William Cavendish, was entertained there with great magnificence; and in 1633 the festivities in honor of the visit of Charles I were so enticing that His Majesty came again to the Abbey in 1634, when there was "such excessive feasting as had scarcely ever been known in England." Charles, accompanied by the Queen, marvelled at the ardor of the reception and the generosity of the host. "The Earl," says one historian, "sent for all the gentry of the country to wait upon their Majesties, and so liberal was he in his efforts to please his royal guests that £15,000 did not cover the expenditure."

Following upon the visit of the Prince of Wales, a visit enjoyable to both guest and host, the Duke of Portland invited to his park the Honorable Artillery Company, with which he had been connected for some time in an honorary capacity, and for ten days the officers and men were encamped under the shadow of the Abbey, partaking of a right royal hospitality, and enjoying what was nothing less than a huge picnic in a huge park. The sham fights which were organized attracted thousands to the spot, and the Bank Holliday of 1882 was certainly unlike any corresponding period in the history of Welbeck. Quietness supervened, and up to the present time no extraordinary carousal has awakened the echoes of the forest, and the inhabitants of the Abbey are enjoying somewhat of that serene repose which marked their life during the career of the late Duke of Portland.

N. Hartley Aspden, in *Forestry*.

BRONZE CASTING.[1]

STALLS IN CHURCH ST. SERNIN. TOULOUSE. FRANCE. XVI. CEN.

THE art of casting in bronze became naturalized in France under Francis I, who invited Benvenuto Cellini and other Italian artists to establish themselves in France, and built several foundries, the principal one being that of Fontainebleau. The manufacture of bronze was not, however, firmly established in France till 1684, when the Arsenal Foundry was built by Louvois, and placed under the direction of the brothers Keller.

The colossal equestrian statue of Louis Quatorze by Girardon was cast by the brothers Keller; it was intended originally to be placed on the Place Vendôme, then Place Louis le Grand, but was broken up at the first Revolution; one foot of the horse is, however, preserved in the Louvre as a specimen of the excellence of the bronze, the beauty of the work, and the colossal proportions of the statue, which was 7 metres (about 26′) high, and was cast *à la cire perdue* at a single jet. The three legs of the horse, supporting the principal weight of the statue, were made of solid wax without a core, and consequently when cast became solid bronze, while the rest of the statue was only 16 millimetres (five-eighths of an inch) thick. The weight of bronze required in this process is calculated at ten times that of the wax employed, and in this statue 3,000 kilograms of wax and 30 tons of bronze were used in the casting. The brothers Keller were the last founders of renown in France; after them the art of casting in bronze by the wax process declined, and at the beginning of the present century all practical knowledge of it was lost.

The sculptor Falconet, who was a contemporary of the Kellers, became a bronze-founder from necessity; not having been able to find at St. Petersburg a bronze-founder who would undertake to cast his statue of Peter the Great, after waiting for more than two years, he acceded to the repeated request of the Empress, Catherine II, and cast it himself *en cire perdue*. At the first attempt the mould burst before it was filled, and the whole of the upper part of the statue was defective. The second casting was successful, with the exception of some cracks and holes, which were filled up with molten bronze so effectually that it was impossible to tell where the statue had been repaired.

Although Falconet does not describe at length the manner in which he cast his statue, he mentions incidentally that he employed the wax process, since he relates that the bronze-founder Ersman, one of those to whom he had applied, declared that Falconet must be mad to attempt to cast a statue of that size with wax only three lines (a quarter of an inch) thick, that such a thing had never been done before, and that if he persevered in attempting it the casting would inevitably fail. Falconet remarks that in casting this statue twice he had learned two things: first, that the modern art of casting colossal statues was imperfect, and, secondly, that it might be rendered perfect if sculptors and founders chose to take the trouble.

The bronze castings made under the First Empire were from moulds made on plaster models by an ingenious method known by the name of *moulage à la Française*, which is now employed in all French bronze foundries. It has the advantage of being economical, especially for large works, and is generally used in all the foundries of the north of Europe; it resembles in some respects the system practised in iron foundries, and is now employed even in Italy in preference to the wax process.

It must also be remarked that casting *en cire perdue* is not suitable for every style of sculpture. Works, for instance, requiring a smooth surface can, and indeed ought to be, cast by the ordinary French system, which produces metal of a closer grain and more polished surface, requiring, however, the use of the chasing-tool over the whole surface to efface the marks left by the joints of the piece-mould, and the entire removal of what is called *la peau de la fonte*, the casting skin or "epidermis" of the bronze as it comes from the mould, and which, in the wax process, constitutes its peculiar charm,

[1] From the Official Report by Sir J. Savile Lumley.

reproducing as it does a perfect fac-simile of the original work as it left the artist's hands.

The ordinary method of casting is more suitable to the bronze articles of commerce which require frequent reproduction, as well as for bronzes intended to be gilt or silvered and burnished. The wax process, on the contrary, is adapted to unique artistic works not intended for reproduction; the casting skin, however, so dear to the sculptor, diminishes to a certain extent the beauty of the artificial "patina," or bronzing, which is always more brilliant on bronzes that have been worked over with the file and the graving-tool. Although casting in bronze by the wax process was given up in France at the beginning of the present century, it has never been lost sight of altogether in Italy, from whence occasionally specimens have been sent to the annual Exhibition of the Fine Arts at Paris.

CONCRETE FLOORS AND PAVINGS.[1] — III.

Monument to Chintreuil.
Sent de Vaux. France. L. Drunkau Archt.

PERHAPS there is no other industry that has developed into a permanent business in a less time, or with equal probabilities of maintaining a position as a staple manufacture, than that of concrete paving. Under various names, fanciful and otherwise, yet to all intents and purposes concrete in its simplest form, many descriptions of paving have been brought into notice, and as a natural sequence those which have stood the test of hard wear and tear without a serious depreciation, have obtained the greatest amount of public support. Foremost amongst these stands "Victoria Stone" — manufactured at Stratford in Essex, the aggregate for which consists of granite, chiefly from the Leicestershire quarries, and the matrix Portland cement of the best quality, the admixture of the two it is almost unnecessary to state being executed with the greatest care. A feature however, in connection with this paving is, that after being taken out of the moulds it is placed in a bath of silicate of soda; the silica, or flinty material is obtained from Farnham in Surrey, and is converted into a silicate by the addition of caustic soda. It is claimed that this treatment not only hastens the hardening of the slabs, but renders them more capable of withstanding heavy wear. This latter qualification has been doubted, but whether or no, we have palpable evidence from the large quantity used in the streets of London, that Victoria Stone is extremely durable. As with all granite concrete pavings, it must be confessed that it does not give that feeling of security in walking thereon which is experienced with York and other sandstone pavings; on the other hand, we do not hear or read of it being the primary cause of accidents from any smoothness of surface. The granite aggregate was formerly employed of a much larger size than at present, as may be noticed in the different textures of paving laid down in some parts of London a few years ago, and that which is used at the present time. The paving made with the smaller aggregate has a better appearance, gives apparently a safer foothold, and must undoubtedly prove more serviceable. The slabs are made of various sizes, and generally about 2 inches thick, and weigh about 26 lbs. to the superficial foot. The crushing weight of Victoria Stone is ascertained to be 6,441 lbs. per cubic inch, as against, 5,851 required to crush York landings. An advantage claimed for this as well as most other concrete pavings is, that it is of an uniform texture throughout, and not only wears of an even grain and is free of lamination, but that it can be turned over and relaid when the original surface is worn uneven.

The Imperial Stone Company, — originally Messrs. Hodges and Butler — whose works are at East Greenwich, and whose manufactures include many other items besides paving, also produce a superior description of slab, and as the Company makes drain-pipes and other articles, it does not confine itself to the use of any special aggregate, as it is obvious that what is suitable for one purpose may not be so well adapted for another. Granite however, is one of the principal materials, and Kentish rag-stone another. It is claimed for the latter that it is a suitable aggregate for concrete exposed to a higher temperature than usual, such as pavings for conservatories and buildings where hot water-pipes are used. In filling concrete moulds for pavings, one of the main points to be attained is to leave no vacancies, but to so arrange the materials that they shall form a dense mass, otherwise as the stone face wears, the surface, as was previously explained, appears pitted. It is well known that to pack a quantity of small loose materials of any description into the least possible compass, the best means to accomplish that object is to well shake the vessel containing them, and the Imperial Company apply this principle by placing the moulds upon what are called "tremblers," which impart a vibratory motion to the frames, and enable each particle of the concrete constituents to interlock with each other in a way which no other method could produce so well. By making the concrete very soft it would help it in this respect, but with the disadvantages of retarding its setting qualities, and possibly of causing the superabundant water to deposit a portion of the cement at the bottom of the moulds. Practically the smaller amount of water employed, the better, provided sufficient is used to convert the cement into a soft paste, and means are adopted of fitting the materials into the least possible space. To effect this object simple compression has apparently not the desired effect, for the aggregates appear to require moving till their proper position or place of rest is ascertained, and the trembler, no doubt, accomplishes this very successfully. Tamping, or a gentle impingement with light beaters, would in the absence of tremblers assist materially to force the particles into place, but always imperfectly. The "Imperial Stone Company" adopt the system practised by the Victoria Company, of placing their pavings in a bath of silicate of soda, and they state that specimens of their materials have been tested by Mr. Kirkcaldy, and found to withstand the enormous crushing force of 8,075 lbs. per square inch, and as tested by Mr. Faija a tensile strain of 792 lbs. per square inch.

The "Eureka Company," or Wilkes Metallic Flooring Company, have for some years past also done an extensive business, principally in monolithic floors and pavings. The surveyor of Marylebone, in January of the present year, testified to the fact that a considerable amount of paving executed in that parish, and forming the footways of a portion of Oxford St., therefore subjected to very heavy traffic, showed no appreciable signs of wear after four years' incessant traffic. For the North Metropolitan and the North London Tramways Companies also it has been extensively used for stable pavings, and the manager of the latter Company affirms that it is proof against the absorption of urine. As this is one of the most important factors in connection with maintaining the healthy condition of horses, its value in that direction cannot be over-estimated, for no description of bricks can be said to positively fulfil this desideratum, and no matter what the jointing material may be made of, the pounding to which stable floors are subjected, must sooner or later disturb paving composed of an infinite numbers of small portions.

Wilkinson's granite concrete flags and monolithic pavings have an established reputation, and the fact that Messrs. Wilkinson & Co., have laid 8,000,000 superficial feet during the last ten years is sufficient evidence in itself of the high character in which their paving is held. The works are at Newcastle-upon-Tyne, where the aggregate is prepared ready for use, and despatched wherever required; this concrete has found especial favor for stable paving, and has been extensively used for the cavalry stables at Aldershot, Curragh Camp, and other military depots; for this purpose it is laid down in a soft state, and whilst in that condition grooved to various patterns as may be desired. Messrs. Wilkinson & Co., offer to guarantee the work executed by them for five years, and this should be sufficient to convince the most sceptical unbelievers in concrete pavements, that the latter is not one of the many inventions which are loudly proclaimed as being superior to anything and everything hitherto produced, are tried, found wanting, and sink into oblivion.

There are of course other manufacturers of floors and pavings besides those named, but whose productions are not of such magnitude, or have not yet undergone the test of time. That concrete floors and paving will come more into general use, cannot for one moment be doubted. Every large conflagration is a factor in promoting the extended use of the former, and all that is needed to make the latter better known and appreciated, is to give it a position where it can be fairly compared with the sloppy and uneven pavements of many towns, and where both can be subjected to the severest test.

The eventual use of concrete on an extensive scale for an endless variety of purposes is undoubted, and although in some instances there have been failures, which may be readily accounted for, yet where its treatment is properly understood, and its application made the study of practical minds, the result will be always the same, as evidenced in the magnitude of the business done by specialists in concrete floors and pavings, and in the acknowledged superiority of the latter over any other systems with which we are acquainted. — *The Building World.*

[1] Concluded from page 273, No. 441.

THE EFFLORESCENCE ON BRICKWORK.

Boston, June 28, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I find, in your number for the 28th inst., that Mr. Babcock offers further explanation on this subject. I will say that, to me at least, he made himself perfectly clear at the start, and was not misunderstood. My only suggestion was, that acid acting on soda, and releasing the carbon produced a chemical change, etc. I said "neutralize or *practically* destroy the soda." I do not think "muriatic acid will decompose sulphate of anything," and the question is yet open, as regards the *sulphate*. According to Mr. Babcock, it is produced by burning the sulphur existing in the coal-dust. As will be seen, *coal-dust* is an important auxiliary, and unfortunately for his theory it is generally, or, to say the least, often not used, and in cases where the whiteness as freely occurs.

While we are agreed that the cause is soda, and that the method of treatment, "to a coat of linseed-oil, is an excellent one," yet I am disappointed that he ignores the point I made: that the whiteness appears equally on bricks burned with wood, and where, in the manufacture; no coal-dust is used; and that from time immemorial bricks have thus appeared white. They were so seen in Boston a century before coal was used, or hardly known as a fuel by its inhabitants. I assume that, even now, the use of coal-dust in the manufacture of bricks is simply local, and an exception to the rule, and in most country places it probably never will be used; yet in special examples of bricks made thus the whiteness appears all the same.

It is a pleasure to be able to agree in the fact that soda in one of its forms is the cause, and that, if you please, simple water dissolves it; and, next, that "linseed-oil as a coating is an excellent treatment." I will, however, add that best success has been attained where dilute muriatic acid has cleansed the pores in the bricks, and thus permitted the oil to farther penetrate; and while speaking of this I will reply to your other correspondent who speaks of the use of kerosene-oil. This material penetrates the brick to a depth of about a half-inch, where they are of an average hardness, and dissolves the soda, but the oil, lacking the body that linseed-oil has, affords much less protection from the atmosphere, and has proved to be of only temporary value. Henry S. McKay.

NOTES AND CLIPPINGS.

No Monument to Victor Emmanuel in the Pantheon. — The project of erecting a monument to King Victor Emmanuel in the Pantheon has been abandoned. A simple tablet will take the place of the proposed monument. A conflict with the Vatican will thus be avoided. The anti-clericals denounce this step as a weak concession to the church.

The Prix Duc.— In the competition for the Duc Architectural Prize, worth 4,000 francs, only three sets of plans were sent in, one by M. Armand, of a residential villa; another by Albert Ballu, of the new Law Courts, to be erected at Cherbourg; and a third by M. Vandozer, for a bridge of fine arts. The architectural section of the Academy has decided to divide the prize equally between the two last-named competitors. The plans were on view to the public from Friday to Monday last in the Caen Museum at the Institute.— *The Architect.*

A Theory of the Self-Purification of Rivers.— A discovery has been made by Dr. Pehl, of St. Petersburg, which promises to have a very important bearing on many industrial processes. The water of the River Neva is very free from bacteria, having only about 300 germs in a cubic centimetre. The canals of St. Petersburg, on the contrary, are infected with bacteria, their number reaching 110,000 in a cubic centimetre, even during good weather. The same is true with regard to the conduits of water for the supply of the city. While the chemical composition of the water passing through these city conduits hardly differs from that of the Neva (by which they are supplied), the number of bacteria reaches 70,000 against 300 in the water freely taken from the river; and the worst water was found in the chief conduit, although all details of its construction are the same as in the secondary conduits. Dr. Pehl explains this anomaly by the rapidity of the motion of the water, and he has made direct experiments in order to ascertain that. In fact when water was brought into rapid motion for an hour, by means of the centrifugal-machine, the number of developing germs was reduced by 90 per cent. Further experiments will show if this destruction of germs is due to the motion of the mass of water or to molecular motion. If this discovery of Dr. Pehl's be confirmed it will become possible to destroy bacteria, and render a water comparatively pure simply by passing it through a centrifugal-machine. The subject is of special interest to brewers who suffer, perhaps, more than any other manufacturers from the attacks of bacteria.— *Exchange.*

The Newburg Washington Monument.— Apropos of this monument, the New York *Times* offers these judicious reflections and suggestions:—"In matters of art no half-way course is possible. A monument to Washington, particularly, must be "big," in the best sense of the word as it is used by artists. This does not exclude actual bigness in size. On the contrary, such a monument might be "big" artistically and big in size also. But if it is not that, then its bigness should consist in its beauty, without relation to size, as some of Barye's little animals or some of Cellini's little bronzes are more tremendous than the colossal St. Charles Borroméo on Lago Maggiore, or the Germania on the Rhine. The sum of money at the disposal of the Trustees is quite large enough, if the latter will avoid anything that savors of mediocrity. Let them decide to have one extreme or the other — a gigantic rude piece of art or a small fine piece. If they choose the former, they have various courses before them. They may intrust to a sculptor of proved strength the finding of a conspicuous mountain top or cliff, visible for great distances up and down the river, near the Highlands, and direct him to fashion it rudely, by blasting, into a profile of Washington. This would require the highest genius to do well. Or, it might be a sheer cliff like that of Crow-nest into which a field might be sunk, bearing in high relief, cut in the live rock, some appropriate monument visible at a great distance. There is great scope for gigantic art of this kind in and near the Highlands of the Hudson, and others besides M. Bartholdi may be found to possess ability in it. For the timid who must have precedents for everything, the rock sculptures of Asia Minor, and, indeed, of Europe, not to speak of the aboriginal sculptures on our own continent, will prove reassuring. But if the Trustees choose the other alternative and demand the much art in the little space, there are the walls of the Headquarters which ask nothing better than to be adorned by reliefs, in marble, bronze, or whatever material is thought fittest. There is less risk of failure here because bas-reliefs when kept under cover and shown by the light of windows, are comparatively understood, while the gigantic in art is necessarily less familiar because resorted to more rarely. Either of these extremes promises the chance of a monument worthy of the man and the place. Anything that savors of compromise will be sure to prove one more product of American cemetery art."

The New Parliament-House, Berlin.—The laying of the foundation-stone of the Reichstag Building, June 10th, the symbolic corner-stone of German unity, was the greatest and most imposing public ceremony performed by the Kaiser since the completion of Cologne Cathedral and the unveiling of the National Monument at Ruedesheim. Herr Paul Wallott, who was not only the designer of the plans which received the first prize at the public competition, but who has also been appointed Supervising Government Architect during the erection of the building, has kindly furnished me with the following official details regarding the projected edifice: "The building will form a great square, with a frontage of 446 feet on the two greater sides, facing west and east respectively, by 312 feet on the shorter fronts. It will enclose two interior courts, measuring 52 by 98 feet, placed symmetrically to the central axis of the building. The outside façades of the edifice will be 85 feet in height, being flanked by four square towers which rise at each corner to 131 feet. The central part on the western front with the grand entrance, is designed to be 105 feet high, and will be surmounted by a huge octagonal cupola, the apex of which will stand 230 feet above the ground. This cupola will cover the central hall, 69 feet square; which, with two galleries added on either side, 46 feet high will form a great hall with a total length of 295 feet, to be used as members' lobby, and for great ceremonies and festivities. The session hall for the Reichstag will cover an area of 6,560 square feet. It will be 43 feet in height, and like the great hall receives the light from above. Besides the seats and desks for the 399 members, it will contain the places for the members of the Ministry and the Federal Council, with galleries for the Court, the diplomatic corps, the press, and the general public. The entire building will be placed on vaulted cellars and comprises four floors, on which all rooms necessary to a great Parliamentary building are to be distributed in the most practicable manner, including the offices for the Presidents and Secretaries, and those for the Federal Council, the library and large reading-room, the archives and record rooms, the different offices of the House, the stenographic and press-room, the telegraph and post-offices, committee-rooms, restaurants, ante-chambers and parlors, wardrobes, toilet-rooms, &c. The internal arrangements will naturally include the latest scientific improvements in electric-lighting, telephonic communication between all parts of the building, hydraulic lifts, heating and ventilation. It is intended to employ none but German material in the erection of the entire edifice. The total cost, exclusive of internal fitting and decorations, is estimated at 18,000,000 marks, (£900,000.)" The building of the edifice is estimated to be completed in from six to eight years, and the German nation has no wish more fervent than that the venerable monarch may be present at the opening of the edifice in the same vigor and good health as he displayed at to-day's great historical ceremony.— *London Daily News.*

A Danger from Natural Gas.— The New York *Tribune* says that a few weeks ago a hostler entered one of Carnegie Brothers' Stables at Pittsburgh, Pa., with a lighted candle in his hand. An explosion followed. The man was blown thirty feet, a horse worth $1,300 was instantly killed, and the stable was completely wrecked. An investigation proved that it was an explosion of natural gas, which had escaped from a pipe a few feet away and had gradually forced its way through "made ground" until it entered the stable. Being invisible and odorless, the danger is doubled. So far no method of making known the presence of natural gas has been discovered. Like Carnegie's stables, nearly all the manufactories along the river-front are erected on made ground. A well-known manufacturer, who carries $250,000 of insurance, said to-day: "Unless some safer method of transportation is invented, we will literally be living on the top of a slumbering volcano."

One corporation has applied to the City Councils for the exclusive right to transport the natural gas through the streets of Pittsburgh. If the Councils act favorably on their proposition, they will at once begin the laying of a double pipe, one of eight inches in diameter within another of twelve. The inner pipe will convey gas to manufacturers, while the outer which will hold the leakage from the inner, and at a less pressure, will transport sufficient for the private consumers. This is the safest method yet suggested. Some opposition to the scheme has been developed, but it is expected that when the New York underwriters have their say, the measure will be made a law by the councils. One New York insurance man who was in the city for a few minutes today said: "Unless your people quit carrying this new gas in common pipes, we will be compelled to do one of two things — raise the rates of insurance or cancel the policies." The companies who are using the common pipe are proceeding under a general State law passed in 1874. In Kittanning and several towns in the lower oil country, insurance companies positively refuse to take risks at any figure so long as the present method of transporting natural gas is in vogue.

One Result of the Smoke Nuisance. — An Observatory almost Useless. — Prof. S. P. Langley, Director of the Western University Observatory, states that the usefulness of the observatory is seriously threatened by the smoke which invades the sky from all quarters, and the increasing haze from moisture in the atmosphere, which the smoke seems to enhance. In five months there has not been one day sufficiently clear for delicate observations. Unless this state of affairs is done away with by the introduction of natural gas or otherwise, Prof. Langley states that the days of the observatory for scientific purposes are numbered. — *Pittsburgh Telegraph.*

The Corinth Canal.—The New York *Evening Post* says that the Isthmus of Corinth Canal, a scheme which was promoted originally so long ago as the time of the Emperor Nero, is now almost an accomplished fact. The dredging operations at the approaches to the canal proceed very rapidly, for about 5,000 cubic metres of soil and sand are removed every twenty-four hours. There are large numbers of workmen employed also on the central portions of the channel, and they have the help of a railway for the conveyance of material. A new town, called Isthmia, has sprung into being, and it contains some 200 houses and stores.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

300,771. Bit-Stock. — John S. Fray, Bridgeport, Conn.

300,773. Lock. — James Gwynn, Detroit, Mich.

300,776. Window-Screen. — George W. Henry, West Jersey, Ill.

300,780. Bench-Dog. — Chas. C. Johnson, Springfield, Vt.

300,790. Hydraulic Cement. — John Murphy, Columbus, O.

300,797. Fire-Escape. — Jas. Edward Post, Poughkeepsie, N. Y.

300,822. Fire-Escape. — James B. Wiltshire, Cincinnati, O.

300,843. Fire-Escape. — Jesse H. Burks, Los Angelos, Cal.

300,849. Weather-Strip. — Jacques Couturier, Lyons, France.

300,857. Fire-Escape. — Lewis J. Evans, New York, N. Y.

300,861. Construction of Buildings. — Edwin Gilbert, Georgetown, Conn.

300,870. Drain-Cleaner. — George Washington, Immel, Logansport, Ind.

300,881. Window-Screen. — Egbert E. Masters, Sacramento, Cal.

300,882. Drain-Tile Machine. — Calvin J. Merrill, Des Moines, Io.

300,898. Pipe-Cutter. — Edwin A. Robbins, Boston, Mass.

300,901. Die-Stock and Die. — Nelson Sawyer, Hartford, Conn.

300,902. Fire-Escape. — John G. Schiller, Youngstown, O.

300,905. Water-Closet. — James Semple, Cincinnati, O.

300,917. Hydraulic Cushion for Water-Pipes. — John Story, Cincinnati, O.

300,932. Elevator-Guard. — Henry C. Wilcox, Boston, Mass.

300,939. Weather-Strip. — William D. Bennett, Bedford, Io.

300,946. Pulp-Board for Roofing Purposes. — Philip Carey, Cincinnati, O.

300,954. Sash-Holder. — Edwin B. Clement, Marshalltown, Io.

300,961. Screw-Tap. — Henry Willcox Eddy, Toledo, O.

300,983. Sink. — James Kilbourne, Columbus, O.

301,005. Sash-Fastener. — Jacob Reiff, Skippackville, Pa.

301,018. Dry Closet. — Frederick F. Street, Hartford, Conn.

301,019. Fire-Escape. — B. Frank Teal, Philadelphia, Pa.

301,022. Warm-Air Furnace. — John Walsh, Newton, Io.

301,058. Bit-Brace. — Wm. A. Ives, New Haven, Conn.

301,061. Hot and Cold Water Faucet. — James C. Loucks, Grand Rapids, Mich.

SUMMARY OF THE WEEK.

Baltimore.

Dwellings. — Francis I. King, Esq., is to have built 3 three-st'y brick and Connecticut brown-stone dwells., on the e s Park Ave., n of Madison St., one 35′ x 58′, and the other, 20′ x 85′; from designs by Chas. L. Carson, architect; John E. Marshall, builder.

Restaurant. — George A. Frederick, architect, has prepared drawings for Aug. Vanness, Esq., for a three-st'y brick building of brick, with stone and terra-cotta finish, on the triangular lot cor. Ensor and Mott Sts., 16′ x 35′ x 48′; to cost, $10,000; Wm. H. McDonald, builder.

Building Permits. — Since our last report twenty-eight permits have been granted, the more important of which are the following: —

J. H. Morrow, 2 two-st'y brick buildings, w s Coombs Alley, bet. York and Hill Sts.

Jas. Gilmore, three-st'y brick warehouse, e s Caroline St., bet. Canton Ave. and Aliceanna St.

A. F. Dunbar, three-st'y brick building, s s Federal St., e of Washington St.

Sam'l B. Derr, 7 three-st'y brick buildings, n s Townsend St., bet. John St. and Reuter Alley.

Mrs. E. Wise, four-st'y brick warehouse, n s Fayette St., bet. Liberty and Charles Sts.

Leander Foreman, 14 two-st'y brick buildings, s s Laurens St., bet. Division and Etting Sts.

John Knerr, three-st'y brick building, w s Riverside Ave., s of Hamburg St.

Swift & Lucy, 10 two-st'y brick buildings, w s Duncan Alley, n of Canton Ave.

G. Mezger, three st'y brick building, n s Baltimore St., bet. Carrollton Ave. and Schroeder St.

Henry Hoffman, three-st'y brick building, e s German St., bet. Eutaw and Howard Sts.

John Haus, three-st'y brick building, w s Fremont St., bet. Mulberry and Pierce Sts.

There is no change in the labor quotations.

Boston.

Building Permits. — *Brick.* — *West Concord St., Nos.* 66–74, cor. Washington St., Nos. 1643–1649, Ward 18, for Elizabeth T. Eldredge, family-hotel, 51′ x 120′, seven-st'y flat; R. Culbert & Son, builders.

Kneeland St., near Cove St., Ward 12, for Old Colony R. R. Co., store, 9′ 4″ x 20′ 8″, one-st'y flat; Samuel Stevens, builder.

Kneeland St., near Cove St., Ward 12, for Old Colony R. R. Co., store, 9′ 3″ x 41′ 4″, one-st'y flat; Samuel Stevens, builder.

Mayo St., near Castle St., Ward 16, for Boston Building Association, 2 tenements, 22′ x 52′ and 37′ 6″ x 50′, four-st'y flat; A. J. West, builder.

Wood. — *Lexington St., Nos.* 241 *and* 243, Ward 1, for Harrison W. Cottle, 2 dwells., 17′ x 28′ and 21′ x 50′, two-st'y mansard; Ephraim Curry, builder.

West First St., No. 345, Ward 14, for E. P. Morrill and S. Ricker, stable, 31′ x 40′ and 32′ x 60′, two-st'y flat.

Salem St., n s, Ward 23, for James Jackson, dwell., 15′ x 20′ and 22′ x 29′, two-st'y pitch.

Salem St., n s, Ward 23, for Nathaniel Crawshaw, dwell., 15′ x 20′ and 22′ x 29′, two-st'y pitch.

Brown Ave., near Sharon St., Ward 23, for Philip H. Butler, dwell., 20′ and 35′ x 40′, two-st'y pitch; Spinney, Haddock & Co., builders.

Adams St., cor. Forrest St., Ward 24, for Jason Gordon, green-house, 10′ x 16′ and 20′ x 72′, one-st'y pitch; Jason Gordon, builder.

Brooklyn.

Building Permits. — *Front St., Nos.* 178 *and* 180, two-st'y brick factory, tin roof; cost, $10,000; owner, The Tin Plate Decorating Co., 72 John St., New York; architect, Wm. J. Fryer, Jr.; builder, Richard Shapter.

Graham St., No. 73, e s, 170′ n Park Ave., four-st'y brick tenement, tin roof; owner, Phillip O'Reilly, on premises; architect, Wm. H. Burhaus.

Atlantic Ave., n s, 234 West Bond St., 6 four-st'y brick stores and flats, tin roofs; cost, each, $6,000; owner, Chester Bedell, 337 Smith St.; architect, Chas. E. Hebberd.

Herkimer St., n s, 100′ e Saratoga Ave., 8 two-st'y frame dwells., shingle roofs; cost, each, $1,500; owner, J. H. Bishop, 49 Broadway, New York; architect, M. J. Morrill; builder, G. H. Chamberlin.

Central Ave., No. 66, w s, 50′ n Melrose St., three-st'y frame store and tenement, tin roof; cost, $4,000; owner, John Repp, on premises; architect, Th. Engelhardt; builders, N. Maurer and P. Kunzweiler.

Newell St., No. 100, e s, 267′ s Norman Ave., four-st'y frame tenement, tin roof; cost, $5,500; owner, James McCafferty, 102 Newell St.; architect, Th. Engelhardt; builder, John Fallon.

Hooper St., n s, 85′ w Harrison Ave., 2 two-st'y brick dwells., tin roofs; cost, each, $4,500; owner, John Sunderlan, 39 Ross St.; architect, Frank Holmberg.

King St., No. 113, w s, about 200′ s Van Brunt St., three-st'y brick tenement, tin roof; cost, about $5,500; owner, C. Smith, 115 King St.; architect, D. H. Gilvarry; builder, P. McGuinn.

Central Ave., s w cor. Himrod St., 2 three-st'y stores and tenements, tin roofs; cost, each, $5,500; owner, John Kelsh, 121 Stanhope St.; architect, Frank Holmberg; builder, not selected.

Bremen St., s e cor. Flushing Ave., 6 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and builder, George Loeffler, 76 Jefferson St.; architect, H. Vollweiler.

Wallabout St., n s, 250′ w Harrison Ave., three-st'y frame tenement, tin roof; cost, $4,300; owner, M. Haaf, 531 Broadway; architect, H. Vollweiler.

Monroe St., s e cor. Lewis Ave., three-st'y brown-stone dwell., tin roof; cost, $8,000; owner, etc., Wm. Godfrey, 123 Stuyvesant Ave.

Oakland St., e s, 200′ s Norman Ave., three-st'y frame tenement, gravel roof; cost, $3,800; owner, Mrs. Barton; architect, I. Pappe; builders, D. H. Hulse and S. Randall.

McDonough St., n s, 38′ e Sumner Ave., 3 two-st'y Connecticut brown-stone dwells., tin roofs; cost, each, $4,500; owner, John F. Saddington, 462 Willoughby Ave.; architect and carpenter, F. D. Vrooman; masnn, John Softy.

Broadway, Nos. 745 *and* 747 e s, 75′ s Locust St., 2 four-st'y frame stores and tenements, tin roofs; cost, each, $7,000; owner, J. H. Dewes and A. Nickel, 853 Willoughby Ave. and 25 Stuyvesant Ave.; architect, Th. Engelhardt, builders, John Auer and Michael Metzen.

Judge St., Nos. 15 *and* 17, w s, 76′ n Powers St., 2 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and builder, Michael Metzer, 300 Ainslie St.; architect, Th. Engelhardt.

Fayette St., No. 22, s s, 225′ e Broadway, three-st'y frame tenement, tin roof; cost, $4,500; owner, Gottlieb Stutt, on premises; architect, Th. Engelhardt; builders, H. Bruchhaeuser and Christ. Schneider.

Johnson Ave., n e cor. Gardner Ave., three-st'y factory, gravel roof; cost, $8,000; owners, Settle Bros., 96 Greene Ave.; architect, M. J. Morrill; builder, Peter R. Kelly.

South Third St., Nos. 56 *and* 58, 2 four-st'y brick tenements, tin roofs; cost, each, $7,000; owner, Peter Hess, 54 Grand St.; architect, Th. Engelhardt; builders, George Lehrian & Son and George Rels.

Fourth St., s s, 185′ e Fifth Ave., two-st'y and basement dwells.; also *Fourth St.*, n s, e Fifth Ave., 5 two-st'y brick tenements, tin roofs; cost, each, $3,000; owner, Magdalena Franz, 418 Third St.; architects, Parfitt Bros.; builder, J. P. Kenny.

Tompkins Ave., s e cor. Willoughby Ave., four-st'y brown-stone store and tenement, tin roof; cost, $13,000; owner and builder, R. C. Addy; architect, J. D. Reynolds.

Sumner Ave., w s, 74′ s Hart St., 3 two-st'y brick dwells., tin roofs; cost, each, $5,500; owner, R. F. Clayton, 401 Fourteenth St.; architect, W. F. Clayton.

Twentieth St., No. 333, between Sixth and Seventh Aves., three-st'y frame tenement, tin roof; cost, $3,000; owner, John Mee, 335 Twentieth St.; architect, W. H. Wirth; builders, T. Rees and Edwards Bros.

Fulton St., No. 1461, n s, 95′ e Tompkins Ave., three-st'y brick and brown-stone store and dwell., tin roof; cost, $7,500; owner, Wm. Graf, 1429 Fulton St.; architect, Th. Engelhardt; builder, E. T. Rutan.

Alterations. — *Withers St.*, n w cor. Leonard St., add one st'y, interior alterations, etc.; cost, $4,000; owner, John L. Witte, 397 Manhattan Ave.; architect, Fred. Weber; builders, Doyle & Brazill.

Smith St., No. 190, three-st'y brick extension, tin roof, interior alterations, etc.; cost, $5,000; owner, M. Louis, 310 Warren St.; builders, John Kerney and E. G. Vail.

Franklin Ave., No. 55, reduce height of building; also three-st'y brick extension, gravel and felt roof; cost, $3,500; owner, Gutta-Percha Co.; architect, John Murphy; builder, not known.

Flatbush Ave., s s, 375′ e Fourth Ave., add two stories; cost, $5,000; owners, G. F. and E. C. Swift, Boston, Mass.; architect, F. C. Muller; builder, B. F. Bailey.

Chicago.

Building Permits. — Boese & Gloeckner, 2 four-st'y stores and dwells., 628–630 Milwaukee Ave.; cost 20,000; architect, T. Karls.

Schoenhofen Brewing Co., three-st'y barn, 23–29 Seward St.; cost, $15,000; architect, Otto Matz.

F. F. Burns, three-st'y dwell., 579 Lasalle Ave.; cost, $12,000; architect, T. Karls.

O. Carlstrom, two-st'y dwell., 805 Seymour St.; cost, $2,500.

M. Koegel, two-st'y dwell., 331 North Paulina St.; cost, $2,800.

A. Aldenstadt, two-st'y dwell., 564 Superior St.; cost, $3,300.

P. Ryan, two-st'y dwell., 293 Elm St.; cost, $3,000; architect, G. S. Spozr.

Dr. Baxter, 3 two-st'y dwell., cor. Aberdeen and Monroe Sts.; cost, $20,000; architect, J. W. Ackerman.

Wm. O'Brien, two-st'y barn, 3820–22 Wabash Ave.; cost, $3,800.

P. Beck, two-st'y dwell., 214 Henry St.; cost, $3,400.

P. Finnerty, two-st'y dwell., 276 Centre Ave.; cost, $3,000.

E. Klemme, two-st'y flats, 739 Jefferson St.; cost, $3,800.

Sw. Evangelical Lutheran Salv. Church, one-st'y church, 2815–25 Portland Ave.; cost, $20,000; architect, C. O. Hansen.

Wm. H. Hoyt, 2 four-st'y flats, 247–249 Illinois St.; cost, $17,000; architect, A. Smith.

Dr. Craten, two-st'y flats, Wentworth Ave.; cost, $3,300.

M. Seger, two-st'y store and dwell., 2901 Hanover St.; cost, $2,500.

A. Schroeder, two-st'y flats, 634 Twenty-first St.; cost, $3,000.

The Board of Education, three-st'y school-house, cor. Illinois and Cass Sts.; cost, $50,000; architect, J. J. Flanders.

T. F. Andrews, 6 two-st'y dwells., Rhodes Ave.; cost, $20,000; architect, R. Ray; builder, J. Griffith.

F. Koesche, four-st'y store and dwell., 118 Clybourne Ave.; cost, $8,000.

Mary Cozzens, two-st'y flats, 363 Thirty-fourth St.; cost, $3,000.

A. Strausse, two-st'y dwell., 3337 Wabash Ave.; cost, $16,000; architects, Addler & Sullivan.

F. Bartdzy, three-st'y flats, 112 Wesson St.; cost, $5,000; architect, H. Kley.

W. D. Kerfoot & Co., 3 one-and-one-half-st'y cottages, Rice St.; cost, $4,500.

D. Quill, two-st'y store and flats, 339–341 West Van Buren St.; cost, $6,000; architect, H. Kley.

M. Madousek, three-st'y store and flats, 635 Blue Island Ave.; cost, $7,800.

V. Ceuck, three-st'y flats, 197 Dekeven St.; cost, $6,000.

E. Martin, two-st'y flats, 3058 Main St.; cost, $4,000.

Illinois Club, two-st'y club-house, 154 Ashland Ave.; cost, $20,000; architect, I. R. Willett.

A. Leichtenberger, three-st'y store and flats, 336 Maxwell St.; cost, $5,000.

George H. Edbrooke, 2 two-st'y dwells., Calumet Ave.; cost, $10,000; architect and builder, Geo. H. Edbrooke.

The Chicago Gas Light & Coke Co., two-st'y stable, Chatham St.; cost, $10,000.

P. Pope, three-st'y store and flats, 781 West Twelfth St.; cost, $6,000; architect, A. Bessler.

Stevenson & Jordan, two-st'y flats, Washtenau St.; cost, $3,800.

F. Follansbee, 3 two-st'y dwells., 23–27 Twenty-third St.; cost, $6,000; architect, J. W. Ackerman.

C. Carpenter, two-st'y flats, 22 North Ashland Ave.; cost, $4,400.

E. G. Bode, two-st'y flats, 364 Maxwell St.; cost, $3,000.

J. Waderstradt, two-st'y dwell., 668 Hinman St.; cost, $3,000.

J. H. Clough, four-st'y medical college, 465–467 State St.; cost, $25,000; architects, Willett & Pashley.

H. D. Runge, one-st'y dwell., 79 Ewing Place; cost, $7,000; architects, Frommann & Gebsen.

R. W. French, dwell., 301 Winchester Ave.; cost, $3,500.

F. Follansbee, two-st'y dwell., 2301 Calumet Ave.; cost, $3,000; architect, J. W. Ackerman.

H. L. Hill, two-st'y barn, 2316 Calumet Ave.; cost, $3,000.

F. C. Porter, five-st'y flats, cor. Cottage Grove Ave. and Thirty-first St.; cost, $60,000; architect, L. G. Quackenboss; builders, Geo. Lehman & Son.

P. Bauman, two-st'y dwell., 752 Twelfth St.; cost, $2,500.

Cincinnati.

Factory Buildings. — John F. Whetstone has let contracts for a five-st'y brick building on East Eighth St., for factory purposes; cost, $31,500; architect, S. E. Des Jardins.

House. — Plans are also being prepared by S. E. Des Jardins, architect, for a frame dwelling-house on East Walnut Hill, for Miss Mollie Williams; cost, about $6,000; also for a frame house at Fairmount, for J. A. Cochran, Esq.; cost, about $5,000.

Building Permits. — During the past week the following permits have been issued: —

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CONTENTS.

THE report of the New York Fire-Commissioners for 1883, which has just been presented to the Mayor, contains a good deal of curious information. During the year there were two thousand one hundred and sixty-nine fires in the city, destroying property to the value of something over three and one-half million dollars. The total insurance on the property destroyed or damaged amounted to about twenty-four million dollars; so that the average damage in each case was not more than one-tenth or one-twelfth of the value of the property attacked. This certainly speaks well for the activity and skill of the firemen. It is interesting to learn that less than thirty-nine million gallons of Croton water were used in extinguishing all the fires of the year, so that only about one-thousandth part of the New York water-supply is consumed in extinguishing fires. In regard to the causes of fires, the report says that about fifteen hundred resulted from carelessness; eighty were chargeable to "defective flues"; and six to "maliciousness"; while incendiaries caused only twenty. One hundred and twenty-one are said to have been due to "mischievousness," in distinction from "carelessness" and "maliciousness," as well as from incendiarism. There is something attractive in these nice moral comparisons of the motives of the persons who caused the fires, but a more material view of the subject, taking into account the physical means, such as matches, oily rags, bad kerosene, and so on, by which the effects were produced, might perhaps have been quite as suitable to the occasion.

A PART of the time of the firemen was employed in preparing a census of the buildings in the city, and it was ascertained that New York contained at the close of the year one hundred and one thousand, seven hundred and thirty-five separate buildings of all kinds. Of structures built, as the report says, "exclusively of brick, stone, iron, or other non-inflammable material," there were one hundred and thirty-six. Forty-seven of these are described as "dwellings," from which we suppose that the list must include those so-called "fireproof" structures in which the floors and fittings are of wood, since dwelling-houses with stone floors are as yet unknown in New York. Nine thousand, seven hundred and ten "business buildings," or more than three-eighths of the whole number in the city, are constructed "exclusively of wood or other inflammable material,"—whatever the other "inflammable material" may be. Of dwellings, seventeen thousand, six hundred and fifteen are of wood. The home-loving people of Philadelphia and Baltimore will be shocked to learn that only about forty-nine thousand buildings in all New York are used exclusively for dwellings, twenty-nine thousand being used partly for business and partly for dwelling. In seventy-seven thousand buildings, many of which are used in part for business or manufacturing, the whole population of New York, exclusive of a few janitors who sleep in the great stores and banks, is lodged, making an average of about sixteen persons to a house. As a considerable part of the present territory of New York City is occupied with small wooden houses, these figures indicate a crowding of population in the tenement-houses of the city proper which is sad to think of.

A MOVEMENT was recently carried out in Clifton, one of the beautiful suburbs of Cincinnati, which is quite characteristic of the people of that public-spirited region. Every one knows that Cincinnati suffers from the smoke of the bituminous coal forming the ordinary fuel of the city, which no smoke-statutes have yet been able to repress; but many of the occupants of the pretty villas on the hills surrounding the town refrain, more for the sake of their neighbors' comfort than their own, from the use of bituminous coal, and keep the air about them clear by burning only anthracite, or some other fuel which gives out little or no smoke. So far as we know, there has hitherto been no general understanding on the subject, each person following the impulse of his own sense of courtesy and cleanliness; but Clifton, which is one of the newer suburbs, has been increasing so rapidly in population of late as to inspire some fear among the earlier settlers lest the good custom which they themselves followed might be ignored by the new comers. One of the most energetic of them, therefore, prepared a paper for signatures, binding all who subscribed it to use in their houses only hard coal, coke or wood, and sent it about the village. It is certainly very much to the credit of all concerned that but two persons to whom it was presented hesitated to sign the paper, and even these two were understood to desire only a little time to consider the subject before joining in the agreement.

ON the Fourth of July the great Bartholdi statue was formally delivered to the United States Minister to France, in the Gauthier workshop in Paris. It is pleasant to find that many compliments were passed between the representatives of France and the United States, and the presentation and acceptance having been completed without any mishap, it is to be hoped that the statue will be quietly shipped to some place where its forlorn condition will not be observed, to await the time when another outburst of enthusiastic gratitude on the part of the American people shall furnish the money to pay for raising its pedestal a few feet higher. It is said that the day of the presentation of the statue was appointed also for the laying of the corner-stone of the pedestal upon the concrete base; but as the funds at the disposal of the committee were insufficient to pay, if not for a corner-stone, at least for any further considerable amount of masonry, it was found advisable to defer the ceremony. On many accounts, this decision seems to us to have been unfortunate. Among people so quickly responsive to generous sentiments as both the French and Americans, the simple expression of the regard which has subsisted for more than a century between the two nations would have been well worth the time which it might have taken; and no one, least of all a Frenchman, would have cared whether the erection of a costly monument, or the laying of a Philadelphia brick, furnished the occasion for reviewing the history of the time when France and the young American republic stood up together in defence of ideas which, under their lead, have in a hundred years remodelled the thoughts and habits of the whole world. We are very much disposed to think that if our own countrymen could be persuaded to think for a moment, with something of the sympathetic feeling of Frenchmen, upon the greatness of the work which French ideas have done for America, and American example has done for France, the response to the amiable feeling of the French toward the American people would be as general and sincere as was the movement in France which led to the presentation of the statue; and even if the eloquence of such an occasion should fail to stimulate subscriptions to the pedestal fund, the effort would have had its value, both in this country, as affording an opportunity for presenting international relations in the way in which they ought to be presented, and in France, as indicating a decent recognition of the sentiment which the gift endeavors to express, and which cares much more for some evidence that it is reciprocated than for the success or failure of any particular scheme for a pedestal.

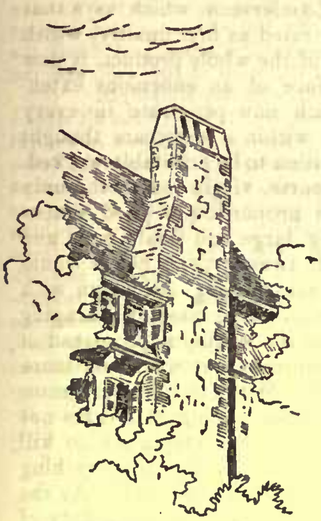
THE company formed for distributing power in the city of Birmingham, in England, by means of compressed air, is nearly ready to commence operation, and all the plans have been made for setting up engines and compressors, which will furnish five thousand horse-power a day. The air is to be furnished under a pressure of sixty pounds to the square inch, and the customers of the company are allowed to utilize it in such machines as they can contrive for the purpose, but those who desire to economize the power are warned that in order to do so to the best advantage it will be necessary to heat the air as they receive it to about three hundred degrees Fahrenheit. The cost of power to consumers will be forty dollars a year for each horse-power, where the air is used in large engines, and fifty dollars a year per horse-power where small engines are used. These prices approach very closely to the standard adopted by the New York Steam Company, and considering the difference in the circumstances at New York and Birmingham, as well as the expense which the consumers of the compressed air will be at in providing machinery of new and untried kinds and in heating the air delivered to them, we think that the advantage seems to be decidedly on the side of steam as a means of distributing power. Probably the people who intend to supply Birmingham with air understand what they are about, but if a town in this country, occupied, like Birmingham, by multitudes of small manufacturers, were desirous of introducing a public power-supply, we are disposed to think water might prove to be an excellent means of distribution. It is true that the water-motors now in use are, perhaps, less perfect as machines, than steam-engines, but they utilize the force supplied to them very successfully, and have the advantage of cheapness, and of being adapted to the use of a very small amount of power; so that with water under pressure at hand, at a low price, many persons would be glad to introduce small motors for driving grindstones or sewing-machines who would not think of setting up a steam-engine; and the company supplying the power might do a large retail business, so to speak, from which a steam company is cut off.

MOREOVER, the expense of obtaining and distributing water under pressure should be less than that of steam. Nothing is easier than to pump water into a pressure-tank or a stand-pipe, if the scale of the operation is so large that the draughts upon the pressure do not interfere with the regularity of the action of the pump, and in distributing the water there would be no loss or annoyance from condensation, no expense for non-conducting coverings to the pipes, no traps or expansion joints, and no inconvenience or expense from heat, either inside or outside the buildings where the power might be used; while the estimation of the power supplied to each customer would be a simple matter compared with the measurement of steam. It is true that the pressure of the water, starting with a constant tension in the pressure-tank, would vary with the height above the ground of the point at which it might be applied, but there would be no difficulty in lessening the pressure from the maximum for a given height to any required point, while the variation of the hydrostatic pressure would give the important advantage that the same water could be used, and paid for, several times over before it lost all its force, and passed into the return-pipes to be pumped back to the tank. There are many ways in which a skilful engineer might utilize this quality of a water-power supply, as distinguished from a steam supply. For example, the water delivered under pressure for driving sewing-machines in the upper story of a Broadway store would, after use there, be ready for operating the elevator, either in that or any neighboring building, and although it would be difficult to proportion the sewing-machines to the elevator in a single case in such a way that neither would ever lack power, and that there should never be any waste, an approximation to this result could be easily obtained by combining several buildings, under the control of the company's engineer, and in such simple cases as that of a machine-shop, using power quite uniformly throughout the building, a turbine wheel in each story would utilize the force of the water-supply in a way which would be quite impracticable with steam. Persons of an inventive turn of mind will think of many other advantages, and probably of disadvantages also, which such a system of water distribution would offer, but it is certain, that success in steam-supply has not yet been attained, and the hydrostatic system which is indeed, we believe about to be tried in London, may prove the best of all.

THE New York *Evening Post* has contained of late some timely editorials upon the waste now going on in the pine forests of the northwest, which has increased so rapidly within two or three years that the predictions of speedy exhaustion of the supply, which were almost laughed at two years ago, are now thought by many to have fallen short of the truth. One of the worst indications of the future of pine timber is noted by the *Northwestern Lumberman*, which says that the average proportion of lumber rated as first quality, which ten years ago was twelve per cent of the whole product, is now only two per cent, and this in the face of an enormous extension of lumbering operations, which now penetrate in every direction districts that were until within a few years thought to be far too remote from transportation to be profitably worked. As all the new districts are, of course, virgin forest, the only explanation of the decline in the proportion of good lumber must be in the fact that everything, large and small, good and bad, is now taken; saplings, which twenty years hence would bring twenty times their present value, being cut down with the rest, and sold for the lowest price. The most discouraging part of the matter seems to be that the lumbermen, instead of growing careful as the stock diminishes, get more and more reckless and destructive. The profits of the business are enormous, a single establishment sometimes paying its owners not far from a million dollars a year; and the temptation to kill the goose that lays the golden eggs by sawing up everything that can be sold seems to be too great to be resisted. As the *Evening Post* suggests, that the tariff, which imposes a duty of two dollars a thousand feet, equivalent, probably, to thirty-five or forty per cent, perhaps does something to increase the evil, both by encouraging the construction of mills, and through the feeling, which every mill owner must have, that as the impost may be repealed at any time, it is important to sell as much lumber as possible to secure the artificial profit while it lasts.

THE so-called "compound" system of steam-engine construction, which has been for some years in very successful use in large marine engines, is now rapidly finding its way, with certain modifications into the design of machines of small dimensions. Most people know that the compound system, as applied to marine engines, consists essentially in the addition of a high-pressure cylinder, generally a small one, to the one or two low-pressure cylinders of the ordinary condensing engine. The pistons of all the cylinders act upon the same shaft, but the steam is admitted first to the high-pressure cylinder, giving a preliminary impulse to the crank, and is then allowed to escape into the low-pressure cylinders, usually placed on each side, where it operates a second time upon the same crank, under diminished tension, but through the medium of a greatly increased piston surface; and having accomplished here all the work of which it is still capable, it passes off into the condensing chamber, to be converted into water and used over again. The reason why this double impulse should be more effective in its results than a single one does not seem very clear, but it is found in practice that something like one-third more work can be obtained with a given expenditure of fuel in a compound engine than in one of the old kind. It was, perhaps, not unnatural that the advantage of adding an energetic high-pressure cylinder to the ordinary pair of low-pressure ones in a marine engine should have been more obvious than that of adding low-pressure cylinders to engines which are always operated at a high pressure, and which waste all their exhaust steam; but, the experiment once tried, it was found that nearly the same economy could be obtained in the latter class of machines as in the former, and small stationary engines, steam-pumps and even locomotives are now everywhere being built or altered to conform to the new system. As applied to steam-pumps, which are among the simplest of machines, the "compounding" takes the form of the addition of a large low-pressure cylinder directly in front of the ordinary high-pressure one, the piston-rod extending through both. Steam is admitted under the boiler-pressure to the small cylinder, starting the piston, and at the cut-off, instead of expanding in this cylinder only, is admitted behind the large piston in the other cylinder, where it appears to complete the stroke much more advantageously than when retained in a single small cylinder. The extension of the principle to locomotives seems to be its latest application, and considering the high pressure at which these are always operated, and the small account which is taken of waste of fuel in them, in comparison with the more important qualities of quickness and certainty of control, it may be questioned whether it is altogether suited to the needs of such machines, but it appears from the foreign journals that in England and France, at least, the compound locomotives now built in the former country are coming rapidly into favor, giving an advantage in economy in fuel which does not seem to be counterbalanced by inferiority in other respects.

AN AMERICAN PARK.



If you would like to see the original and only garden wherein Mother Eve and Father Adam built their home, and commenced housekeeping, come with me for an afternoon on a trip into the country adjacent to New York, and about an hour from the city. Now, it is generally believed that there are no suburbs to New York that may be truthfully called healthy or beautiful, but only either marshy lands, low and muddy, covered by a constant fog of malaria, or besieged by clouds of insects, known as mosquitoes, but which have been given the reputation of being regular full-fledged birds in New Jersey. Our trip to-day will banish all such ideas. Undeniable traces exist which prove its Edenic origin, and although there have been no fossil remains of his snakeship, or the disputed spare rib yet unearthed, most unmistakable apple trees have been found, besides an abundance of "trees that are pleasant to the sight." Whether it is, however, as Mohammed surmised, one of the seven heavens, has not yet been proved, although there are some people who believe it to be fully as pleasant.

I remember being impressed some few years ago by an article which appeared in one of our monthlies, entitled "Bedford Park," a suburb of London; and upon a visit to that beautiful spot being very much struck with the quaintness and picturesqueness of its homes and its little church, but, on the other hand, being much disappointed with the generally shabby and cheap methods of building, and the rather monotonous flatness of the country: it was not an Eden, although it was beautiful. We shall find this afternoon a more beautiful location, better built homes, and shall leave you to your own impressions of their picturesqueness.

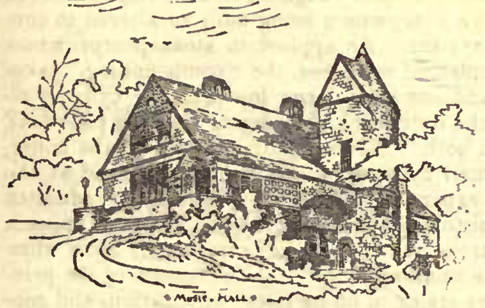
The spot is many hundred feet above the sea level, and from almost any point can be seen at night the harbor lights, with the wooded heights of Staten Island and Navesink beyond. As we talk, we are rapidly leaving the city behind us, and each minute brings infinite relief from the dust and din which daily surrounds the man of business, and which emphasizes the expression,

"God made the country, man the town."

Our train being an express does its business quickly, and we are soon whizzing past an old wind-mill, which lazily revolves, and brings to memory the valiant Don Quixote. Not unlike the thousands of wind-mills in Holland, too, is this one, since its mission is fulfilled in constantly pumping, pumping, pumping and storing water for the little park beyond. Just behind it, and surrounded by extensive grounds, is a large brick mansion, the home of the gentleman to whose indefatigable interest the park owes all its improvements.

As we swing around the curve, a bevy of ladies and gentlemen spring into view, dressed in lawn-tennis suits, and whacking away at a poor little ball with a vigor which seems to threaten destruction to the poor little fellow as it bobs hither and thither, and ends at last by making a "love" for some one, leaving the points for the others.

"But come along, don't stand gaping at this 'view of fair women,' for we have not come out here to witness this every-day occurrence, but, rather, to get a breath of clear, bracing, unadulterated air, and to get a view of the pretty homes all around us."

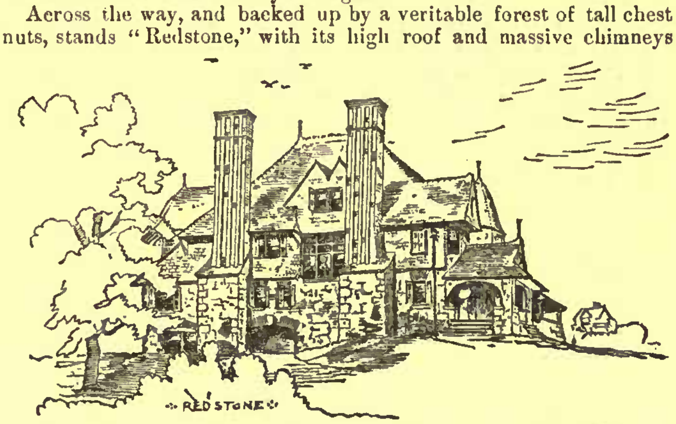


As we turn from the station a quaint-looking building with a quainter tower appears from behind the trees, and we find that it is a building dedicated to the Muses. Just take a peep inside: the walls and ceiling are in wood-work, the sides arcaded, and the ceiling in open truss-work. In one of the arcades is a huge fireplace, which we are sorry to be told engages ever and anon in the luxury of smoking, but which certainly never ought to do so. The proscenium arch is wide, and with panelled sides, while across the arch runs an open-work of turned spindles; and on the stage is an abundance of scenery, dressing-rooms, and the luxury of gas throughout the whole building.

Here the Doctor of Alcantara once mixed his vile nostrums; here pretty Miss Patience and love-sick maidens languished with soulful utterances, and here monthly are performed gems of dramas and song by native talent, who afterward make things merry with Terpsichorean sports.

Near the Music-Hall, and overshadowed by large trees, is "Greystone Cottage," with its inviting porch and circular stone bay. Were you to step inside you would, no doubt, be made doubly welcome, first by its owner, then by his trusty dog, and peeping around your mind would be carried far away to foreign climes by *bric-à-brac* of Oriental shape and fashion. A large group next meets the eye as we pass under the large trees and across the lawn. The landscape is made up of old birch, oak and chestnut trees, from the foliage of which spring turrets, chimneys, gables and oriels. There is a large picturesque Queen Anne house, with its stained shingles, here two more smaller ones, and under the trees a Swiss cottage, with roof projecting four feet or more, and with a veritable bird's-nest hanging from one corner. On the staircase hangs the hospitable name "Engleside." A wide piazza greets you, and the shingles are black and rusty with apparent age; not so, however, for there is not a house here that existed six years ago.

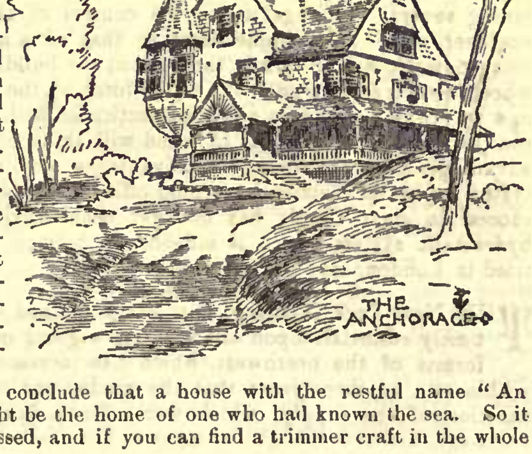
Across the way, and backed up by a veritable forest of tall chest nuts, stands "Redstone," with its high roof and massive chimneys



which seem to indicate a roaring fire at the base of each one, and so there is at times. If you do not believe in open fireplaces, and large ones, too, just step in here and sit down for a minute before the hall fireplace, which measures five feet in the opening. The hall itself runs two stories high, with an open-beam ceiling; the walls are colored in Indian red, and on one side of the second-story runs a regular Romeo and Juliet balcony, which looks directly over into the great fireplace below. You may, if you are fortunate, see three or four little heads peering through the balustrade, but do not be alarmed, you came to see the fireplace only.

Whole logs disappear within this cavern in winter, and give out not only heat, but a sense of hospitable cheer and comfort, which puts to shame the most expensive iron, brass or gold grate-fireplace ever placed in the city of New York. "Hearth, Hall, welcome all," cut in the frieze means just what it says. The staircase is very wide, with a knight in full armour in glass-work in the large window, and on its landing stands an old clock that strikes a cathedral gong; it tells us also that we must hurry on, but not before getting a glimpse of the dining-room conservatory, in which a fountain plays away to its heart's content, and showers itself upon gold-fish and turtles; a lemon tree stands beside it in full fruit, and with beautiful effect.

From a balcony we look across and see the picturesque roof of the "Seven Gables." The abundance of the trees which surround the houses shows here and there a gable, but you must seek many positions before you see the *toute ensemble* of this house. Above the library bay breaks a square balcony with curious posts, and from the dining-room runs a wide piazza, with large pavilion hung with hammocks and swings, which offer a cool and inviting retreat from the sun. Could Hawthorn enter upon this scene he would probably seek out the quaint library, with its simple brick fireplace, and well-filled shelves.

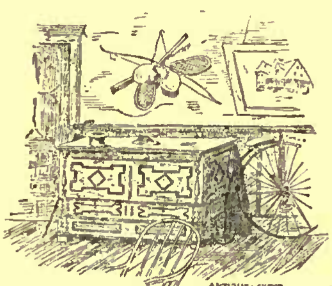


One would conclude that a house with the restful name "Anchorage" might be the home of one who had known the sea. So it is, rightly guessed, and if you can find a trimmer craft in the whole squadron we should like to see it. It looks down upon you from an eminence, and from its crow's-nest hanging from a corner you may see far away to sea, while high above from the mizzen-top, as it were, flies a metallic pennant. Further, I give you my word, if you enter the cabin door you will receive a hearty welcome, and the best the ship affords.

In your view from its windows, you have, no doubt, looked across to "Sunnyside," with its outside chimney; across the brook to "Oak

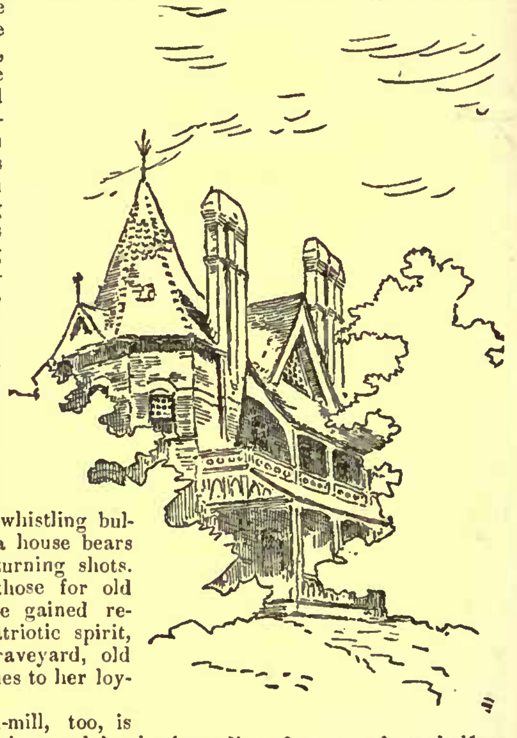
Lodge," or the other way through the forest trees to "Montview," with its superb little park in front, fitted up with swings and hammocks and everything to make glad the hearts of the children. Winding around the road you come upon a new stone house partly built, and promising to be a beautiful production; a low, massive, arched entrance, with cobble-stone ornamentation; a stone terrace; a long simple roof broken by dormers and ornamental chimneys is all that forms this beauty, but its dignified appearance is most pleasing. If you look across from this terrace three or four more houses appear, each bearing its particular charm, and surrounded by the forest trees.

Only a short distance off is the "Hammock," with its slanting roof and circular stone bay, and through the tree-tops are the gables of another, from whose windows come strains of most enchanting music. In the former an old chest will catch your eye as you enter, which is — well, I dare not say how old, but something less than a thousand years, I fancy, and over which are hung rackets, bows, arrows, boxing-gloves and other implements of prowess. Still farther on we pass the "Chestnuts," with its quaint staircase, and then on to the "Last Resort." "Excuse these tears in business hours," says my companion, "but I actually weep with bygone laughter to think of the stories that have emanated from that roof, and actually loosened its very shingles, besides adding avoirdupois to many a resident who believes in the 'laugh-and-grow-fat' theory." Almost hidden among the trees you will find it a cool place in summer, and a warm, jovial one in winter.



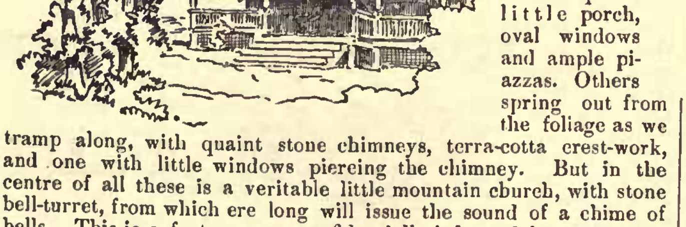
Antique-Chest The Hammock

If we keep on this present road we shall enter the primeval forests, untouched as yet, but awaiting the time when the woodsman's axe will clear away spaces, and welcome other habitations. Turning back then, and following another road we pass the "Châlet," with its stone terrace; opposite, another stone house with crow-stepped gables, and, built into the hill, reminding us of many a Brittany house, still another with a quaint little porch, oval windows and ample piazzas. Others spring out from the foliage as we tramp along, with quaint stone chimneys, terra-cotta crest-work, and one with little windows piercing the chimney. But in the centre of all these is a veritable little mountain church, with stone bell-turret, from which ere long will issue the sound of a chime of bells. This is a fact, we are confidentially informed by a resident, who is evidently not the sexton, nor does he pump the organ, but is just as much interested in the church as if he did. The



interior is about seventy feet long, and covered by an open-trussed roof, ornamented with simple Gothic tracery. Step under the low massive arch into the chancel, and look back; the afternoon sun streams through a large and magnificent memorial window, and floods the nave with subdued light, bringing out the tints of the wall, and the warm wood-work of the benches and little wine-glass pulpit.

My companion, wretch that he is, remarks that he "has n't stayed in a church so long for a year," and is anxious to get out, so we will continue our tramp down the hill. "Hickory Hill" shields the home of piazzas, and the "Lodge" below, which, although the smallest house in the park, *is* so minute and pretty that many an eye has looked upon it with envy. We are coming now to a view of which I wish you to take particular notice. On a knoll stands a large brick house, "Knollwood" by name, with spacious piazzas and balconies, and in front of this we will sit down under the large branching trees. Before us, and far to the south, are the Narrows, the heights of Staten Island and Navesink; nearer, is Newark Bay, and scattering here and there in the middle distance are villages looking like so many little paper boxes. Among them is old Springfield, of revolutionary fame. There it was when the British invaded the town that old General Stark shouted to his brave little band, "At 'em boys, they 're ours to-day or Mollie Stark's a widow!" There, too, is the little white church steeple, made memorable by the good old deacon, peaceable enough in peace, but no less determined in war, who, finding that the boys were getting short of gun wadding, rushed into the church, and bringing out an armful of hymn-books yelled out, "Give 'em Watts, boys, give 'em Watts!" and sure enough they did give them Watts to the music of whistling bullets, and many a house bears the marks of returning shots. Glorious times those for old Springfield! She gained renown for her patriotic spirit, and the little graveyard, old and mossy, testifies to her loyalty.



The old wind-mill, too, is seen lazily revolving, and in the immediate foreground are half-a-dozen more houses. Directly at the foot of the hill, and flanked by a row of large chestnut trees is a house which frightened the neighbors by its sunset effects. It is named "Sunset Cottage;" if we mistake not the name is wrought in sea-pebbles on a rough-cast panel. A quaint Brittany turret occupies one corner, with a sun-dial on its face bearing the motto, "*Ars longa est, vita brevis est,*" and on

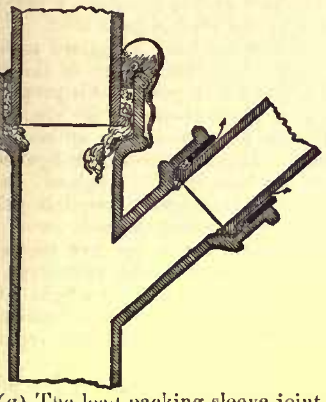
Sunset Cottage.

the other side is a massive chimney tapering towards the top, and with a veritable water-butt at its base. The coloring is a dull golden stain at the gable tops, gradually shading down into deep Indian red at the base, and were there an old well-sweep there we would swear the house to be a hundred years old.

But there sounds the whistle! a quick train will take us back to the city, so let us away. We have had a good tramp, a pleasant afternoon, a glimpse of thirty or forty houses, and a good long sniff of pure mountain air; what more could one desire?

SANITARY PLUMBING.[1] — XXV.

CLASSIFICATION OF THE DIFFERENT KINDS OF JOINTS.



PIPE joints may be divided into four general classes: —

I. The bell-and-spigot joint.
II. The sleeve joint.
III. The screw joint.
IV. The flange joint.

These may be subdivided as follows: —

I. The bell-and-spigot joint into: —
(*a*) The hand-calked lead.
(*b*) The machine-calked lead.
(*c*) The ball-and-socket.
(*d*) The rubber ring.
(*e*) The soft packing.

II. The sleeve joint into: —
(*a*) The lead-packing sleeve joint.
(*b*) The plain-ring " "
(*c*) The divided-ring " "
(*d*) The bolted-ring " "

III. The screw joint into: —
(*a*) The flanged screw joint.
(*b*) The inner-ring " "
(*c*) The outer-ring " "
(*d*) The plain " "

IV. The flange joint into: —
(*a*) The spigot-and-socket flange joint.
(*b*) The spherical " "
(*c*) The loose-ring " "
(*d*) The wedge-and-key " "
(*e*) The plain non-adjustable " "
(*f*) The plain adjustable " "

I. The Bell-and-Spigot Joint.

(*a*) Figure 135 shows the ordinary hand-calked joint. It is made with lead and oakum or jute. A gasket of jute or other similar fibre is inserted into the cavity of the bell or hub, and the spigot end of the length next above it is set firmly down upon it, or the gasket is rammed in with a tool after the lengths are set up. The gasket is used to prevent the lead from running out of the joint and obstructing the bore of the pipe at some point below, besides wasting the lead. The lead is now poured upon the gasket from a ladle, and shrinks as it cools. The calking-tool must then be used to expand it again, and drive it into the cavities and pores of the iron. A faithful and skilful operator can, by perseverance, succeed in fitting the lead into the iron at all parts of its circumference, so as to make it tight for a time, just as a painstaking dentist can drive the gold, by patient labor, into the cavities of a tooth, and temporarily arrest its decay. But the process in both cases is slow and uncertain. The dentist confines his calking to a single small spot, well within his reach, and he labors with extraordinary care. Yet the filling often fails when put to the test. The plumber must work quickly over an extended field often in awkward positions; he must perform a delicate task with clumsy tools. The metals to be welded together are often so placed that it is impossible, without the utmost patience and skill, to reach them properly. The result is that when put to the test the joint *almost always* fails. Extra-heavy pipe and hubs are required to withstand the blows of the calking-tool. Lighter pipes cannot be made tight without danger of cracking the iron. The writer has made a number of tests on pipes of different thicknesses with the aid of an experienced pipe-layer and calker. With double-thick pipe joints could be made which would stand the hydraulic test or a water-pressure equal to that produced by such a test at the bottom of an average city house. Almost invariably a second calking was found necessary after the plumber had carefully done the work once in a manner which he considered sufficient, and had pronounced it completed. The single-thick pipe could not be made to stand the water-pressure test at all. It was cracked by the calking-iron before it had been made tight. Were the hydraulic test, now recommended by sanitarians, to be applied to all the cast-iron soil-pipes set up within the last year in city houses, not one in a hundred would be found to hold water. The experiments of Colonel Waring and other authorities in this direction fully corroborates this statement. Colonel Waring says, "I have recently had occasion to test the soil-pipes of a large house of the best class, where the greatest effort was made to secure tight work, where the joints were so exposed that there was no difficulty in calking them thoroughly, and where there was every reason to suppose that every joint was absolutely tight. On closing the outlets, and filling the pipes with water the whole system leaked like a sieve."

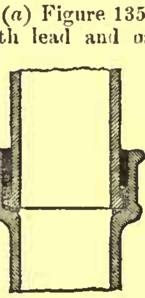


Fig. 135.

The ordinary Hand-Calked Bell-and-Spigot Joint.

It is now generally recognized and acknowledged that a plumber's calked joint is rarely either air or water tight, though a vast amount of lead and labor is spent on them to make them so. When we reflect that the sole aim and object of a soil-pipe joint is to make a gas and water tight connection between pipes, we see that the method commonly employed is an absurdity, and reflects little credit upon human ingenuity.

Even supposing that, by chance, a calked joint has been made to stand the test which is now properly required of it when new, its tightness is very soon destroyed by the expansion and contraction of the pipes, caused by the passage through them of hot water or steam. The expansion of the spigot is in such cases greater than that of the hub, because it is on the inside nearer the heat and not protected like the latter from the hot fluids passing through the pipes. Hence, the lead is temporarily compressed between the spigot and hub, and, being inelastic, does not resume its original bulk when the pipes cool again. A minute opening is thus formed all round the spigot, as shown in the lower branch of the pipe in the initial cut, and the joint leaks.

The object of requiring the whole system of pipes used in plumbing a house to be filled with water as a test, is not only to determine the tightness of the joints in a manner which is impossible with the peppermint or smoke tests, since these can be eluded by a temporary coat of paint or putty; but also to try the quality and thickness of the metal. If a pipe is very defective in casting its weakness will be revealed by a strong pressure test, and the faulty piece rejected.

The longitudinal expansion and contraction of the soil-pipe also affects, often still more seriously, the calked joint. When a length of pipe contracts the spigot is drawn away from the hub of the adjoining pipe, and if the second pipe is held fast the hub cannot follow it. The two must, therefore, separate slightly, and the movement draws the lead ring outwards with it. The spigot then returns again under the influence of expansion, but the lead ring does not necessarily return with it, but often remains protruding slightly from the socket, and the joint leaks. This process may be repeated until the lead has been drawn out a considerable distance from its proper position. Every plumber knows how common a thing it is to find the lead thus protruding from the socket in pipes which have been for a certain time in use in trying positions.

The calked joint is incapable of resisting any severe tensile strain which is often brought to bear upon it by the settling of the house. The only thing which resists such a strain is the artificial contact or compression produced between the two metals. This may be very feeble with smooth pipes, where but a small quantity of lead is used, and the calking has been spared.

Another serious objection to this joint is the difficulty of disjointing pipes in which it is used. The usual way to take out a pipe, once so put together, is to break it to pieces, and then remove it by degrees. There is, in fact, no practicable alternative; for to melt off the lead would not only be expensive and dangerous, but involve the disjointing of quite a considerable length of pipe in order to enable a single spigot to be lifted two inches, or enough to disengage it from its hub. Now alterations in our plumbing arrangements are necessarily so frequent that this objection becomes a serious one.

The necessity of using fire in a house in process of construction for melting the lead necessary to make this joint is also a formidable objection to it, on account of the danger of igniting the surrounding carpenter's litter, and burning down the house. It is true that lead or solder melting would have to be carried on for other purposes, such as wiping the joints on the smaller pipes, but the less use we have for the solder-pot the less will be the danger, and the less the temptation for the workmen to carry on the melting in dangerous places in order to save himself the trouble of running up and down wearisome flights of stairs to a place of safety.

Still another very serious objection is the temptation this joint opens for fraud. The lead may be partially or even wholly omitted without very great risk of detection, since it is out of sight, and frequently immediately covered by a coat of paint. The calking may be still more easily slighted. If the hydraulic test is not demanded, a coat of paint or a little putty will easily make the joint stand the smoke or peppermint test. A few of the joints well within the reach of the house owner may be filled with genuine lead, while all those which are covered by floor boards, or are not easily accessible may be composed of paper and sand, and covered with putty. Possibly a thin coating of lead may be poured on top to present an honest appearance, and satisfy the suspicious and shrewd house-owner who goes about probing the nearest joints with his pen-knife in order to ensnare "the rascally plumber."

The "*Sanitary Engineer*" narrates a striking illustration of audacious fraud in the use of paper and sand joints, as follows: —

"I cannot better describe it than to quote a conversation I recently had with a journeyman plumber who had been looking for employment. He said: 'I was looking for work, and I went into a shop on Second or Third Street, I am not sure which, and asked for a job. I was told that they needed no more help, and the clerk proceeded to inform me that they had a man that was able to iron-pipe two ordinary three-story-and-basement houses in a day. I pretended to doubt this statement, when he said, 'Why —— bet the boss five dollars he could do it, and he did it and won the five dollars.' I asked the man, who was standing by, how it was possible to even stick the lengths together, or even calk them at all. He replied, 'Oh, I just put a little paper in each joint, poured in some sand, and then, when the pipe was all up, I went over the job with my pot and ladle, and poured a little lead on the front of each hub.' This

[1] Continued from page 305, No. 441.

frank admission fairly indicates the character of a great deal of work that has been done this summer in many parts of the city."

The initial-cut shows a defective joint produced by carelessness, which is only another form of fraud. The jute has been driven beyond the end of the spigot, and projects into the interior of the pipe, forming an obstruction to the water-way, and the nucleus of a deposit which may ultimately choke up the drain.

By careless packing of the jute, also, lead may be dropped through the crevices in the packing, and itself form an obstruction in the pipe. A large amount of lead is thus lost to the master-plumber by his workman.

Where putty is used over the jute packing instead of lead, rats and mice may eat away the putty, or it may be cracked by jars or settlements in the building, and an entrance for sewer-gas be thus occasioned.

Mr. William Paul Gerhard, C. E., in his excellent book, "*Hints on the Drainage and Sewerage of Dwellings*,"[1] well says, "no other part of a common plumbing job shows so many defects as a stack of iron, soil or waste pipe; there is scarcely another detail in a system of drain-pipes for a dwelling in which so much rascality or criminal stupidity is shown than in the manner of making joints in iron pipe, and this is especially the case wherever architects or builders tolerate such pipes to be built into walls, inasmuch as, under such circumstances, defective joints are readily covered up and brought out of sight. . . . The manner of applying the gaskets of oakum; the quality of the melted lead; its purity; the temperature to which it is kept in the pot on the fire; the manner of pouring the lead, and, finally, the operation of calking it after shrinking; these are all details worthy of careful consideration, but, unluckily, seldom looked after in plumbing a dwelling. . . . It has been my personal observation that honest and conscientious plumbers—with best possible intentions to do only first-class work — were frequently unable to calk the lead of joints sufficiently tight without splitting the hub of the pipe. In other cases the joint could not be made tight owing to the impossibility of reaching all parts of the lead in a joint with the usual calking tools, the soil-pipe being located in a recess or partition."

There is still another very serious fault in this joint. It is a fault but little considered heretofore, because it is only of late that it has been found necessary to apply the hydraulic test to pipes of the soundness of which we desire to be assured. Pipes so jointed admit of no simple method of closing temporarily the ends and branch-outlets left for connection with fixtures in order to permit the pressure test to be applied.

It has been the writer's custom invariably to specify that the hydraulic test should be applied whenever he has called for ordinary pipes; but he has never been able to have this provision executed without the utmost difficulty. The plumber uses every possible means to avoid the task. He knows in the first place that it will inevitably betray a host of leaky joints and defective pipes unless his work has been done with extraordinary care, and attended with unusually good luck, and few plumbers have, as yet, provided themselves with the proper appliances to close the openings in a satisfactory manner. Thus, though the pressure test is of the utmost importance, architects find it exceedingly difficult to enforce its application. Where it is called for in the specification it is beginning to be customary for plumbers to raise considerably their figures when they believe this provision will be enforced. Although there are several ways of accomplishing the temporary closure of the outlets, all of them are expensive, and difficult of application. The most common way is to press India-rubber plugs against the outlets by means of iron disks, rings, bolts and nuts of various forms.

Speaking of the great importance of applying the pressure test, the "*Metal-Worker*" says: "A pipe may be tight and apparently sound, yet of so thin a substance that the least pressure will destroy it or break it through. Joints may be tight at the moment, though barely filled with a thin coating of putty blown out almost at a single breath. Such pipes, though tight for the moment, are not safe against the slightest pressure, and at any time may be liable to have their continuity broken by a slight jar. The longer we study this subject, the more completely do we become convinced that the true remedy for this state of things is a test of the soil-pipes by pressure. Scamping is so easily done, and so difficult of detection that it seems impossible to avoid it, even in the best jobs which may be constructed. A large proportion of the work is done in difficult situations, where the workmen has every temptation to save himself labor and discomfort, and in such situations poor work is the rule rather than the exception. . . . . The real objection to such a test is to be found in the fact that it calls for perfect workmanship throughout. It demands just what every house-builder and house-owner wishes to have, but just what it is very difficult to obtain from even the best plumbing establishments in the city. In gas-fitting, which is much less difficult than plumbing-work, no sane man would dare to trust a large job without carefully testing it under pressure. We do not think it will be many years before the method of testing by pressure will be made a requirement in the best jobs of plumbing-work."

Finally the lead-calked joint when faithfully made, is very expensive both in material and labor. The amount of lead required for each joint, including waste, is estimated at about a pound for every inch in the diameter of the pipe. Thus an ordinary 4-inch soil-pipe consumes four pounds of lead in each joint.

[1] Published by William T. Comstock, 6 Astor Place, New York: 1884.

The average length of time required by a skilful pipe-layer to make a single joint is estimated at twenty minutes, not including, of course, the planning of the pipe-system or the cutting and general arrangement of the pipe sections for their proper positions, a part of the work which has no connection with the kind of joint used.

Instead of filling the joint with lead, it has been suggested to use some alloy which expands in cooling. But this is open to the important objection that most of the alloys which possess this property are too expensive. Old type-metal is perhaps one of the cheapest alloys which has been suggested for this purpose, but the antimony it contains renders it too hard and brittle. Belvidere bronze or Spence's metal, an alloy of iron and sulphur, has been tried in England. It is also brittle, and has the additional disadvantage of requiring the pipes to be heated to ensure its running all round the hub, owing to its very low melting point. Nevertheless the writer has seen excellent joints made with this material which has the advantage of being economical, and when properly applied, of making a tight joint without calking. Our experience with it is, however, too limited at the present time to enable us to make any positive statements regarding its use for pipe-jointing as a substitute for lead.

Thus we find that the ordinary hand-calked bell-and-spigot joint possesses only one of all the eleven desiderata given in our table of requirements for an ideal joint. It is unreliable, incapable of resisting the effects of expansion and contraction, or heavy strains; requires unusual skill in its formation; will not admit of disjointing for repairs without its partial destruction; affords every opportunity for fraud by covering up the traces which might lead to its detection, and it is expensive. Its only important merit is its compactness and the facility with which it may be made to conform to the irregularities of the structure for which it is intended.

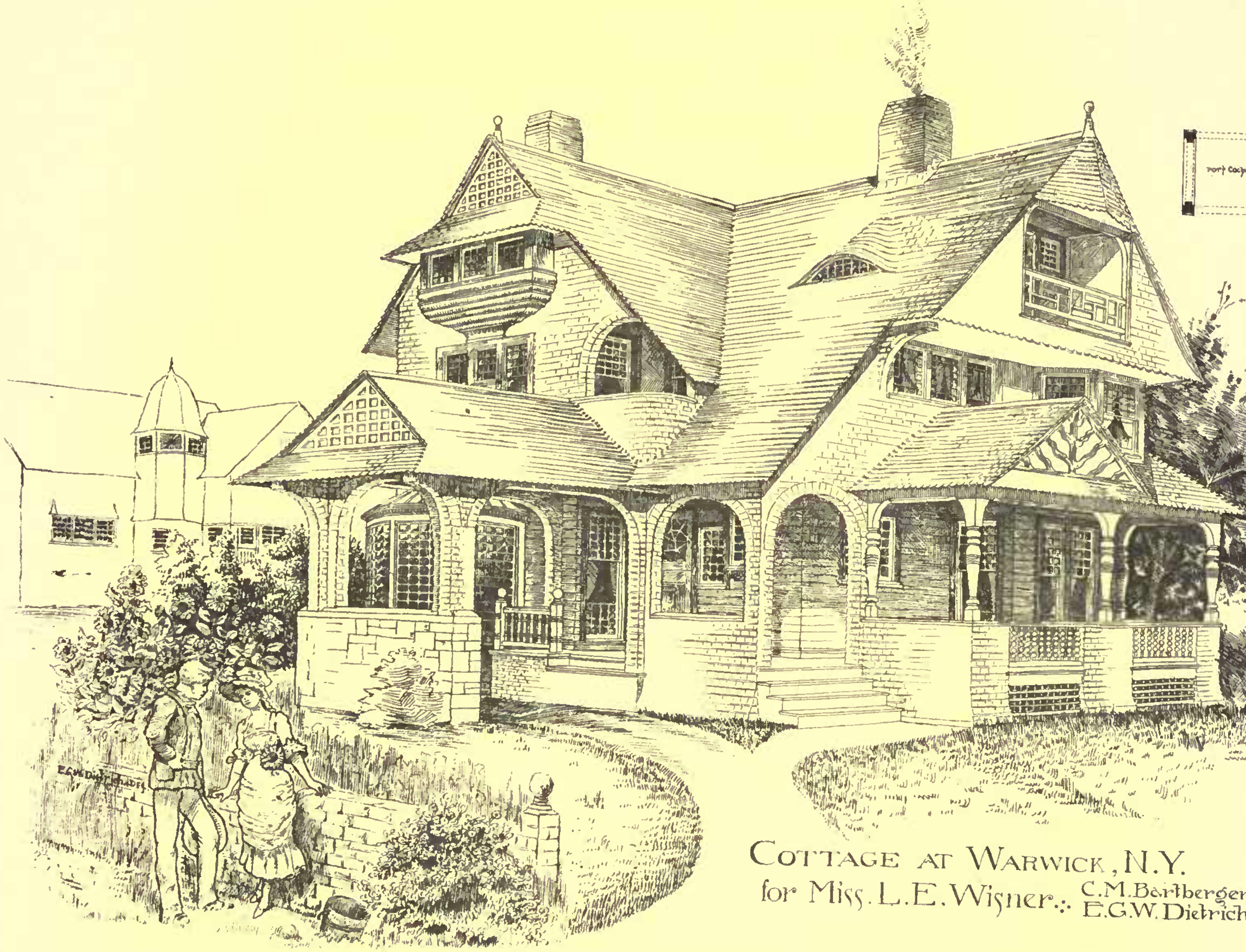
If now we examine the form of this joint from a scientific standpoint with a view to determining the principles which give rise to its failure, we shall arrive at the following conclusion: Its inability to resist changes of temperature is due to the fact that the bell and spigot are so placed relatively to each other and to the interior of the pipe that they cannot be equally affected by changes of temperature, from within or from without; while the packing is so placed that when the pipe is heated, say from within, it is obliged at every point of its circumference to receive the full compression due to the excess of expansion of the entire diameter of the spigot over that of the bell. In other words, the *smallest* dimensions of the packing-ring is obliged to receive nearly the entire variation of size of the *largest* dimension of the spigot. The thickness of the ring is reduced by the expansion of nearly the entire diameter of the spigot, and owing to the absence of the property of elasticity in lead, the reduction in the thickness of the packing-ring is permanent while the alteration in the size of the spigot is only temporary. From this consideration we deduce the following laws with regard to the form of pipe joints:—

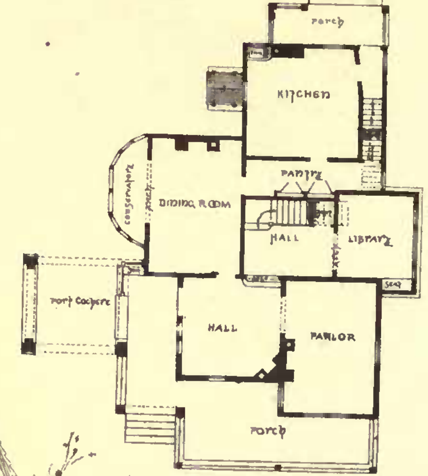
(1) *No bell-and-spigot joint having packing between the bell-and-spigot is capable of withstanding the effects of the lateral expansion and contraction of the pipes unless the packing has an elasticity sufficient to restore the alterations in its thickness produced by the difference of expansion and contraction of the entire diameter of the spigot over that of the bell.*

(2) *Inasmuch as no packing material having this degree of permanent elasticity has been as yet discovered suitable for drain-pipes, no bell-and-spigot joint having packing between the bell and spigot is capable permanently of withstanding the effects of considerable variations of temperature such as are produced in plumbing by the passage through them of hot water or steam.*

Another point which is defective, regarded from a scientific standpoint is the direction in which the power required for calking is applied. The surfaces to be welded together are at right angles with the pressure applied instead of being in a direct line with it, as it should be. Hence a great loss of energy is sustained, and in order to render it possible to apply power in sufficient quantity to do the work it must be applied successively at small portions of the joint at a time, instead of simultaneously over the whole. From this results a loss of time, and the peculiar form of the hub renders it necessary that the calking be done through the medium of a tool by hand, which increases the loss both of time and energy. The edge of the tool cannot be made to fit exactly the space between the bell and spigot, but must be considerably smaller in order to allow for variation of casting and setting. Hence, it acts like a blunt chisel, partially embedding itself in the lead at each blow of the hammer instead of exerting a uniform pressure exactly at the points desired. The proper use of the tool under these circumstances requires considerable skill on the part of the workman, and, as the effectiveness of the calking depends much upon the manner in which the tools are handled, the quality of the joint is largely dependent upon the skill of the operator, whereas it should evidently be entirely independent of skill, the required degree of skill being not always at hand. A still further loss of energy is accordingly sustained, inasmuch as it is contrary to the theory of chances that, even presupposing the most perfect skill of manipulation, the precise position and direction best suited to the varying conditions of the metals to be welded, should be given to the calking-iron at every blow. From these considerations we deduce a third law regarding the form of pipe joints, namely: —

(3) *The joint should be so constructed that the power required for its formation may be applied to the best advantage, and its application must be independent of skill on the part of the workman.*





First Floor.

Cottage at Warwick, N.Y.
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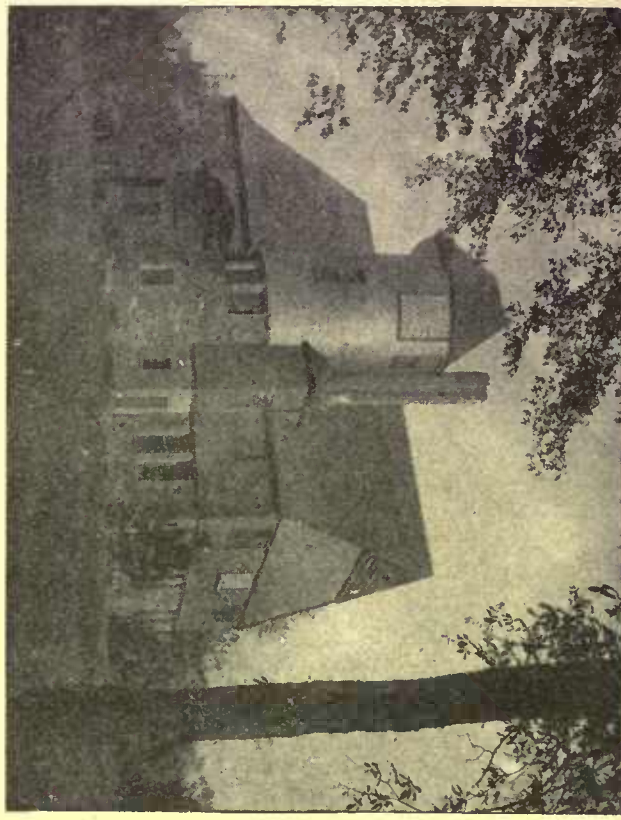

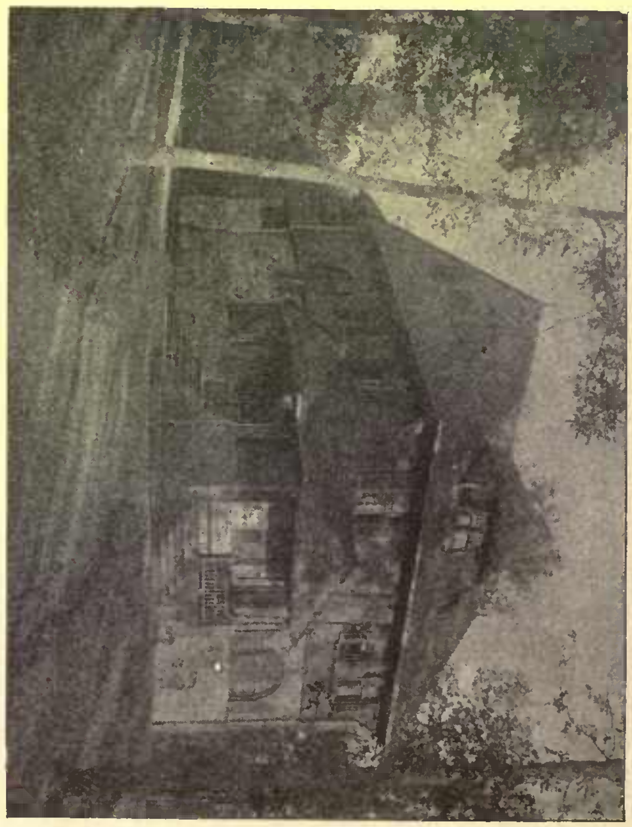

Views at Short Hills, N.J.

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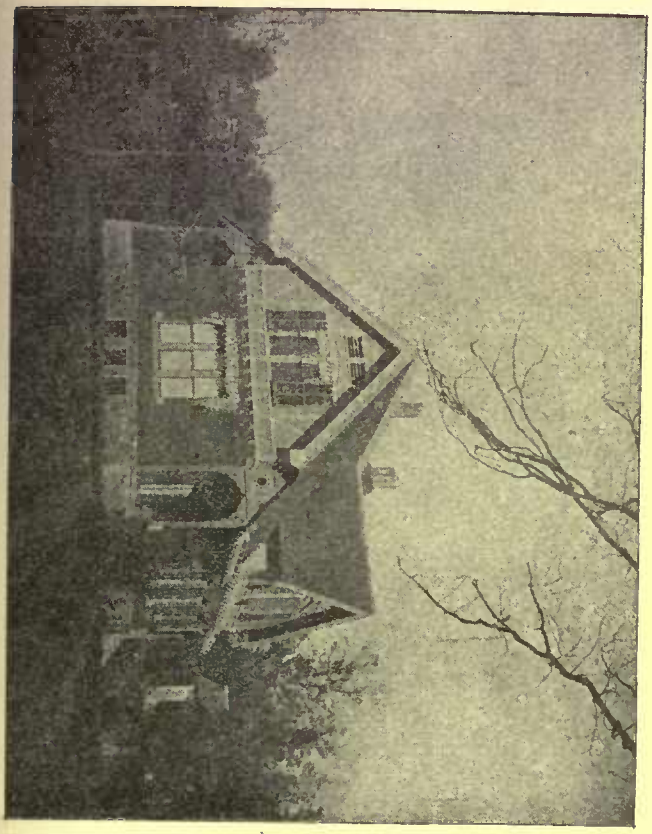

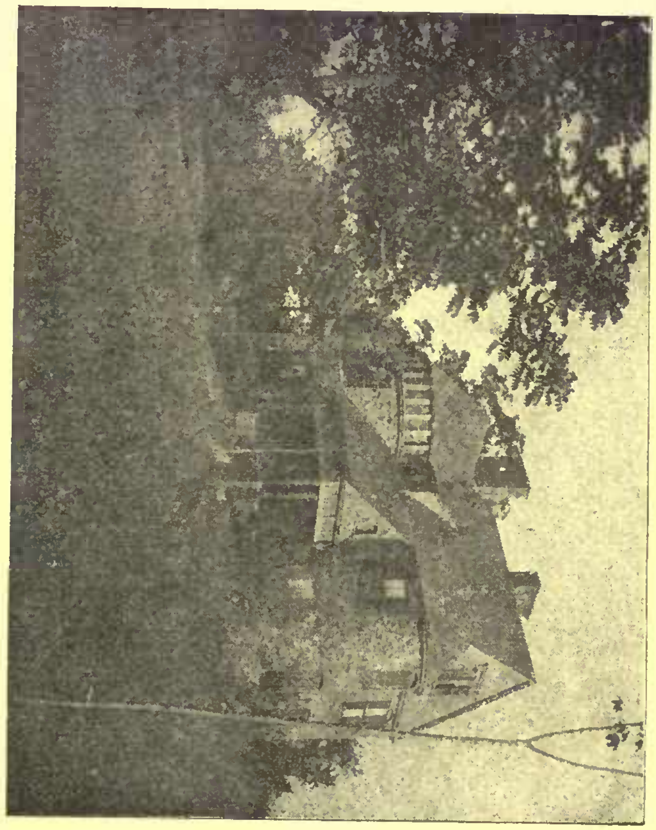

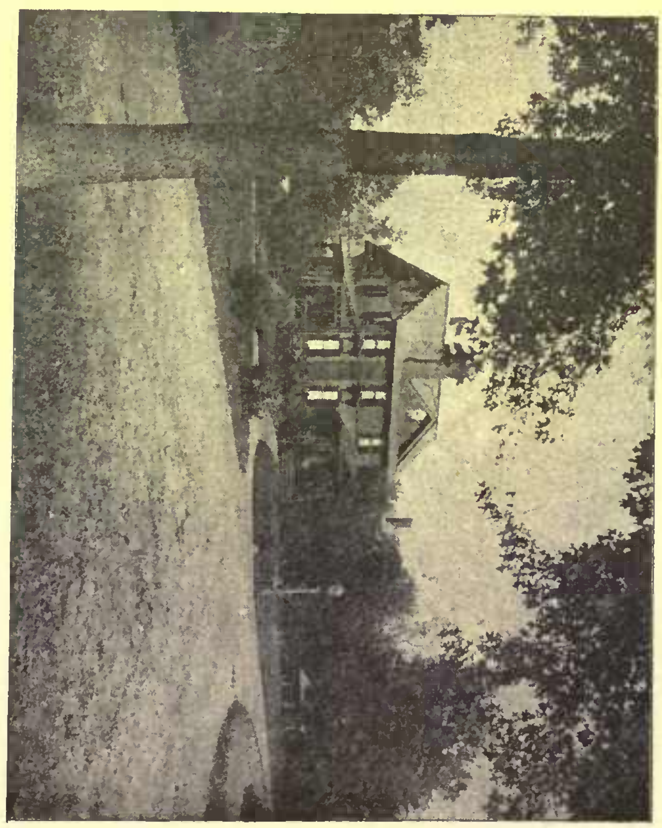

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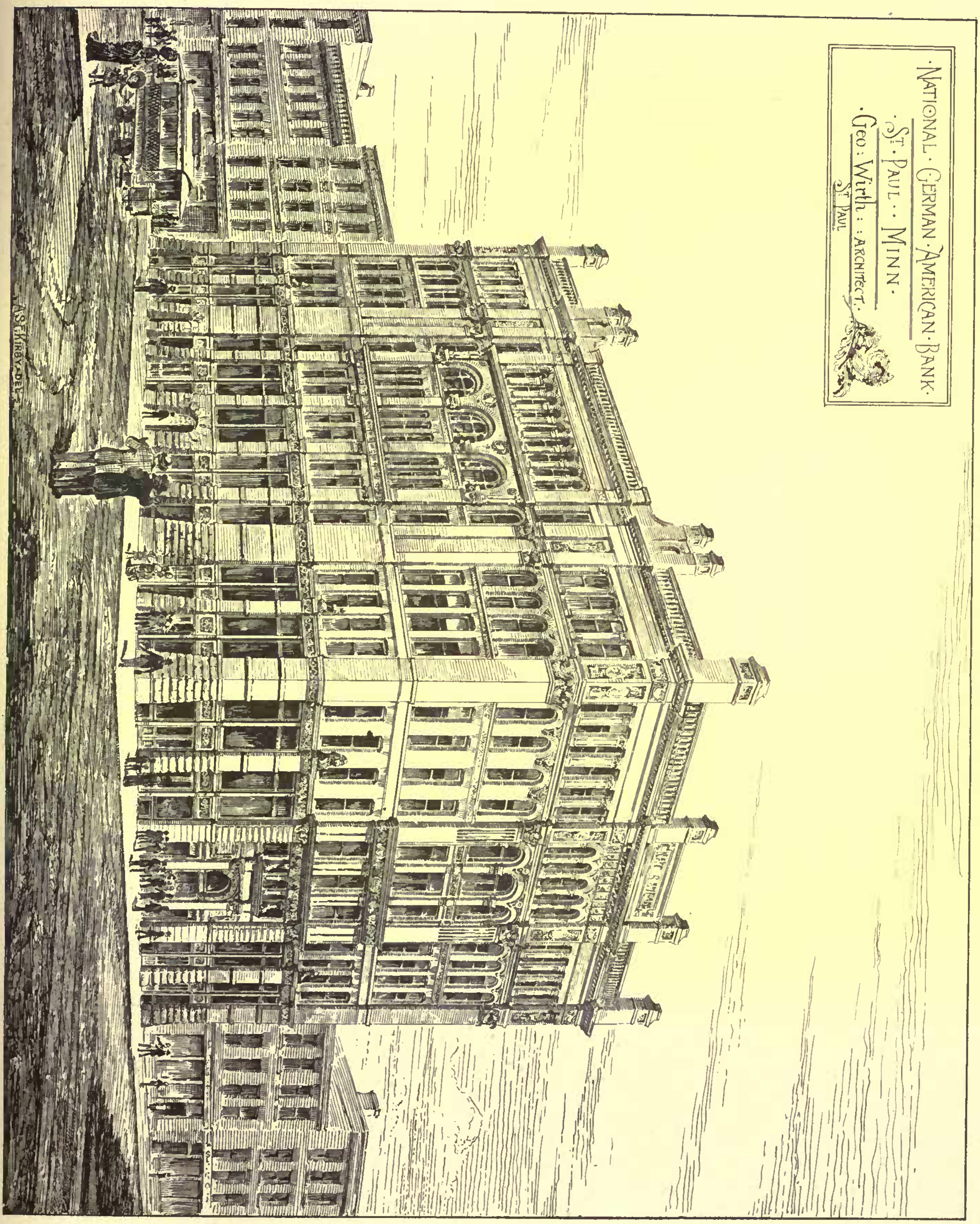

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THE ILLUSTRATIONS.

VIEWS AT SHORT HILLS, N. J.

AS we think it not impossible that the negatives (amateur) from which these views are reproduced may have got mixed, we will not attempt to identify them, but will leave readers of "An American Park" to puzzle out the names and titles from the description therein. We can only say that the "Music Hall" is the work of Messrs. McKim, Mead & White; the "Anchorage," "Engleside," and "Seven Gables," of Messrs. Lamb & Wheeler; "Sunset Cottage," and "Redstone," of Messrs. Lamb & Rich; "Knollwood" (not shown), and the "Lodge" of Mr. A. B. Jennings, all of New York; while "Greystone" (not shown), was designed by Mr. W. H. Wood, of Newark, N. J.

COTTAGE FOR MISS L. E. WISNER, WARWICK, N. Y. MESSRS. BARTBERGER & DIETRICH, ARCHITECTS, PITTSBURGH, PA.

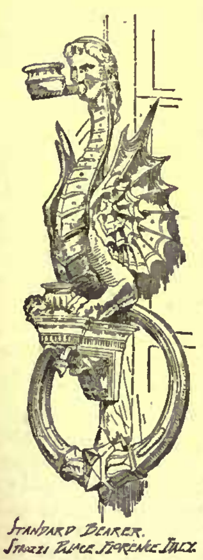
THE NATIONAL GERMAN-AMERICAN BANK. MR. GEORGE WIRTH, ARCHITECT, ST. PAUL, MINN.

THE size of this building is 100′ x 150′; size of banking-room 50′ x 100′, 18′ high. The building is arranged for offices, has two elevators and forty-five fire-proof vaults. Stairways of iron and slate, with partitions and floors made with hollow fire-proof materials; all girders are iron. The fronts are faced with Philadelphia pressed-brick and terra-cotta from the North-Western Terra-Cotta Company, Chicago. The piers in the basement are of Duluth brown-stone, with pilasters of polished jasper. The banking-room will be finished in birch and bird's-eye-maple. The cost of this building will be $225,000.

STAIRCASES.[1] — IV.

THE TRANSITIONAL PERIOD IN ENGLAND. — ELIZABETHAN.

"The stately homes of England,
How beautiful they stand!
Amidst their tall ancestral trees,
O'er all the pleasant land." — MRS. HEMANS.


STANDARD BEARER.
STROZZI PALACE, FLORENCE, ITALY.

THE Renaissance of Italy began to affect the architecture of England in the reign of Henry VIII, early in the sixteenth century,[2] but more imperfectly than in the coeval era of François Premier. Italy was then the cynosure of all eyes. Its arts, its universities and its learning magnetized travellers from the most distant countries. The age of Leo X was destined to mark a brilliant period in its history. At first progress here was slow, though guided, as in France, by imported foreign artists[3] and by the descriptions of travelled nobles. The amalgamation of the Italian, grafted as it was by the local artists on the later Tudor Gothic, produced but a bastard fusion. No ancient examples existed whereby to guide or inspire; we cannot wonder, therefore, at the rudely outlined imitations of Southern elegance. It had a certain charm, however, all its own. The condition of society permitted now the abandonment of the fortified manorial residence, while with the accession of Elizabeth in 1558, and during this and the reign of the first of the Stuarts, an immense impulse was given to the erection of large and costly houses containing apartments of great size. These were arranged round a central court, with the principal apartments looking outwards. The staircase became much amplified (owing to the chief rooms being upstairs), though retired in situation, and ultimately usurped the place of the hall, which from the days of the Saxons had formed an integral part of the feudal system, and had held the place of honor in every house. The source of inspiration was the Italian examples; the materials, the details, the execution were essentially English, influenced to some extent by Holbein and other artists of the Low Countries and of Italy. In plan, circular forms and straight flights between parallel walls were now abandoned in favor of the rectangular open newel. The balustrading below the hand-rails in early examples — as at Boughton Malherbe, Kent, and Leeds Castle, Kent, were filled up with plaster,[4] but later this gave place to the vigorously-carved work which formed so conspicuous a characteristic of Elizabethan art. The staircases were subdivided into broad, short, straight flights, with numerous quarter-spaces and landings surrounding a central well-hole. One is struck by their large size, their quaint picturesqueness and artistic composition, their massive newels, and their richly-carved balustrades. A pictorial eye governed the grouping, a vigorous hand the detailing, careful workers the solidity and substantiality, and a liberal owner the wealthy profusion of oak or chestnut material which nature had placed at disposal in such abundance. The balustrade and newel occupied at no other period a position of such conspicuous importance. Nearly all examples have massive, solid newels of bold design surmounted by vases, baskets of flowers, miniature statues, columns, lions or grifins on their haunches holding shields, carrying armorial bearings and such like, with pendants below frequently connected with the top of the finials immediately under. In fact, they form one of the chief decorative and constructive elements of the design. In the early example at Layer Marney Hall (1523) they run from bottom to top and are connected by arches. In Benthall Hall, Shropshire (1535), we see the curl-edged scroll-work butting between massive newels, with, as is usual, a very broad solid hand-rail capping the balustrade. Aubrey, in his oft-quoted description of Lord Bacon's "Verulam House," says, "in the middle was a delicate staircase of wood which was curiously carved; and on the post of every interstice was some pretty figure, as a grave divine with his book and spectacles, a mendicant friar, and not one twice." Bacon himself, in his interesting essay describing a "Princely Pallace," says, "The Staires, likewise, to the upper Roomes, let them bee upon a Faire open Newell, and finally raild in, with Images of wood, Caste into a Brasse Colour: and A very faire Landing Place at the Top." Let us imagine, then, a staircase of the period thus, with its quarry-glazed mullioned windows, its walls decorated with panelled wainscot, or the rich tapestry which had now come into general use, and hung with bow and firelock, armor, pike, and pistol, the ceiling and raking soffits covered with highly-enriched plaster-work of peculiar complicated scroll-work, with many pictures, and a lavish profusion of ornament, and we cannot help being filled with a sense of respect and admiration for the richness of fancy which produced a sight so peculiarly attractive to a pictorial eye, so thoroughly in harmony with the brilliancy of the age, and so emblematic of the national life in which they were created. The late Sir Sydney Smirke, in his "*Lectures*," advises us to avoid "the wantonness of design in these staircases;" but we cannot help thinking that they possess some admirable points, such as the picturesque composition, the air of homely grandeur, and the solidity of construction prevailing throughout, which we may take a lesson from with advantage.

The influence of Holbein, who favored the Italian *cinque-cento* style, and of John of Padua may be said to have been predominant from about 1524 to 1580. The transitional staircase at Burleigh House, Northamptonshire (c. 1570), which has a large solid newel surrounded by stone steps (a feature we also find at Montacute and elsewhere), was, therefore, a plan most naturally to be expected would be much used. The raking barrel-vault, the cross arches with the groined landings, having massive ribs and pendants all covered with ornament, show clearly an Italian influence, and possibly the handiwork of the talented author of Longleat, which was then in course of erection. Hardwick Hall (c. 1590–97) has also a stone stair of immense size. The great bulk of the staircases, however, were of timber disposed round an open newel. Westwood House, Warwickshire, and Wakehurst, Sussex (c. 1590), are interesting, principally from the newels of the former being surmounted by complete Corinthian pillars having ball finials, while the latter is inclosed in a curious pilastered case.

The staircases of James the First's reign form a remarkably interesting and important group. Hatfield, by Thorpe (1605–11), stands out pre-eminent amongst the earliest and finest oak stairs of this reign existing. It measures about 21′ x 35′, and is comprised of five flights of steps. The newels, ornamented with delicately-carved arabesques, are crowned with armorial lions and miniature statues. The balustrade is formed of termini, with small connecting arches such as we find at Audley End, Essex, by Bernard Jansen and Thorpe (1503–16), an example in which scroll-enriched newels run from bottom to top, and Claverton, Somersetshire (1628). Shaped-hanging scroll-work under the stringer, the hatch-gate, the ornamental soffit in plaster-work, and the usual repetition of half the balustrading on the wall side, all combine to make a beautiful and representative example. Knowle, Kent, presents, with its double tier of superposed pillar newels and flat pointed arches, a rich and effective staircase of the period. In Holland House (1607), the Italian influence is strikingly seen in the rusticated balusters arched between, the ornamented stringer with its painted scroll decoration, and the broad cornice rail. At Ham House, Surrey (1610), we have a rich walnut balustrade filled with carved representations of armor and military trophies. At Charlton House, Kent, by Jansen (1607–12) — about the last of the foreign artists — there is one of massive chestnut; Lyveden Old Building presents us with a characteristic Jacobean example; Forde House, Devonshire (1610), Blickling Hall, Norfolk, and many other instances exhibit in their leading features the staircases of this period then erecting in England. Early in Charles the First's reign we have Aston Hall (1618–35), a fine staircase with a profusion of characteristic ornament; but perhaps the best is the somewhat similar one at Crewe (1615–36), where, in a space only 24 feet square, has been constructed "one of the most beautiful examples of the Transitional era, of excellent design and sound construction."[5] At Aldermaston, Berks (1636), we have another remarkably effective and highly enriched specimen of Charles the First's time. The newels are capped with large symbolical figures, and here we have also the hanging scroll-work and half balustrade against the wall we noted as at Crewe and Hatfield. The balustrade shows the decline in the style which commenced in this reign, the grotesque animals and figures holding shields and ornament, which we see in the still more debased

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[1] The Institute Prize Essay, 1884, by Thomas Purves Marwick, A. R. I. B. A., published in the *Building News*. Continued from page 309, No. 444.

[2] In 1618, when Torrigiano was employed by the king on the monument of Henry VII.

[3] See Sir Digby Wyatt's book "*On the Foreign Artists Employed in England during the Sixteenth Century.*"

[4] Parker's "*Glossary.*"

[5] Prof. Barry's lectures.

illustration from Rawdon House, Herts, where it is filled with hideously grotesque monsters. The best period had now passed, but the influence of the picturesque Elizabethan staircase, which in spirit was an essentially Gothic construction, died slowly. So late as the Commonwealth we see it in the staircase in Cromwell Hall, Highgate, where the newels are, as usual, surmounted by bold finials, and on the top are dwarf representations of the soldiers of Cromwell's army. The balustrade of thirteen bays is boldly designed, and carved with panels of military weapons, shields, festoons, and the usual interlaced strap-work derived originally from Germany and the Netherlands. From early in Henry the Eighth's reign to Longleat formed the first moiety of the Transition; Longleat to Whitehall the second. The latter period was but half a century, yet no subsequent epoch possesses an interest equal to this when Elizabethan or Jacobean art was at its best. We proceed to notice the development of a purer, if less pictorial style.

THE RENAISSANCE.

With the advent of Inigo Jones commenced the purer phase of the Renaissance. From its first incipient stages the traces of Italian influence had become more and more emphasized. Jones returned from his second visit to the South (1612) a thorough Palladian disciple, and he led Palladianism to the front, where it remained for a century and a half,—until after the publication of Stuart's "*Athens*," in 1762. The houses under his influence became copies of Italian villas, cubical blocks without courts, the offices in a basement instead of being brought into touch and harmony with the surrounding landscape, and a total contrast to those immediately preceding in the reign of Elizabeth and the early part of the reign of James I. Symmetry and formalism, porticos and colonnades, were now substituted for the domestic convenience and irregularity of the Elizabethan mansion. The staircases were dressed in Italian costume to match, and planted in a conspicuous situation so as to be seen and form a stately approach. Timber was still greatly used, and the quality of the workmanship was admirable. The staircases designed by Jones stand out pre-eminent for beauty and solidity of construction. The finest is undoubtedly that leading from the entrance hall to the first floor of Ashburnham House, Westminster[1] (*c.* 1650), which has been illustrated by Ware, Britton, and Pugin, H. W. Brewer, and latterly by the Institute measured drawings. Sir John Soane, who was a great admirer of this architect's staircases, had also careful drawings of it prepared, which he frequently brought under the notice of students, in his Royal Academy lectures, recommending it to their very careful study.[2] It is composed of four ranges of steps, occupies a space of only 23 feet square, and is 43 feet to the top of the beautiful oval lantern and gallery. This lantern is the charming feature of the composition. It is surrounded by twelve small Ionic columns in triplets resting on a deep coved entablature. The lower portion of the walls are richly panelled and subdivided by fluted Ionic pilasters.[3] The balustrade is composed of regular balusters horizontally moulded, and all the details except the ceiling are of wood constructed largely out of the solid, and put together where necessary with wooden pegs. The whole composition is an example of exquisite proportions and refined delicacy of taste. The staircase at Ambresbury, Wiltshire (*c.* 1661), we have had occasion to refer to in a previous part of this paper as containing a service-stair within the circumambient principal. As Jones died in 1652, the actual execution was carried out by his nephew and pupil Webb. It measures about 18 feet square, the balusters similar to those in Ashburnham House, but slightly enriched and surmounted by a massive cornice butting between enriched pedestals. In the illustration here given from Chandos Street, Westminster, we note the balustrade filled with carved running scroll-work of leaves, fruit and flowers, somewhat similar in style to that from the old house in Greenwich, of date about 1640. Towards the latter end of the seventeenth century we find the balustrades filled with this carved scroll-work of intricate and elaborate design, interspersed with figures and animals concealing themselves among the leaves and branches. The staircase from Belsize House, Hampstead, an interesting old building long since demolished, is a good specimen, and is herewith illustrated.

Of eighteenth-century staircases we have little to say that is not already well known. Some we find remarkably mean and steep, others uselessly large, all generally cold, tame, and expressionless in design compared with those we have been considering. In arrangement they naturally followed the Italian distribution and were placed in the central hall, where a grand and striking approach, in opposition to the domestic convenience and comfort of Elizabethan plan, was considered the one thing desirable. Oak was largely employed—often cut out of the solid—in massive newels and huge ramped handrail and stringer cornices. Iron balustrades were also in use, and gave a lightness of design very different from the work of James I. Wren's influence completed the change Jones had commenced; his staircases were substantial structures with good details and carving. The stairs leading to the upper stages of his towers were generally in an angle, the projection being shown on the inside, as at St. Stephen, Walbrook, and St. James's, Garlick Hill, while the great central spiral stair of St. Bride, Fleet St. (1680), and the circular geometrical staircase in the South Tower of St. Paul's are well-known specimens of his constructive talent. His pupil, Hawksmoor's (1666–1736) manner is well shown at Easton Hall, Kent. Vanbrugh (and his great staircase at Blenheim) and the correct classicality of Chambers land us at Fonthill. With the mention of Soane's Scala Regia,[4] the British Museum staircase by Smirke, and Barry's Peers' Staircase—as illustrative and representative of the staircases of one of the phases of that revival originating with Wyatt, which has succeeded in retaining the longest possession of the field in this "Age of Revivals"—we regretfully take leave of a branch of our subject worthy and capable of much interesting enlargement. Our historical notes of the staircase in other countries must perforce now be exceedingly brief.

SCOTLAND.

Remotely situated, inhabited by a people neither possessed of the means or opportunities of cultivating the art of architecture, Scotland advanced but slowly along the track marked out by the firmly progressive castles of England. The early Keep was invariably entered by a wooden ladder or movable outside stair for drawing up, while access to the upper floors was obtained by a circular or straight flight of steps in the thickness of the wall, much as we find in England, though naturally, from the unsettled condition of society this form of building continued to a much later date. The War of Independence led to that Franco-Scottish alliance which—fostered by Charles V and VI of France in the many privileges given to the sons of Scottish barons serving on the famed "Body-Guard"—ultimately resulted in everything politically and socially, as well as architecturally, becoming imbued with French ideas and forms. Subsequent to that, and especially during the sixteenth and seventeenth centuries up to the time of the Commonwealth, Scottish architecture, instead of deriving its influence from the great English centres, drew it from France. In place of the Perpendicular phase of Gothic, therefore, we find the Flamboyant; in place of the Elizabethan we find adaptations of the French Châteaux of the sixteenth century. This grafting of French—with the crow-stepped gables of Flanders—on to the native castellated produced that peculiarly bold, unrefined, yet thoroughly characteristic, Scottish Baronial style, of which the distinguishing features are the great number of turrets and towers, the stepped gables, the ranges of pedimented dormers, and the bold corbellings, forming picturesque groups, harmonizing well with the rugged and mountainous character of the scenery, amid which the castles were usually planted. The fusion with the Renaissance becomes earlier noticeable than might have been expected. Mixed up with the Gothic, the interlaced strap-work of the Elizabethan, and the leading features of the Baronial style it produced such work as we see in Heriot's Hospital (1628–1642), Wintoun House, and Glasgow Old University.

Outside staircases with close stone parapets on one or both sides, were very common in the domestic architecture of towns, but seldom possessed any prominent feature of interest. Where running up alongside a wall the landing was usually supported on a plain or chamfered pillar to give access to the door below. Internal staircases were invariably circular on plan, except in late examples when the parallelogram came into use. Where attached to the upper stories of towers, in corbelled rocket-shaped towers of simple detail to afford access to the various floors and roof, it is usually carried up and capped with a conical or ogee-shaped top, such as we see in French examples. Elsewhere they generally project from the face of the wall, or occupy an internal angle, are circular or polygonal outside, rise from the ground, and have a separate, tower-shaped roof. In old town houses this feature of a circular projection on the back wall containing the stair, serving all the upper floors of a tenement continues even to this day. It is a common feature also in the domestic architecture of Flanders. With advancing ideas and the more settled state of society in the sixteenth century, we find the diameter of the stair enlarged and the "going" eased, as in the example at Fyvie Castle, Aberdeenshire.[5] The very long steps used here are supported on a series of triangular stone vaultings springing off cross arches from newel to wall. The staircase leading to Queen Margaret's Bower, Linlithgow Palace, shown by one of our lithographic illustrations this week, presents us with an elegant specimen of the newel being carried up, from which spring the ribs of the roof-vault. The staircase of Burgie Castle (1567) shows level radiating ribs carrying a flat roof. That the means of defence were seldom overlooked in this country, we see in the large staircases at Noltland Castle, in the remote Orkneys, and in Careston, Forfarshire, where shot-holes are provided for defence in the event of an enemy gaining possession. For this purpose, also, staircases were in some instances placed in different parts of the building in place of running from bottom to top, and had thus to be stormed separately. At Glamis Castle, Forfarshire (1689), the hollow newel we have had several occasions of referring to was used as a well, service-doors being introduced at each floor. Externally the staircase towers had doorways surrounded by boldly-outlined mouldings, often partaking of a French character. The windows were most usually plain moulded until the Italian influence

[1] This has been lately ascribed to Webb. Jones, like Thorpe, gets the credit for a considerable amount of doubtful work.

[2] Sir John says: "Inigo Jones, whose superior knowledge in architecture I have often mentioned, was particularly happy in his staircases, both as to convenience and artistic-like effect, even when confined to very small spaces. How superior is the decoration in his stairs to modern houses of similar class. What comparative magnificence in the former, what poverty and meanness in the latter! Whatever we have gained in lightness and effect, we have lost in importance and character."

[3] Jones usually gave a marked entasis to his columns, a peculiar feature he imitated from Alberti and others, and which Sir Hy. Wotton says makes columns look "as if they were sicke of some Tympany or Dropsie, unseemly to the very judgment of sight."

[4] Illustrated in Britton and Pugin's "*Public Buildings of London.*"

[5] Supposed to be the largest circular stair in Britain.

became felt, when they were decorated with rude pilasters and cornices, and surmounted by pediments of ornamental scroll-work.

GERMANY.

The tide of architectural art in Germany ebbed and flowed in sympathy and unison with that of adjoining countries. In ecclesiastical structures we find the staircase from early times forming an important factor in the external design. It, of course, was circular on plan, the inclosing walls being usually square or polygonal, carried up into a lofty tower and crowned with a pyramidal roof. It was here that these features first originated. The elegant quartette of staircase towers at Spires (1030–61), which lend so picturesque a charm to the design; the four at Worms (*c.* 1110), towering 200 feet high, and which so agreeably break up the sky-line; those at Mayence, at Laach, and at Aix-la-Chapelle, are sufficient to show the important position in grouping assigned to the staircase tower in the ecclesiastical structures of mediæval Germany. Of open examples we cannot point to more exquisitely elaborated turret-staircases than those at the four angles of Strasburg's mighty tower (1277–1439). In Mayence Cathedral there is one similar to those previously detailed at Laon and Rheims. In Naumbourg (1249–72), in the screen across the west choir and giving access to the loft over, are two elegant internal spiral staircases inclosed in open cage-work of pillars and arches. It is needless, however, to farther multiply instances. Those mentioned, with Ulm Minster, Prague, Treves, Hildesheim, and many others sufficiently exemplify the importance, the grace, and the beauty which the architects in Germany — whether native or foreign — constantly endeavored to give to this feature in their cathedrals and churches. The first decided symptoms of the change to the Renaissance began towards the middle of the sixteenth century. A good example of an external staircase about the end of this century is that at the Town-Hall of Lübeck. It is a single flight along the wall, giving access to the first floor, the steps being carried on groining springing off elliptic arches. The richly-carved balustrade and wood inclosure are ornamented with termini and other details, bearing a resemblance to the work at Heidelberg and to that of the coeval Jacobean period in England. The public halls of the sixteenth century were usually on the first or principal floor, approached by a single external stone staircase. Occasionally, however, these were double, as at Dettelbach and Volbach. For the application of the staircase in ordinary domestic architecture, we naturally look to quaint Nuremberg, the centre of Germany during the Middle Ages, both in arts and commerce. The turrets containing the usual circular stair form well-known features, are carried up from the ground or corbelled out, sometimes vaulted all under the steps, crowned with a steep roof, and always forming picturesque and pleasing features wherever used. In early examples we find them polygonal on the outside; but, with the changes of style, we notice them become circular, as, for example, in a house in Hirochelgasse, Nuremberg, of date 1540. The later Renaissance is well illustrated by Neumann's staircase (1720–44) in the Palace Würzburg, Bavaria, a stately and noble specimen. The approach is by a broad central flight between two rows of marble columns carrying the groining of the two upper flights, which branch to right and left. The era of Revival — fostered as it was by the munificence of Ludwig I of Bavaria — has done much for the development of grand staircases of colossal size. Schinkel's striking double flights in the portico of the Museum at Berlin,[1] Fergusson says, make it the best portico of any erected in modern Europe, "as the stairs give meaning to the whole and there are no windows in shade." Immediately in the rear is Stüler's[2] vast and magnificent staircase, which measures about 100 feet by 50 feet, and to which Sir William Tite has awarded the highest praise. Demmler's circular staircase in an internal angle of the pentagonal palace of Mecklenburg-Schwerin (1844–57) is also interesting. The steps are of black marble supported at both ends on cast-iron pillars. The landings surround the stair, and have pillars and arches tier over tier, the whole construction being surmounted by a lofty stone-vaulted cupola. The principal staircase in the Town-Hall of Buda-Pest, Hungary, by Von Dett, we mention for its effective artistic treatment of constructional iron-work, of which — with the exception of the Kärst-marble steps — it is wholly composed. The Royal Palace at Munich has a handsome example; but the finest in that city is Gärtner's, in the Public Library, Ludwig Strasse. It consists of a broad, well-broken flight of steps, having on each side of the upper landing a colonnade of marble columns supporting a barrel-vaulted ceiling, magnificently decorated with chaste, harmonizing, allegorical frescos of great beauty.

SPAIN.

The staircases of Spain possess no originality warranting detailed analysis. The forms, like the architecture generally, were borrowed from neighboring countries. We will only instance a few prominent examples. In ecclesiastical architecture the best known is that by Diego de Silve in the north transept of Burgos Cathedral. It consists of five flights of steps, giving access to the church from a high level, and is of a most elaborate character, though somewhat spoilt, says Waring, by a confused and unmeaning iron railing. The ascent of the tower of Santiago Cathedral is by a stair carried all round between the outer and the inner wall, the central space being used as a succession of rooms one over the other. In the celebrated Giralda tower the space between the walls is 23 feet, and the ascent by inclined planes, as in the contemporary campanile at Venice, and may be easily performed by two persons on horseback.[3] The late George Edmund Street, in his "*Gothic Architecture in Spain*," mentions a curiously constructed newel stair in Tarragona Cathedral (1175–1250), an example which we cannot remember ever having before met with. "The central cylinder is 18 inches diameter, in stones 2 feet 3 inches high, each stone having three corbels with sockets for the steps wrought on; the steps being thus supported by the newel, and yet independent of it." In the secular architecture of the Renaissance era Spanish work was largely indebted to Italy, the spring from which the leading ideas were mainly drawn. The arcaded patio or courtyard which formed the leading feature in the plans of all large houses was but the *cortile* of the Italian *palazzo*. The staircases were usually open, invariably rectangular, and afforded access to the upper arcade, whence the rooms were entered. Sir Digby Wyatt has given several sketches of these, such as that in the Casa del Infantado at Valladolid, the Casa de las Conchas, Salamanca, and that from a house in the Calle de Moncara at Barcelona. "The most remarkable feature about these staircases," says Sir Digby, "is the dome-work of wood which covers them at a level with the roof, which is formed of complex panelling, inlaid with foliage and geometrical figures." The Gothic staircase, of date 1436, in the Casa de la Deputacion at Barcelona — the *patio* of which has three tiers of arches in place of the usual two — runs up alongside a wall, and has a close parapet, ornamented with circular traceried panels, the steps being outwardly profiled and resting on a long flat elliptic arch. In Mr. B. Smith's recently published "*Sketches*" are some characteristic staircases as, *e. g.*, that in the Casas Consistoriales at Granada, by Herrera, (*c.* 1584), and that in the Casa Zaporta at Saragossa, which is an exceedingly dainty specimen, having a sculptured close balustrade, and an elegant arcade at the level of the upper landing. One of the finest of all we have cited, however, and perhaps in Spain, is undoubtedly that in the *cortile* of the Hospital of the Holy Cross at Toledo, by Henrique de Egas. It is in the "Plateresque" or early Renaissance style, of date about the beginning of the sixteenth century. The balustrade is formed of double-bellied balusters, butting between circular diapered pillar newels with carved capitals and surmounted by vases. From the landing, looking back towards the richly-arcaded patio beyond and above, we view a most picturesque, effective, and thoroughly artistic composition. The later debased Renaissance, named by the Spaniards after Jose Churriquera, its apostles, "Churriguerismo," is typically illustrated in an example at Barcelona. Here the columns are twisted, with raking elliptic arches over, and a carved balustrade between the pedestals. The whole is pleasing enough in general design, but in detail of very questionable taste.

RUSSIA.

The double staircase in the palace of the Archduke Michael at St. Petersburg, by Rossi, in 1820, occupies an area of no less than 6,400 feet, and is a most elaborate production; but by far the handsomest modern erection of this kind is that built in 1838 by Kleuze, in the Museum of Fine Arts. It is a straight stair measuring about 130 feet by 50 feet, and consists of three continuous flights, each of 21 Carrara marble steps 22 feet broad. As in the example at Munich, it is flanked on each side of the upper floor by a colonnade, composed of 10 Corinthian columns, and has a deeply-coffered ceiling.

BELGIUM.

We would only mention one peculiar feature of the sixteenth-century staircase-towers at Bruges. These were of varied design, always carried to a considerable height, and were used principally as observatories from which the foreign consuls and merchants could witness the arrival and departure of vessels.[4]

CONCLUSION.

We have thus, in a rapid historical survey, traced our subject in its natural sequence from its earliest inception onwards through what Ruskin calls the "trinity of ages;" the classical age to the fall of the Roman Empire, the mediæval age to the close of the fifteenth century, and the modern age to the present time. As "Invention is nothing more than a new combination of ideas from time to time stored up in the mind,"[5] a consecutive account of the ideas of those who have gone before may be of some utility. We must now examine a few practical considerations which, perhaps, from the attractiveness of our subject hitherto have been already too long delayed.

THE BARTHOLDI STATUE: A FRENCHMAN'S VIEW OF THE SITUATION.

M. LOUIS LEROY has written in *Charivari* on the subject of the Bartholdi statue in rather an amusing strain. He says that although General Grant, who was President of the United States in 1871, addressed the Emperor of Germany a letter of sincere congratulation soon after the war upon the brilliant way in which he had conducted it and brought it to a close by dethroning Napoleon III, and seizing two French provinces,

[1] Illustrated in Schinkel's works.
[2] Gold Medallist, R.I.B.A., 1858.
[3] Gwilt.
[4] R.I.B.A. "Proceedings" for 1856.
[5] Sir Joshua Reynolds.

yet this unfriendly feeling on the part of a sister republic had not caused the French to show any resentment. They had continued to wish prosperity to the United States, and in proof of their regard had offered them a colossal bronze statue — Liberty Enlightening the World.

It was thought that the slight differences between friends could be smoothed over by so appropriate a present. M. Bartholdi, a sculptor of approved merit, was selected to carry out the wishes of the subscribers to a work of art of so great importance. To-day this work is happily finished. According to general opinion this colossal statue, unique in the world, in the nose of which two or three persons are able to move about at ease, is a grand monument of the artistic skill and ability of our time.

We have left, he says, to the care of our American brothers the construction of a proper pedestal for this statue—a mere trifle in comparison with the importance of the figure which it is intended to support.

But the Americans exhibit the coldness of desolation in doing their share of the work. The subscription is far from being covered. They lay down millions at the feet of ballet-girls and the divas of comic-operas, and they are not able to decide upon furnishing the foundation of the pedestal. Let us see. It only needs a little courage on the part of that devil, the pocket. Once put the statue in place, and be assured that you will be quite satisfied with the effect.

Perhaps your hesitation proceeds from the difficulty of demanding of us the 30 per cent of customs dues which you have imposed upon works of art of French production?

Oh! if that is all, we will pay the customs dues. But if only the dollars which you hold so dear to your heart had the power of speech, they would themselves urge you to raise the necessary amount to construct the pedestal.

It is very comical that Americans should pay so dear for the warblings of Patti, and show this parsimony with regard to a statue of Liberty Enlightening the World. Do then as she does, ungrateful sons. Enlighten us.

Do not be embarrassed by the sympathy of Grant with the Prussian arms. We only wish well to that excellent General, and are perfectly reconciled with him.

Our Government has associated itself with the subscribers to the statue, and has courteously placed a man-of-war at their disposal to transport the gift across the Atlantic. If, however, you have placed obstacles in the way of its reception, it might be well not to send it to you at all.

And here is an idea! Suppose the good female should remain in France? Do you not know that she would appear as well upon the piers of Havre as in the bay of New York? She would then enlighten France instead of America, and we should be all the better for it. On reflection, it is a very foolish thing to wish to impose a gift upon those who are unwilling to receive it.

Take my advice, brave Yankees, and refuse the gift. It is such a mass of metal that it would never be able to pirouette like a ballet-dancer. You saluted the debarkation of Fanny Ellsler with salvos of artillery; but this grand dame Liberty is so deaf that you need not do so much for her.

Let her stay here, and you are promised an exceptional festival. We know as much of liberty as yourselves, and we have an artistic aptitude which absolutely fails with you. Your young painters know something of it, since they come in crowds to sit at the feet of French masters. You may retain the foundations of the pedestal and we will keep the bronze.

But never forgetting our courtesy, the few American subscribers to the pedestal shall be favored with invitations, and it will be a rare feast to listen to the speeches which will be delivered on the day when, in old France, there will be unveiled a Liberty which young America did not want.

POSTAL-RATES ON DRAWINGS.

Boston, July 4, 1884.

To the Editors of the American Architect: —

Dear Sirs, — The postal-rates for transmission of drawings in England and Canada is the same as for printed matter; but in the United States the rate for sending a drawing is the same as that charged for letter postage. I have repeatedly received drawings on which the prepaid postage was the same as that charged on books, and I know parties who send drawings and never pay letter-rate for them. If a blue-print of a drawing is made, the print can be sent as second-class matter. I have thought over this subject for some time, and I fail to see why the high rate on drawings is retained. It certainly diverts a good amount of material to the express companies, and that is so much revenue lost to the government.

One naturally expects in the postal service some progression towards carrying letters, books, drawings, etc., at the cheapest possible rate. The parcel-post introduced in England last year was a step in the right direction, and in a country like this surely the postal department should not be behind the age.

The information given by clerks at the Boston office is not always reliable. I remember sending a heavy roll of drawings to England, which must have weighed more than a quarter pound, and in response to repeated asking I was told it was only six cents! On another occasion I presented a cabinet-size photo, addressed to Canada, and the clerk assured me the charge would be ten cents. I did not pay it, as two similar packages had been sent and delivered in Canada for two cents each, mailed from an office in the suburbs, where they positively told me the postage was two cents. Evidently some of the post-office clerks do not know their business.

I will be glad to have an expression of your opinion on the present rates charged for drawings. Yours, etc. G. D. B.

[It is an exceptionally able post-office clerk that can keep the run of the variation in the "rulings" of the Post-Office Department, and we do not wonder that different clerks give differing answers to the same question, or that rural post-masters transgress rules that are familiar to city officials. We often note with amazement the postage paid on drawings which arrive at this office: some are covered with stamps; others run the gauntlet in safety under the ægis of a single two-cent stamp. The law as it at present affects the transmission of drawings is plain and concise. It says: "Drawings, plans and designs, which were formerly rated as fourth-class matter, are now subject to letter postage." This rule took effect February 21, 1881. Our correspondents had better be cautious about sending "blue-prints" at less than first-class rates; for Paragraph 233 says: "When only a single copy of a reproduction by any other process than ordinary type, plate, and lithographic printing is offered for mailing, and it does not appear from internal evidence that it is being sent in identical terms to several persons, it is subject to letter rates of postage."

We believe strongly that the ruling against drawings as fourth-class matter is not wholly logical and is largely unjust. We know that most of the "rulings" of the Department are brought about by outside pressure, and we feel that this is a case where pressure could successfully be applied by the largest class aggrieved by the present law — that is, by the architects. If architects throughout the country will draw up and sign a remonstrance, and a request that drawings be restored to the fourth class, we shall be happy to transmit it to the Postmaster General, and will do all we can to assure its consideration. — Eds. American Architect.]

THE CAMBRIDGE ODD-FELLOWS HALL.

Boston, July 3, 1884.

To the Editors of the American Architect: —

Gentlemen, — We are aware that it has been said "to him that hath shall be given," etc., but we did not expect to see any of our work claimed for our large namesake. We refer to your reference of this date to the Odd-Fellows Hall, Cambridgeport, p. xiii, of this day's issue. We were under the impression that we were the architects of that building. We even dreamed that we attended the corner-stone laying, on one of the hottest days of the present season. Certain newspapers were under a similar impression as to the authorship of the design, as you may see by the enclosed slip. If you will kindly give us the evidence upon which you credit it to Mr. H. H. Richardson, we will try to adjust our faith to the evidence.

Truly yours, Hartwell & Richardson.

BRONZE CASTING.

Boston, July 5th, 1884.

To the Editors of the American Architect: —

Dear Sirs, — The article on "bronze casting" in the *Architect* of the 5th inst. contains a gross error. It states that in France all practical knowledge of the art of casting in bronze by the wax process was lost at the beginning of the present century. This statement is not true. If the words of the best French sculptors are true, and the bronze works of the last eighty years are worth anything as evidence, there has been a lively interest in wax-process bronze-casting, as well as in every other kind of casting, in France during the above mentioned period. It is true that at this time large statues are not often cast by the wax-process, though like difficult undertakings are successfully accomplished in casting large statues in one piece. The bronze-founders of to-day in France include some very able men, men who are filling the demands of many great sculptors, men who are not only familiar with the methods of the past, but are active students in one of the greatest arts. There is one founder in Paris, A. Gruet, Jne., who as a nobleman as well as founder, is alone sufficient to sustain the reputation of France as a country where great work in bronze-casting is kept in an enviable state of perfection. T. H. Bartlett.

"STORY" OR "STOREY."

Boston, July 7, 1881.

To the Editors of the American Architect: —

Dear Sirs, — What is your custom both in books and in the *American Architect* in spelling the word story, meaning the divisions of a house, as second or third story. Is it "story" or "storey"? A reply will greatly oblige Yours truly, W. G. Corthell.

["Story" is the American spelling the word; "storey" the English.— Eds. American Architect.]

THE ANTI-SIPHON TRAP,

Buffalo, N. Y., July 5, 1884.

To the Editors of the American Architect: —

Sirs, — Allow me to thank you for "Sanitary Plumbing," and to ask for further information with regard to the "Anti-Siphon glass-side bulb" trap illustrated (page 245, etc). Is it in the hands of any manufacturing house? Is it patented? Or can any plumber make it? If it cannot be purchased, can you obtain me a sample trap? Respectfully, Louis Bethune, *Architect.*

[The "Anti-Siphon Trap" is protected by patent, and the inventor is perfecting his arrangements for its manufacture, which we understand are nearly completed. At present no traps are ready for the market, and we do not believe that any samples can yet be obtained.— Eds. American Architect.]

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

301,080. OUTSIDE PIPE-CUTTER. — Elbridge F. Barnes and Lorenzo C. Strickland, New Haven, Conn.
301,087. AUTOMATIC MECHANISM FOR SANDING BRICK-MOLDS. — James A. Buck, Crescent, N. Y.
301,092. APPARATUS FOR GENERATING HEATING-GAS, ETC. — Solomon N. Carvalho, New York, N. Y.
301,099. DAMPER-REGULATOR. — Nelson Curtis, Newton, Mass.
301,106. MACHINE FOR BENDING TUBES AND PIPES. — Edward P. Follett, Rochester, N. Y.
301,109. SAFETY-GATE FOR FREIGHT ELEVATORS. — Robert Fyfe, New York, N. Y.
301,123. SHINGLE-SAWING MACHINE. — David F. Hunt, Antrim, N. H.
301,124. DEVICE FOR PREVENTING PERCUSSION OR WATER-HAMMERING IN PIPES. — Francis Hyde, Toronto, Can.
301,125. HOISTING APPARATUS. — Maximillian Jacker, Florence, Wis.
301,131. MOLD FOR BRICK AND RE-PRESSING MACHINES. — Geo. H. Kuntz, Belleville, Ill.
301,138. FIRE-ESCAPE. — John L. McDonald, Shakopee, Minn.
301,149. MIXED PAINT. — Henry C. Pettee, Vallejo, Cal.
301,151. STENCH-TRAP. — Herman Pietsch, Flatbush, N. Y.
301,153 HOISTING APPARATUS. — De Witt Clinton Prescott, Marinette, Wis.
301,155. BRICK-KILN. — John Puerner and William Haumerson, Jefferson, Wis.
301,157. WEATHER-STRIP FOR WINDOW-SASHES. — George P. Rasck, Des Moines, Io.
301,164. FRICTION-HINGE. — Robert S. Robson and John Loughrey, Cambridge, Mass.
301,172. SAFETY DEVICE FOR ELEVATORS. — Rudolph C. Smith, Yonkers, N. Y.
301,173. SCREW-DRIVER. — Charles F. Spencer, Rochester, N. Y.
301,213. SAFETY APPLIANCE FOR ELEVATORS. — Robert A. Chesebrough, New York, N. Y.
301,219. URINAL. — Isaac Davis, Trenton, N. J.
301,221. WEATHER-STRIP. — Wm. J. Devers, Providence, R. I.
301,224. COMBINED HINGE AND BLIND-FASTENER. — Warren Small Dwinel and Earl Pierce Mason, Providence, R. I.
301,230. VENTILATING SEWERS. — Wm. M. Green, Chicago, Ill.
301,231. CRANE. — P. Henry Griffin, Detroit, Mich.
301,247. GAGE. — Michael P. Leonard, Pittsburg, Pa.
301,252. ALARM-LOCK. — Alexander F. McCollam, Fair Play, Cal.
301,258. VENTILATOR. — Conrad Müller, Hamburg, Germany.
301,260. METALLIC CEILING. — Albert Northrop, Pittsburgh, Pa.
301,261. HOT-AIR FIREPLACE. — Doyel Pearson, Memphis, Tenn.
301,268. MEANS FOR CONNECTING PIPES TO BOWLS. — George E. Poole, New York, N. Y.
301,289. SASH-BALANCE. — Friend W. Smith, Jr., and S. Stuart Williamson, Bridgeport, Conn.
301,296. FIRE-ESCAPE. — Alfred A. Starr, Westfield, N. J.
301,303. DOOR-KNOB ATTACHMENT. — Thos. Taylor, South Norwalk, Conn.
301,310. DOTTING-PEN. — Louis T. Weiss, Brooklyn, N. Y.
301,339. BIT-BRACE. — William R. Clarkson, Buffalo, N. Y.
301,359. MANUFACTURE OF BRICKS. — William L. Gregg, Philadelphia, Pa.
301,362. WEATHER-STRIP. — John T. Hall, Zenobia, Ill.
301,387. FIRE-ESCAPE. — John S. Oram and Henry R. Dickerman, Cleveland, O.
301,388. DOOR-HANGER. — Edward T. Prindle, Aurora, Ill.
301,391. SIPHON. — John P. Reinecke, Pittsburg, Pa.
301,429. WINDOW-SHUTTER. — Ludwig F. G. Boeckelmann, Davenport, Io.
301,441. FIRE-ESCAPE. — Kasson Freeman, Grand Rapids, Mich.
301,453. BLIND-SLAT ADJUSTER. — Richard M. Martin, Minneapolis, Minn.
301,458. TRAP FOR LAVATORIES, ETC. — Charles F. Pike, Philadelphia, Pa.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report thirteen permits have been granted, the more important of which are the following: —

Geo. W. Donohue, 8 two-st'y brick buildings, n s Jefferson St., bet. Duncan Alley and Choptank St.; 10 two-st'y brick buildings, s s Jefferson St., bet. Chester St. and Duncan Alley; and 2 two-st'y brick buildings, e s Chester St., s of above.

Graham Gordon, 5 two-st'y brick buildings, com. s e cor. Light and Lee Sts., fronting on Light St.

Isaac Benesch, four-st'y brick building, w s Eutaw St., bet. Saratoga and Mulberry Sts.

Geo. E. Bay, 2 three-st'y brick buildings, w s Foster Alley, s of Lanvale St.

Wm. E. Wood & Co., 10 two-st'y brick buildings, s e cor. Sassafras and Cross Sts.

Geo. M. Gill, two-st'y brick buildings in rear, s e cor. Eutaw Pl. and McMechin St.

Boston.

MONTHLY REPORT. — During the month of June, 27 permits for brick buildings, and 109 permits for wooden buildings were granted at the office of Inspector of Buildings.

BUILDING PERMITS. — *Brick. — Carlton St.*, near Claremont Park, Ward 18, for John F. Mead, 3 dwells., 16′ x 36′, three-st'y flat; Oliver W. Patrick, builder.

Claremont Park, near Carlton St., Ward 18, for John F. Mead, 4 dwells., 19′ x 36′, three-st'y flat; Oliver W. Patrick, builder.

Appleton St., near Tremont St., Ward 16, for Joseph T. Bailey, manufactory, 47′ x 100′, four-st'y flat.

Commonwealth Ave., *No.* 229, Ward 11, for Wm. L. Richardson, dwell., 24′ x 81′, five-st'y flat; Woodbury & Leighton, builders.

Eliot St., *No.* 134, Ward 14, for Z. T. Hollingsworth, shops, 16′ 6″ x 19′ and 23′ 6″, three-st'y flat; Dewing & McClure, builders.

Wood. — Blue Hill Ave., cor. Columbia St., Ward 24, for John M. Way, store, 12′ x 16′, one-st'y pitch; D. B. Clemet, builder.

K St., *No.* 219, rear, Ward 14, for Arthur Deedy, greenhouse, 10′ x 12′ and 10′ x 16′, one-st'y pitch.

Heath Pl., near South St., Ward 22, dwell., 28′ 6″ x 36′, three-st'y flat.

Clifton St., nearly opp. Batchelder St., Ward 20, for Nellie E. Terhune, dwell., 21′ 6″ x 50′, two-st'y pitch; John Oliver, builder.

North Harvard St., cor. Western Ave., Ward 25, for H. Reed, dwell., 22′ x 34′, two-st'y mansard.

Bodwell Park, near Bird St., Ward 20, for Edw. McKechnie, dwell., 29′ x 30′, two-st'y pitch; Edward McKechnie, builder.

Orleans St., *No.* 69, rear, Ward 2, for Patrick Morrison, storage, 20′ x 50′, one-st'y flat; Paul Bayley, builder.

Savin Hill Ave., cor. Auckland St., Ward 24, for city of Boston, primary school-house, 14′ 9″ x 25′ 6″ and 32′ 10″ x 66′ 3″, one-st'y hip; W. H. Jobling, builder.

Geneva Ave., near N. Y. & N. E. R. R. Ward 24, for Frank M. Silva, 3 dwells., 21′ x 31′, two-st'y pitch.

West Cottage St., near Brook Ave., Ward 24, for W. W. Dromey, 2 dwells., 20′ x 31′, three-st'y flat; W. W. Dromey, builder.

Clifton St., near Cottage St., Ward 20, for Joseph Breckenbridge, 2 dwells., 26′ 10″ x 52′ 8′, two-st'y pitch; Hamilton Parks, builder.

Wise St., near Centre St., Ward 20, for Mary A. Cook, dwell., 24′ and 29′ x 30′, three-st'y pitch, John L. Dakin, builder.

Mayfair St., *No.* 15, Ward 21, for Sarah H. Wheelock, dwell., 21′ and 27′ x 32′, two-st'y pitch, Holmes Bros., builders.

Quincy St., near Blue Hill Ave., Ward 21, for Frank M. Silva, dwell., 20′ and 27′ x 31, two-st'y pitch.

Everett St., Ward 2, for Dennis Sullivan, dwell. and store, 20′ x 30′, two-st'y flat; Richard Costello, builder.

Brooklyn.

BUILDING PERMITS. — *Stuyvesant Ave.*, w s, 24′ n Hancock St., 4 three-st'y freestone dwells., tin roofs; cost, each, $6,000; owner, Benjamin Linikin, Greene Ave.; architect, Amzi Hill.

Sixth Ave., w s, 10′ s Nineteenth St., three-st'y frame tenement, tin roof; cost, $3,500; owner, M. McDonough, 341 East Twenty-second St., New York; architect, Geo. W. Bush.

Lawton St., n s, 250′ e Broadway, 2 two-st'y frame dwells., tin roofs; cost, each, $2,800; owner and builder, Geo. W. Jackson, 298 Lorimer St.; architect, J hn Herr.

Bedford Ave., *Nos.* 773 *and* 775, 2 three-st'y brownstone dwells. and stores, tin roofs; cost, each, $4,750; owner and carpenter, D. H. Fowler, 777 Bedford Ave.; architect, Amzi Hill.

Seventeenth St., *No.* 220 *A*, s s, 25′ w Fifth Ave., three-st'y brick dwell., tin roof; cost, $10,000; owner, Maggie Heins, 202 Seventeenth St.; architect, Arthur J. Stever; builders, P. J. Carlin and Dan. Ryan.

Locust St., n s, 231′ w Beaver St., 2 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and architect, John Kramer, 297 Floyd St.; builder, John Kueger.

Quincy St., s s, 330′ e Reid Ave., two-st'y brick dwell., felt and gravel roof; cost, $4,000; owner, J. Miller; architect and builder, A. Miller.

Division Ave., n e cor. Second St., four-st'y brick tenement, tin roof; cost, about $5,000; owner, Geo. C. Dreyer, 45 Division Ave.; architect, Amzi Hill; builders, Hadden & Kiduff and J. J. Brennan.

Tompkins Ave., w s, 110′ n DeKalb Ave., three-st'y brown-stone dwell., tin roof; cost, $9,000; owner, John Deterling, cor. De Kalb and Tompkins Aves.; architect, I. D. Reynolds; builders, P. Carlin & Sons and S. C. Whitehead.

Fulton St., s s, 450′ w Ralph Ave., 2 three-st'y frame stores and tenements, tin roofs; cost for both, $8,600; owner, Chas. Guthy, 1782 Fulton St.; builder, Jacob Pirrung.

Aberdeen St., n e cor. Broadway, 2 three-st'y frame stores and tenements, tin roofs; cost for both, $8,635; owner, John Bauman, 716 Madison St.; builder, Jacob Pirrung.

Vanderbilt Ave., e s, about 200′ n Greene Ave., two-st'y brick stable, carriage-house and dwell., tin roof; cost, $8,000; owner, J. C. Hoagland, 186 Quincy St.; architects, Parfitt Bros.; builders, T. B. Rutan and Hart & Boyd.

Fourteenth St., n s, 95′ 6″ w Fifth Ave., three-st'y brick flat, tin roof; cost, $7,000; owner and architect, S. Moffit, Fourteenth St., near Fifth Ave.; builders, Wm. and Thos. Corrigan.

Fifteenth St., s s, 175′ w Sixth Ave., three-st'y brick tenement, tin roof; cost, $6,000; owner and architect, Dennis Crowley, on premises; builders, Wm. and Thos. Corrigan.

Seventh Ave., s e cor. Fourteenth St., 2 three-st'y brick stores and tenements, tin roofs, iron cornices; cost for both, $16,000; owner, Henry Hehn, 29 Coenties Slip, New York; architect, Adam Munch.

Eleventh St., n s, 100′ w Fifth Ave., 20 two-st'y brick dwells., tin roofs; cost, each, $6,000; owners, Rhodes & Reynolds, West Brookville, N. Y.; architect, Chas. Lincoln; builders, A. E. Reynolds and —— Buchanan.

Seventh St., s s, 220′ e Sixth Ave., 3 two-st'y brick dwells., tin roofs; cost, each, $3,500; owner, Samuel S. Squire, Eleventh St., near Seventh Ave.; architect and builder, C. B. Sheldon.

Norman Ave., n s, 20′ e Diamond St., 10 three-st'y frame (brick filled) tenements; also, *Diamond St.*, e s, 79′ n Norman Ave., three-st'y frame (brick filled) tenement; also, *Jewel St.*, w s, 79′ n Norman Ave., three-st'y frame (brick filled) tenement, felt, cement and gravel roofs; cost, each, $3,800; owner, architect and carpenter, David Atkin, 551 Lorimer St.; mason, John Hafford.

Locust St., s s, 100′ e Broadway, three-st'y frame (brick filled) store and tenement, tin roof; cost, $4,300; owner and builder, George Loeffler, 78 Jefferson St.; architect, H. Vollweiler.

Calyer St., *No.* 197, n s, 25′ w Leonard St., three-st'y frame (brick filled) tenement, gravel roof; cost, $5,500; owner, Mrs. A. C. Moore, 187 Calyer St; architect, F. Weber; builders, J. Reed and S. F. Barlett.

Grand St., s s, 300′ e Gardner Ave., three-st'y frame (brick filled) office and tenement, gravel roof; cost, $6,000; owner, C. B. Tuttle, 18 Bedford Ave.; architect, E. F. Gaylor.

Summit St., *No.* 7, s s, 75′ e Commercial Wharf, three-st'y brick shop, tin roof; cost, $3,000; owner, David Van Cleaf; builders, J. F. Nelson and J. A. Kelly.

ALTERATIONS. — *Clinton Ave.*, *No.* 227, 2 three-st'y brick extensions, tin roofs; also entire front rebuilt; cost, $10,000; owner, B. M. Hutman, 289 Park Pl.; architect, R. B. Eastman; builders, Wm. Hazzard's Son & Co.

Clinton Ave., *No.* 525, two-st'y brick extension, tin roof, etc.; cost, $4,000; owner, Estate of D. A. Sanborn, 521 Clinton Ave.; builders, J. J. Bentzen and H. J. Smith.

Chicago.

STORE. — T. V. Wadskier, architect, has completed plans for a six-st'y store-building, cor. of Adams and Market Sts. To be 123′ on Adams St., 95′ 6″ on Market St., and 170′ deep with extension, Anderson pressed-brick, stone and iron finish, terra-cotta cornice; owners, C. M. Henderson, and C. B. Blair; cost, about $150,000.

BUILDING PERMITS. — J. Holbein, two-st'y dwell., 636 Nineteenth St.; cost, $4,500; architect, A. Bessler.

C. R. Hopkins, two-st'y dwell., 3263 Vernon Ave.; cost, $6,000; architect, Robert Rae, Jr.

U. P. Smith, 20 two-st'y dwells., 12-48 Graves Pl.; cost, $80,000; architects, Wheelock & Clay; builder, A. H. Lowden.

Western Ave. M. E. Church, church, cor. Western Ave. and Monroe St.; cost, $25,000.

Newberry Estate, 2 additional stores, 121-127 Kinzie St.; cost, $10,000.

J. Sollitt, three-st'y dwell., 519 West Jackson St.; cost, $10,000; architect, J. M. Van Osdel.

J. Johnston, three-st'y store and dwell., 27-29 North State St.; cost, $6,000; architect, H. Lord Gay.

A. Kuehl, two-st'y store and dwell., 2900 Butler St.; cost, $3,100.

L. Isaacson, three-st'y dwell., 188 North May St.; cost, $5,000; builders, Lund & Gilbert.

S. E. Johnson, two-st'y dwell., 458 Dayton St.; cost, $5,500; architects, Scott & Gage.

M. Downs, two-st'y dwell., 115 Seeley Ave.; cost, $4,500; architect, A. M. Coulton.

M. F. Ross, two-st'y flats, 52 Artesian Ave.; cost, $2,900.

M. Kerwin, three-st'y dwell., 117 Locust St.; cost, $3,200.

C. L. Jencks, 5 three-st'y dwells., 1924-34 Clark St.; cost, $12,000; architect, J. Speyer.

G. Gunderson, 2 three-st'y stores and dwells., 387-389 West Indiana St.; cost, $12,500; architect, G. Isaacson; builders, Geo. Lehman & Son.

C. B. Blair, six-st'y store, cor. Adams and Market Sts.; cost, $100,000; T. V. Wadskier; builders, C. & A. Price.

Wm. Matthei, three-st'y store and dwell., 5 Gurley St.; cost, $7,500; architect, Wm. Strippelman.

J. A. Heath, two-st'y dwell., 3226 Prairie Ave., cost, $7,000; architect and builder, J. A. Heath.

H. Heilberg, two-st'y store and dwell., 935 Milwaukee Ave.; cost, $5,000.

H. A. Bliss, two-st'y dwell., 3350-52 Wabash Ave.; cost, $15,000; architect, Robt. Rae.

C. M. Henderson, six-st'y store, 237-39 Adams St.; cost, $40,000; architect, T. V. Wadskier; builder, W. Barton.

C. S. Bonney, two-st'y dwell., 1127 Genesee St.; cost, $5,000.

Mrs. Potter Palmer, three-st'y dwell., 64 Cedar St.; cost, $8,000; architect, J. S. Silsbee.

C. L. Gribenow, three-st'y store and dwell.; cost, $6,000; architect, C. L. Berlin.

G. Schmid, 2 two-st'y dwells., 46-48 Bellevue Ave.; cost, $7,000; architect, J. H. Huter; builders, Angus & Gundler.

L. Longprof, two-st'y flats, 521 North Ashland Ave.; cost, $4,000.

Seaman, Cox & Brown, three-st'y addition to factory, 147 Hoyne Ave.; cost, $6,000; builder, J. S. Price.

Erring Womans' Refuge, three-st'y store and dwell., 219-21 Thirty-first St.; cost, $12,000; architect, L. B. Dixon; builder, W. L. Crilly.

Wm. Ward, two-st'y dwell., 2108 Butterfield St.; cost, $3,000; builder, E. McDonald.

T. Stevenson, two-st'y dwell., 144 Barber St.; cost $2,500; builder, Peter Young.

Cincinnati.

BUILDING PERMITS.—Lawrence Grace, two-st'y brick dwell., cor. Coleman and Dayton Sts.; cost, $7,000.

C. Longel, four-st'y brick dwell., cor. Pearl and Ludlow Sts.; cost, $3,500.

Nic Wolf, four-st'y brick dwell., cor. Second and Ludlow Sts.; cost, $3,500.

E. Schnidhad, three-st'y brick dwell., cor. Findlay and Pleasant Sts.; cost, $2,500.

Proter & Gamble repair three-st'y brick dwell., cor. York and John Sts.; cost, $2,800.

Jos. Ausdermore, two-st'y brick dwell., 253 Browne St.; cost, $5,000.

Mrs. Grave, three-st'y brick dwell., 76 Martin St.; cost, $3,800.

Jas. M. Glenn, four-st'y brick dwell., cor. Sixth St. and Broadway; S. Hannaford, architect; cost, $10,000.

F. Wibbelman, three-st'y brick dwell., cor. Liberty and Cutter Sts., for Catholic Church; cost, $9,900.

A. J. Hickenlooper, two-st'y brick dwell., 116 Dayton St.; cost, $4,000.

St. Anthony's Church, one-st'y brick school, cor. Budd and Carr Sts.; cost, $5,000.

Six permits for repairs, costing $5,000.

Total permits 17; cost, $49,400.

Total permits to date, 479.

Total cost to date, $1,785,185.

New York.

HOSPITAL.—The American Veterinary Hospital proposes to build a college on the n s of Sixty-fourth St., 375′ w of Eighth Ave.

APARTMENT-HOUSES.—For Mr. A. C. Hassey, an apartment-house, 52′ x 107′, is to be built on the n w cor. of Second Ave. and Eleventh St., from designs of Mr. Arthur Crooks.

For Alice Golding, a four-st'y flat, 20′ x 45′, at No. 235 West Thirty-eighth St., from designs of Mr. W. H. Smith.

OVERPRODUCTION OF BRICKS.—A large meeting of the brick manufacturers of New York and New Jersey was held July 8 in this city, and by a unanimous vote it was decided to reduce the supply to the present demand, and thereby enable the trade to save themselves from future loss. It was also decided to create a permanent organization of brick manufacturers.

BUILDING PERMITS.—*Fifty-fifth St.*, s s, 100′ w Sixth Ave., four-st'y brick, terra-cotta and brown-stone club-house and studio, fire-proof block roof; cost, about $55,000; owner, A. H. Barney, 10 East Thirty-eighth St.; architect, R. H. Robertson; builders, R. Deeves and Jeans & Taylor.

Tenth Ave., w s, 100′ n Sixty-fourth St., five-st'y Connecticut brown-stone tenement, tin roof; cost, $19,000; owner, John L. Miller, on premises; architects, Thom & Wilson; mason, G. A. Zimmermann.

Madison Ave., e s, 50′ s Seventh St., four-st'y brick and brown-stone dwell., tin roof; cost, $35,000; owner, Mayer Sternberger, 41 East Sixty-seventh St.; architects, Thom & Wilson; mason, I. A. Hopper.

West Forty-eighth St., *No.* 404, five-st'y Connecticut brown-stone tenement, tin roof; cost, $21,000; owner, Charles Gahren, 111 East Seventy-third St.; architects, Thom & Wilson.

Thirty-first St., n s, 60′ w Seventh Ave., five-st'y brown-stone apartment-house; cost, $25,000; owner, Jas. W. Silleck, Peekskill, N. Y.; architects, Thom & Wilson; builders, S. Lowden and T. J. Duffy.

West Thirteenth St., *Nos.* 7, 9 *and* 11, five-st'y brick (Ohio stone trimmed) store and lofts, tin roofs; owner, M. S. Van Buren, 21 West Fourteenth St.; architect, F. S. Copley.

Fourth St., s s, 42′ e Second Ave., 2 two-st'y brick stores and dwells., tin roofs; total cost, $3,000; owner, Robert F. Smith, 201 Broadway; architect and builder, Jno. B. Wilson.

Twenty-sixth St., n s, 188′ e Seventh Ave., 3 five-st'y brick tenements, tin roofs; cost, each, $20,000; owner, John Totten, 240 West Forty-ninth St.; architect, G. B. Pelham.

Tenth Ave., w s, 20′ s Sixty-first St., five-st'y brown-stone store and tenement, tin roof; cost, $15,000; owner, John Richards, 406 West Fifty-eighth St.; architect, L. Ungrich.

Seventy-fifth St., s s, 217′ 3″ w Ave. A, five-st'y brick tenement, tin roof; cost, $20,000; owner, Annie E. Kelly, 203 East Sixty-ninth St.; architect, G. A. Schellenger.

East Sixty-first St., *No.* 252, four-st'y brick and brown-stone tenement, tin roof; cost, $14,000; owner, architect and builder, Thomas Crimmins, 1151 Park Ave.

One Hundred and Thirty-second St., s s, 425′ e Eighth Ave., 5 three-st'y brown-stone dwells., tin roofs; cost, $10,000; owner, Walter S. Price, 33 West One Hundred and Thirty-first St.; architects, Cleverdon & Putzel.

West Forty-fourth St., *Nos.* 312–320, 5 five-st'y brick and brown-stone dwells., tin roofs; cost, each, $15,000; owners, James Kyle & Sons, 137 East Fortieth St.; architect, James Kyle.

One Hundred and Twenty-seventh St., s s, 212′ 6″ e Seventh Ave., 4 three-st'y sandstone dwells., tin roofs; cost, each, $9,000; owners, Adelaide and Ethelbert Wilson, 267 West Twenty-sixth St.; architect, J. F. Miller; builder, E. Wilson.

Seventieth St., 125′ from Fourth Ave., 3 five-st'y and basement brick and brown-stone dwells., slate and tin roofs; cost, each, $18,000; owner, Union Theological Seminary, E. M. Kingsley, Treasurer, 30 Clinton Pl.; architects, W. A. Potter and J. B. Lord; builders, Norcross Bros.

One Hundred and Fiftieth St., s s, 350′ e Courtland Ave., four-st'y brick tenement, tin roof; cost, $6,000; owner, Franz Knab, 139 East Third St.; architect, A. Arctander.

One Hundred and Twenty-third St., s s, 75′ e Seventh Ave., 7 four-st'y and basement brown-stone dwells., tin roofs; cost, each, $10,000; owner, A. Alonzo Teets, 208 West One Hundred and Twenty-fifth St.; architect, J. H. Valentine.

Ave. A, w s, 103′ 2″ n Eighty-first St., 2 five-st'y brick store and tenements, tin roofs; cost, each, $20,000; owner, Francis J. Schnugg, 225 East Tenth St.; architect, J. Kastner.

East Fourth St., *No.* 235½, five-st'y brick tenement and store, tin roof; cost, $8,000; owner, Franz Snchy, 235 East Fourth St.; architect, Chas. Sturtzkober.

West Twentieth St., *No.* 229, five-st'y brick tenement, tin roof; cost, $15,000; owner, Wm. S. Wright, 36 West Twenty-seventh St.

Seventh Ave., w s, 25′ n Fifty-third St., four-st'y brick stable, tin roof; cost, $15,000; owner, Anthon Lana, 318 West Thirtieth St.; architects, Thom & Wilson.

Third Ave., s w cor. One Hundred and Twenty-eighth St., four-st'y brick tenement and store, tin roof; cost, $10,000; owner, Jacob Ebling, on premises; architect, Julius Boekell.

North Brother Island, two-and-a-half-st'y brick dwell., slate roof; cost, $10,000; owner, City of New York (Department Board of Health, 301 Mott St.); architect, Chas. C. Haight; builder, Chas. Jones.

North Brother Island, two-st'y kitchen building, slate roof; cost, $16,000; owner and architect, same as last.

Second Ave., *No.* 2184, five-st'y brick tenement and store, tin roof; cost, $16,000; owner, Henry Klauber, 2180 Second Ave.; architect, John McIntyre.

Forty-ninth St., s s, 175′ w Eighth Ave., 7 five-st'y brown-stone front tenements, tin roofs; cost, each, $14,500; owners, James H. Havens, 418 West Fifty-fifth St., and Wm. Rankin, 338 West Forty-seventh St.; architect, M. Louis Ungrich.

One Hundred and Fifty-third St., n s, 175′ e Tenth Ave., three-st'y brown-stone front dwell., tin and slate roof; cost, $9,000; owner, Fred. W. James, 268 West Forty-second St.; architect, James E. Ware.

One Hundred and Thirtieth St., s s, 156′ e Seventh Ave., three-st'y brown-stone front dwell., tin roof; cost, $12,000; owner, Ella C. Earle, 601 Lexington Ave.; architect, James E. Ware.

St. Nicholas Ave., n w cor. One Hundred and Fifty-second St., 4 three-st'y brick dwells.; cost, corner, $12,000; others, each $11,000; owner, Chas. L. Fleming, 63 East Sixty-first St.; architect, Jas. E. Ware.

Cherry St., *Nos.* 396, 398 *and* 400, five-st'y brick brewery, tin roof; cost, $45,000; owner, Jas. Wallace, 55 West Thirty-eighth St.; architect, Gage Inslee.

Bowery, *Nos.* 222 *and* 224, five-st'y brick building, slate and tin roof; cost, $48,000; owner, Young Men's Christian Association, Twenty-third St., cor. Fourth Ave.; architect, Bradford L. Gilbert; builders, P. Tostevin's Sons and Patrick Walsh.

One Hundred and Twenty-third St., n s, and *One Hundred and Twenty-fourth St.*, s s, 425′ e Eighth Ave., 2 four-st'y brown-stone front tenements, tin roofs; cost, each, $14,000; owner, John J. Quinn, 347 Quincy St., Brooklyn; architects, Cleverdon & Putzel.

Ogden Ave., w s, 626′ 6″ n Union St., 4 two-st'y frame dwells., tin roofs; cost, each, $1,900; owner, Estate of Mary Crait, Wm. Venvill, agent, Mott Ave., cor. One Hundred and Sixty-fifth St.; builder, A. MacNally.

Grand Boulevard, s e cor. One Hundred and Thirtieth St., 4 four-st'y brick tenements, tin roofs; cost, each, $10,000; owner and builder, John Fullam, 103 East One Hundred and Twenty-first St.; architect, Wm. J. Merritt.

Tenth Ave., *No.* 326, five-st'y brick tenement and store, tin roof; cost, $12,000; owner, Estate of Richard Ray; lessee, D. Edward Seybel, 247 Fifth Ave.; architect, Bart. Walther; builder, Jonathan Hanson.

Tenth Ave., *No.* 328, five-st'y brick tenement and store, tin roof; cost, $14,000; owner, lessee, architect and builder, same as last.

Seventy-first St., s s, 60′ w Lexington Ave., 2 four-st'y brown-stone front dwells., tin roofs; cost, each, $25,000; owner, John Livingston, 981 Lexington Ave.; architect, F. T. Camp.

Ninety-first St., n s, 105′ e Park Ave., 4 three-st'y and basement brown-stone front dwells., tin roofs; cost, each, $10,000; owner, Susan Sullivan, 1365 Lexington Ave.

ALTERATIONS.—*Fifth Ave.*, *No.* 3, three-st'y brick extension, slate and tin roof, front altered, etc.; cost, $20,000; owner, Benj. F. Dawson, on premises; architect, H. J. Hardenbergh; builders, J. Banta and J. L. Hamilton.

East Eighth St., *No.* 310, new store fronts and interior alterations; cost, $3,000; owner, Chas. Miehling, 124 Second St.; architects, Berger & Baylies; builders, G. Staiger and Guy Culgin.

Bleecker St., *No.* 102, two st'y brick extension, tin roof; cost, $4,000; owner, Moritz H. Rosenstein, on premises; architect, Wm. Graul.

East Sixteenth St., *No.* 110, add one and one-half stories, also four-st'y brick extension, internal alterations; cost, $19,000; owner, V. Cassine King, 75 East Fifty-fifth St.; architects, Thom & Wilson; builders, M. Reid and Grissler & Fausel.

Lexington Ave., *No.* 266, three-st'y brick extension, tin roof, new windows, etc.; cost, $10,000; owner, Grace R. Miller, on premises; architect, H. E. Ficken.

One Hundred and Twenty-third St., *Nos.* 182 *and* 184, building moved and three-st'y brick extension, tin roof, also interior alterations; cost, $5,000; owner, Charlotte Bull, 184 East One Hundred and Twenty-third St.; architect, A. Spence.

West Thirty-fifth St., *No.* 33, two-st'y brick extension, tin roof; cost, about $5,000; owner, Fredein W. Stevens, 64 West Forty-ninth St.; architect, G. E. Harney; builders, J. J. Tucker and A. L. Casey.

Clinton St., *No.* 189, five-st'y brick extension, tin roof; cost, $7,000; owners, M. Schoencupp and M. Goldberg, 31 Catharine St.; architect, Chas. Rentz.

West Twenty-eighth St., *No.* 103, two-st'y brick extension, tin roof; cost, $5,000; owner, Mary Taylor, on premises; architect, Ralph S. Townsend.

West Seventeenth St., *No.* 49, four-st'y brick extension, etc.; cost, $9,000; owner, Academy of the Sacred Heart, on premises; architect, T. H. Poole; builder, A. N. Gatchell.

Philadelphia.

CHURCH.—*Broad St.*, cor. Butler St. (Nicetown), there will be built a Roman Catholic church, 84′ x 142′, height of tower, 124′, to be built of granite and brick, with terra-cotta mouldings and Indiana limestone trimmings, with tile roof; from plans by Willis G. Hale, architect.

BUILDING PERMITS.—*Twenty-first St.*, cor. Locust St., 2 three-st'y dwells., 23′ x 44′; Geo. McNichols, contractor.

Twenty-first St., cor. Locust St., 2 three-st'y dwells., 21′ x 44′; Geo. McNichols, contractor.

North Seventh St., *Nos.* 1724 *and* 1726, 2 two-st'y dwells., 14′ x 46′; Owen McKenna, contractor.

Eighth St., cor. Filbert St., three-st'y store-building, 20′ x 86′; M. McShain, contractor.

Frankford Ave., *No.* 2853, two-st'y hall-building, 20′ x 42′; R. Creiger, contractor.

Long Lane, cor. Twenty-seventh St., one-st'y still-building, 31′ x 40′; C. E. Johnston & Co., owners.

Fourth St., cor. Doye St., two-st'y stable, 30′ x 45′; Geo. C. Jackson, contractor.

Twenty-third St., cor. Turner St., three-st'y machine shop, 32′ x 53′; Jno. Braun, owner.

Frankford Ave., *No.* 2230, three-st'y dwell., 17′ 6″ x 30′; Robt. Beatty, contractor.

Queen Lane, w of Green St., two-st'y dwell., 18′ x 43′; Martin Hetzell, contractor.

Second St., n of Lehigh Ave., fire engine-house, 27′ x 60′; Thos. Cassady, contractor.

Baring St., e of Thirty-seventh St., three-st'y dwell., 26′ x 60′; F. H. Vogdes, superintendent.

Wreken St., w of Pepper St., 4 two-st'y dwells., 12′ x 34′; Thos. L. Kelly, owner.

Tacony St., n of Bridge St., 2 three-st'y dwells., 18′ x 50′; Bloucher & Schoch, contractors.

Orthodox St., e of Mulberry St., two-st'y store and dwell., 16′ x 50′; Bloucher & Schoch, contractors.

Washington Ave., e of Twenty-third St., three-st'y addition to cooperage, 96′ x 130′; Thos. Little & Son, contractors.

Rodman St., e of Tenth St., three-st'y factory, 32′ x 32′; Thos. Little & Son, contractors.

Main St., below Shur's Lane, one-st'y dye-house, 35′ x 60′; Richard Hey, owner.

Sixteenth St., n of Jefferson St., three-st'y dwell., 40′ x 72′; J. B. Doyle, contractor.

Twelfth St., cor. McKean St., two-st'y dwell., 18′ x 40′; Thos. O. Malley, owner.

Terrace St., bet. Seville and Adams Sts., three-st'y dwell., 17′ x 47′; Jas. H. Boone, contractor.

Fifteenth St., s of Montgomery Ave., 10 three-st'y dwells., 18′ x 70′; C. M. Baker, contractor.

Mt. Airy Ave., cor. Somerset St., three-st'y dwell., 28′ x 32′; Jno. Wallace, owner.

Nevada St., bet. Eleventh and Twelfth Sts., two-st'y dwell., 17′ x 46′; S. Stewart, contractor.

Chestnut St., w of Thirty-third St., two-st'y church, 86′ x 109′; Jno. A. Decker, contractor.

Delhi St., n of Susquehanna Ave., two-st'y dwell., 16′ x 45′; Jno. Weihle, owner.

South Eighth St., *No.* 1704, two-st'y dwell., 16′ x 42′; H. C. Mintzer, owner.

St. Louis.

BUILDING PERMITS.—One hundred and four permits have been issued since our last report, fifty-two of which are for unimportant frame houses. Of the rest those worth $2,500 and over are as follows, viz.:—

W. Koopman, 2 adjoining two-st'y brick dwells.; cost, $5,600; H. E. Pelpers, architect; Remmers & Thompson, contractors.

—— Barry, two-st'y brick dwell.; cost, $3,300; C. H. Aufderheide, contractor.

Dr. Chas. Garcia, 3 two-st'y brick mansard roof stores and offices above; cost, $13,000; J. J. Stenen, contractor.

Gregory, Roche & Mentana Casino Co., brick theatre or concert-room; cost, $4,000; I. Taylor, architect; Bergan Bros., contractors.

M. E. Green, double brick dwell.; cost, $5,000; I. Taylor, architect; W. Green, contractor.

G. J. Fritz, brick addition to workshop; cost, $4,000.

James Layton, two-st'y brick dwell.; cost, $5,000; Chas. E. Illsley, architect; Barnett & Duffner, contractors.

James Layton, two-st'y brick dwell.; cost, $5,000; Chas. E. Illsley, architect; Barnett & Duffner, contractors.

St. Louis Stamping Co., four-st'y brick addition to warehouse; cost, $7,000; Aug. Beinke, architect and contractor.

J. G. Rubbelman, 2 adjacent two-st'y brick dwells.; cost, $6,000; Aug. Beinke, architect; S. H. Schaffner, contractor.

St. Louis Gaslight Co., two-st'y brick Purifying-room; cost, $7,000; sub-let.

General Notes.

KANSAS CITY, MO.—M. E. Church South, wood church, n e cor. Missouri Ave. and Campbell St.; 54′ x 70′, two-st'y; cost, $6,000.

James W. Wood, addition and general repairs to a block of buildings at 109, 111, and 113 West Ninth St.; cost, $5,000.

Walter B. Lee, 2 houses, each 30′ front, and 65′ in depth, and two-st'y high; cost, $10,000 each.

Anheuser-Busch Brewery Company, brick barn at the n e cor. of Twentieth and Walnut Sts.; cost, $4,500.

MILWAUKEE, WIS.—Granite monument 30′ high, to be erected in Forest Home Cemetery, to the 100 victims of the Newhall House fire; Henry O. Avery, architect, New York.

Wm. Franzen, dwell., on State St., cor. Fifteenth St., Second Ward; cost, $2,500.

Mr. Van Ewick, frame building on Harmon St., Sixth Ward; cost, $4,000.

Mrs. E. F. Pratt, brick house on Astor St., Seventh Ward,

Mrs. Downer, dwell. on Prospect Ave., First Ward, cost, $7,000.

SPRINGFIELD, O.—Wittenberg College, is to have a new $10,000 theological hall.

Efforts will be made by Springfield citizens to have the new intermediate penitentiary located in this city.

TOWNSEND, MASS.—Orthodox Congregationalist Church edifice in this place, is to undergo an extensive remodelling, under the architectural supervision of Silloway & McKay, of Boston. A similar work is in process by them on the Bunker Hill Baptist church edifice at Charlestown, Mass.

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CONTENTS.

THE example of the Rotch family, who recently founded a travelling scholarship in architecture, seems to have inspired some friends of art in New York to attempt to utilize the income from certain funds in establishing a similar scholarship for students of painting and sculpture. The two foundations which are to furnish the means of maintaining the scholarship are those known as the Hallgarten and the Harper funds. According to the newspapers, the principal of these funds amounts altogether only to about ten thousand dollars, the interest on which would, with great economy, support a single student in Paris, Florence, or Munich, but nothing more, and we do not understand a half-promise which is made, that a second year may, if the progress of the student is satisfactory, be added to the time during which he is to be maintained abroad, unless it means that the award of the scholarship, instead of being annual, is to be an irregular affair, occurring whenever the holder for the time has no further use for it, or when it has no further use for him. Like the Rotch scholarship, the New York prize is to be won in competition, the first contest for the purpose taking place on the first Monday in December next. All students of art resident in the United States, and under thirty years of age, are eligible as candidates, and they are required to show their capacity by the submission of as complete a representation of their work as possible, studies from life and from the antique, sketches in black and white or color, designs and models, being all received on equal terms. We must confess that this feature of the competition has an air which does not commend it to our judgment; but all defects in the plan of the competition are condoned by the admirable choice of members of the jury which is to decide among the contestants. This jury consists of nine artists, of whom two are sculptors, Messrs. Augustus St. Gaudens and Olin L. Warner, while the others, Messrs. William M. Chase, Abbot H. Thayer, J. Alden Weir, F. D. Millet, T. W. Dewing, Walter Shirlaw and R. Swain Gifford, represent not only the best and most thoughtful American school of painting, but perhaps, also, the highest discretion in regard to the needs of American students of art.

TO be selected by such judges as the candidate most worthy to bear the honor of a scholarship of this kind would in itself be a great encouragement to a young artist, but in looking forward beyond this one cannot avoid a little fear lest, by the time our most promising students have gone through the preliminaries to the enjoyment of their well-earned year of work in foreign schools, the directors of those same foreign schools may have come to the conclusion that they will keep American students out of them. We have become so accustomed to the generous courtesy of other nations in this respect that it is hard to believe in the possibility of the summary closing of all the schools of art in Europe to the Americans who have learned so much and won such high distinction there, but there are many indications that this event is not far off. We mentioned not long ago that the Italian Government had publicly announced its intention of coming to the defence of its citizens who are suffering on account of the discrimination against their works of sculpture and painting which has been imposed by the United States; and according to a letter to a Boston paper from a well-known young artist of that city, the French Minister of the Fine Arts recently assured an American painter in Paris that his Government intended to "deliberate seriously" as to retaliation by France for the "preposterous tax" laid in this country upon the pictures of the very masters who, as he said, have in some instances more pupils from the United States in their studios than from any other nation, not excepting France itself. The present Minister is a man who joins decided convictions with great energy in carrying out his ideas; and if he should really undertake to make American artists in Paris as uncomfortable as the United States Government has made their French friends, they will have some unhappy moments in store for them.

THE differences of the journeymen and master-plumbers in New York have been happily settled by arbitration, and everything is to go on as before. The agreement drawn up and signed by the members of the joint arbitration committee is sensible and moderate, and although one of its clauses, stipulating that a "general amnesty" shall be declared by both the master-plumbers' and the journeymen's association, has an air of almost comic gravity, the two societies are so dependent upon each other that this point is really a very serious part of the treaty. The other portions of the agreement contain concessions on both sides, but all of these seem to be in the interest of justice, and the award will certainly make the relations of masters and men pleasanter and less easily disturbed than before. In regard to the right of any master to dismiss men without such interference from the journeymen's association as led to the original quarrel, it is now decided that any dispute which may arise as to the justice, either of the discharge of a workman, or the desertion of an employer by one of his men, shall be settled by appeal to the Board of Arbitration of the two societies. In return for this concession, which means to them the removal for the future of the risk of such strikes as that which is just over, the masters agree that work shall stop at four o'clock on Saturday afternoon; and that the men shall either be paid off at that time on the job, or shall be allowed to stop work early enough to get back to the shop and receive their pay at that hour. Some other stipulations are made, but they seem to be simply repetitions of rules already in force, and these two contain all the real additions to the code for regulating the actions of plumbers.

ONE of the last acts of Congress before the recess was the establishment of a Bureau of Statistics of Labor, and of this Bureau Mr. John Jarrett, of Pittsburgh, well known as the President of the Amalgamated Association of Iron-Workers during the stormy years from 1880 to 1883, has been made the chief by President Arthur. The editor of the *Iron Age*, who knows much more about Mr. Jarrett than we do, regards the appointment with great favor, and we trust that the new Bureau may be the means of diffusing among the citizens of the United States of all professions a knowledge of each others' ways of thinking and living, with the mutual regard and respect which such knowledge would bring with it. Hitherto, the constant aim of the false pretenders who call themselves labor-reformers, and with whom Mr. Jarrett has perhaps unjustly been classed, has been to obscure as much as possible the higher feelings and sympathies by which the inhabitants of a common country are naturally united, and to magnify, for their own purposes, an accidental and generally temporary difference of occupation into a barrier which, as they would have it, separates the various ranks of Americans as the distinction of caste does the Hindoos. No more pernicious or absurd delusion was ever propagated for the benefit of designing men, and if Mr. Jarrett can use his influence and that of his new office to expose the fallacies disseminated by selfish demagogues, he will deserve well of his country.

A CORRESPONDENT asks us where he can get books giving plans and descriptions of public buildings, such as court-houses, libraries, and so on. So many others ask the same question that we might as well make the general answer to all, that there are practically no books of the kind. School-house, theatre, and hospital architecture, being special branches, are represented by something like a dozen books of value in each, and Mr. Saxon Snell has recently written and published an excellent work on Parochial Architecture, giving plans of almshouses, infirmaries, and the other buildings which English charity gives municipal governments the care of. Beyond these, the only way in which anything can be learned of public buildings is by the study of technical periodicals. Very rarely, a monograph is published, describing some particular Parliament-House, Palace-of-Justice, city-market, or other important structure, but these are not of much use as guides in the design of smaller buildings, and a collection of plates from the illustrated journals, particularly from those devoted to architecture, arranged according to subjects, forms the best working library that an architect can possess.

WE are not surprised to hear that the owners of some of the newly driven wells in New York city have found themselves in possession of property less valuable than they imagined. A few days ago a case of sickness occurred there which seemed from the circumstances to have been connected with the drinking of certain mineral water; and the inspectors of the Board of Health, having been notified, visited the place where the mineral water was made, and found that the proprietor, either to save his water-rates, or because the appearance of the Croton was objectionable, had been using water from one of the cheap wells now so common in the city. The water was clear enough, but a chemical test showed it to be seriously contaminated with organic matter, which in case of an epidemic of cholera or typhoid fever, would, in the opinion of the inspectors, render it more dangerous than the water of the Broad Street pump in London, which killed five hundred people during the cholera epidemic a score of years ago. It is needless to say that the further use of the well-water was forbidden, and it is to be hoped that a similar investigation will be made into the condition of other wells. We would particularly direct the attention of the Board of Health to the well from which the occupants of the Western Union Telegraph building are said to obtain such delicious drinking water, and to the wells belonging to the great breweries. It is to be said for the latter that the artesian wells which most of them possess are used mainly to supply water for cooling the vats, rather than for mixing with the beer; but one or two of them have recently been at the expense of sinking very deep wells, the water from which would be less efficient for cooling than that found nearer the surface, and if this water is to be used in the beer it should certainly be analyzed and approved previously.

A GREAT deal of use is now being made of natural gas, which has been obtained in great quantities from borings in certain parts of Pennsylvania, and more recently in the city of Pittsburgh. In one of the largest plate-glass manufactories of the State no fuel is used except the gas, and the product is said to have a remarkable uniformity and purity of color; and many other industrial establishments have abandoned coal and coke, and have had their furnaces altered to burn the new fuel. The gas is of course much cleaner than coal, and the flame from it is said to be more easily controlled, while its cost is considerably less than that of any other fuel. If the flow of gas from the wells could be depended upon, there is no doubt that preparations could be made at once for distributing it throughout the city of Pittsburgh, if not to a much greater distance, but, like that of oil, the amount contained in the subterranean fissures in which it has collected must have a limit, or even if a certain supply could be maintained by natural processes, the increasing draught upon it would affect the pressure under which it is delivered in such a way as to give continual annoyance. An attempt has been made to utilize the gas for domestic use, but it has the peculiarity of being nearly or quite without smell, so that an escape from a leaky pipe, or a key carelessly turned, is likely not to be noticed until the gas has accumulated to a dangerous extent. A severe explosion took place a few days ago from this cause, and if the cheapness of the gas should prove too great a temptation for householders to resist, its use will probably be made the subject of municipal regulation.

OUR readers will be glad to have the opinion of an expert so well qualified to give one as M. Planat, the editor of *La Semaine des Constructeurs*, on the important question of the advantages of steel over iron as a material for use in building proper, as distinguished from engineering work. The great superiority of steel rails over those of iron, which has been proved by the experience of some years, and the economy and success which has attended the use of steel tension and compression members in bridge work, have naturally attracted the attention of architects and builders, and within a few months rolled beams, of the sizes and sections commonly used in buildings, have been put upon the market in this and other countries, with a claim, which certainly seemed well founded, that their superior strength rendered them much more economical in use. In the United States, where the price of Bessemer steel is relatively to that of wrought-iron, lower than elsewhere, the economy would be something very considerable, if the mere strength, as shown in the tables in books on construction were the only thing to be considered, but the resistance to tensile and compressive strains give little idea of the strength of steel to sustain such loads as are ordinarily placed on floors, and, what is more important still, the transverse strength varies in accordance with the development of qualities which greatly effect the usefulness of the metal.

THE building steel which M. Planat considers is of a very "mild" grade, giving a resistance to transverse strain no greater than that of wrought-iron; but it is to be remembered that a stiffer and more highly carburetted metal than this is too brittle to be safely used in building. Although of no great stiffness, the soft steel from which beams are rolled is much more elastic than iron, the strain under which it deflects permanently being more than one-half of the breaking load, while iron receives a "set" under a weight of one-third of the breaking strain, from which it never recovers. Unlike the English and American engineers and architects, who generally base their estimate of the proper sizes of beams on the breaking strain, using this as the constant in their formulas, with a certain factor of safety, and taking little or no account of the elastic limit, their French brethren disregard the ultimate strength, and use the elastic limit as their constant, dividing this by two as a factor of safety, to find the working dimensions required. The French method is certainly the most rational, and deserves to be generally adopted, but, as will be observed, its application to steel beams leads to some curious results. With an elastic limit equal to one-third the breaking weight, the French rule gives, for iron, a factor of six between the breaking and the safe load, while for steel beams, which have the same ultimate strength, but an elastic limit about twice as high as that of iron, the rule gives a factor of safety of four. There is, therefore, for the French architects who follow the customary formulas, an advantage in using steel which we should not find in our practice, but M. Planat, nevertheless, believes that the time for the economical employment of the new material has not yet come. It is true that he doubts the propriety of reducing the ratio between the breaking and the safe strain upon steel so low as the French formula would bring it; but in addition to this, he points out that the handling, even of mild steel, is more difficult, and attended with much more risk, than that of iron. In ordinary building, much more than in engineering work, beams and bars of metal are subjected to the roughest treatment. They are cut, hammered, chipped, broken, and drilled, and exposed to blows and accidental strains of all kinds; and while rolled iron suffers such abuse without much injury, steel bars or light beams can be broken by the shock of unloading, or, if not broken, may suffer incipient fracture.

APROPOS of the possibility of converting quicksand into a solid sandstone by chemical process, we remember being told by the late General Benham that while he was engaged upon the works of fortification in the harbor of Charleston, South Carolina, some of his men reported that a quarry of stone had been discovered on one of the islands. Knowing that the islands were nothing but masses of sand, the General expressed some doubt as to the discovery, and was taken to the spot, where, indeed, appeared a deposit of brown freestone. The General, probably suspecting the source of the formation, ordered the rock to be cut into, and in the middle of it was found a cannon-ball, which had probably been fired from the shore in Revolutionary times, and had imbedded itself so far in the sand that the salts formed by the gradual solution of the iron in the sea-water, instead of being washed away, were retained in the surrounding mass long enough to decompose and attach themselves to the grains of sand. Analysis shows that a very small proportion of iron is sufficient to bind sand into a tolerably hard stone.

THE MEMPHIS SEWERS AFTER FOUR YEARS' USE.

By GEO. E. WARING, JR., M. INST. C. E.

GARGOYLE. AMIENS. CATHL. FRANCE. BLDG. NEWS.

IN November, 1880, Mr. F. S. Odell, C. E., read a paper before the American Society of Civil Engineers on the sewerage of Memphis. Mr. Odell had been employed on the work, and he describes its details well. He closed his paper with these words: "With the results already achieved by this small-pipe system of sewerage, it seems safe to predict that a new era has been inaugurated, and that the coming years will witness great modifications in the prevailing methods of sewerage."

In the discussion that followed the reading, much was said that would not be said now. It seems to me worth while to refer here only to the criticism of the absence of man-holes, and to the general disposition, prudently evinced, to await the result of a longer trial of the system in practice.

The omission of man-holes was no part of the "System" — it was due to the need for close economy. One result of this omission was the adoption of a cheap and convenient means for inspecting and for gaining access to the pipes, which seems to answer a very good purpose. There is much good sense in a suggestion made by Mr. Rawlinson when I told him of the hand-holes and stand-pipes that have been used in all the work done after the first few hurried months of construction, early in 1880. It was that these would answer an excellent purpose if, whenever it became necessary to dig down to use one of them, a man-hole should be built at that point — because a second stoppage is very apt to come where the first one came. Of one thing I am well satisfied: man-holes on small pipe sewers should not open into the interior of the pipe. They should be used only as a convenient means of getting at the hand-hole cover — there should be no chance for the accidental or intentional introduction of things which might obstruct so small a conduit.

All the man-holes built under my direction, and nearly all built since, were on the main sewers, — some of them in connection with overflows, made necessary, not as has been suggested by the introduction of storm-water, but by the excessive waste of the public water-supply, sometimes to prevent the deposit of Wolf River mud in the water-pipes, and sometimes to keep them from freezing — aggravated, it may be, by a desire to add to the pumping expenses of the very unpopular Water Company.

Concerning these main sewers, where they have, at rare times, been found to be too small, I would say that I was ordered to build them on a basis of the discharge of forty gallons per head per day by the population that would use them within a few years.

The authorities of Memphis announced it as an important advantage of the system, that the cost of increasing this part of it could be postponed to the time when supplemental mains should be found to be necessary. With clean water, and with reasonable protection of house-piping against frost, they would now be amply large. This, however, is said only by the way. The size of the lower portion of the main sewers has nothing to do with the success or failure of the system of sewerage under discussion.

The four years that have elapsed since the first half of the Memphis system was built, — during which time extensive works of the same sort have been constructed in many other places, including a considerable trial in Paris — may suffice to show whether or not the methods there first adopted have proved successful. These methods have been widely discussed, and their application has been carefully studied. As a rule, the reports have been very favorable. So far as I know, only one engineer, basing his report on a personal examination of the work on the ground, has expressed a specially unfavorable opinion, and his criticism related only to novel features of the system *which had been abandoned.* A few others have questioned the propriety of introducing this method of sewerage so generally as has been recommended; but with the single exception above referred to, I think nothing that has been reported concerning Memphis is so unfavorable as to controvert Mr. Odell's anticipations.

In view of the frequent discussion of the subject, and of some confusion in the details of different reports, it seemed proper to have made a careful examination and an authentic report covering the whole case. To this end, Wm. H. Baldwin, Esq., C. E.,— who had conducted the inspections of the sewers of our principal cities, made in connection with my work on "*The Social Statistics of Cities of the United States,*" for the Tenth Census; who had been employed on the Memphis work in 1880, and who is well known as a skilful and impartial observer,— visited Memphis in March, 1884, and reported the exact condition in which he found the whole work. He was instructed to note especially all modifications of the original methods made in the later construction, and to study carefully the sanitary bearings of the original and of the later work.

It is true that Mr. Baldwin has been identified with my work almost continuously since the spring of 1880. This, I am sure, would in nowise influence either his observation or his report. On his return he gave me notes of his examination, accompanied by the following letter:

"BUFFALO, N. Y., June 4th, 1884.

COL. GEO. E. WARING, JR.,

Dear Sir: — The accompanying notes on the sewerage of Memphis are derived from careful observation and inquiry made during a visit to that city in March last. I went to Memphis to satisfy myself about the practical working of its sewers, and also to ascertain to what extent they had been modified or reconstructed. I spent nearly a week in patient investigation and inquiry, examined the flush-tanks and the main and lateral sewers at all available points, and questioned everybody connected with the work, or who appeared to know or care about it. I could by no means find any evidence that the sewerage works had been modified or changed in any essential feature, nor that any part had been reconstructed excepting some repairs made necessary, usually, by settlement of the grounds on which the pipes were laid. On the contrary, I found that a good many miles of pipes had been laid, and the work is still being extended on the same principles as originally designed. And I recognized the same workmen I knew in 1880, and saw them laying pipe just as they were instructed to do at that time. I came away strongly impressed with the amount of service that can be secured from a system of six-inch pipes, and with the decided improvement in the atmospheric condition of a city supplied with sewers, compared to Memphis as I first knew it in the spring and summer of 1880.

Very respectfully, WM. HENRY BALDWIN."

The following is the text of Mr. Baldwin's report:

"NOTES ON THE SEWERAGE OF MEMPHIS,"

March 29, 1884.

"*Outlet.* When the sewers were laid, in 1880, a twenty-four-inch iron pipe from the jail discharging into Wolf River was improvised as a temporary expedient, intended only to be brought into use by means of a switch, whenever the river should be unusually high. For various reasons the construction of the permanent outlet originally designed to discharge into the Mississippi River has been postponed from time to time, and now the ground on which it was located is covered by buildings and railroad tracks, and it is not likely that an outlet sewer will ever be laid along this line. The effect of discharging sewage into the Wolf River is not likely to be appreciable upon the water-supply—the intake of which is a mile and a quarter distant,—as the current is invariably in the opposite direction.

"*Main Lines.* The current of water in the main sewers is swift and rapid, but not strong enough to carry along some heavy things, such as brick-bats, bones, pieces of iron, broken glass and crockery, etc. These have never been allowed to accumulate in sufficient quantity to cause a stoppage. For convenience of their removal, man-holes have been built along the main sewers, at convenient intervals, and it is customary to drag a rope and steel brush through the main sewers, about once a month. This applies only to sewers ten inches or more in diameter. No such cleaning has been required upon the lateral sewers.

"*Stoppages.* These have occurred in lateral sewers only, (that is to say in sewers of six inches and eight inches diameter.) They are almost invariably caused by a splinter of wood, a carpenter's rule, a bone, a bottle or some such thing a little longer than the diameter of the sewer getting crosswise and holding back floating matter, paper and rags, until the sewer becomes stopped. These stoppages are grouped together on a few lines, and are principally in the neighborhood of public schools, shops, etc., only a few having occurred in localities occupied by the better class of residences. In some places where such stoppages have repeatedly occurred man-holes have been built for convenience of access. The whole number so built on lateral sewers, is: Four on the six-inch line in the alley south of Adams street, all within a single block less than 700 feet in length. Two on the six-inch line in the alley south of Market street, 300 feet apart, one above and the other below a public school; and two on the eight-inch line in Adams street and Lauderdale street, 600 feet apart, where the sewer is deep, and it was thought best to build [use?] man-holes already made for another purpose rather than take the risk of having to dig the sewer up again. The whole number of man-holes on all the lateral sewers in the city is eight, and the whole length of sewers on all these lines within easy access of man-holes is less than half a mile.[1] No sewer has yet become stopped by the gradual silting-in of deposits, and no six-inch line has yet been known to run full of water unless when temporarily obstructed. Even the longest lines usually run only about one-fourth full.

"*Extensions.* Sewers have been extended, especially on the east side of the city, to a distance sometimes as great as two thousand feet from the mains. Such extensions, and all recent work, are built in exact conformity to the methods originally used, except that at intervals of one hundred feet a pipe with an opening [hand-hole[2]] in the top is laid, the opening being closed by a saddle cover that can be removed in case of need to examine the inside of the sewer without breaking a pipe. This is a precaution deemed by the authorities to be well worth all it costs, which is less than one cent for each foot of sewer. *No essential feature of the original work has been abandoned or changed.*

"*Flush-Tanks.* These have done good service whenever water can be secured to operate them. The muddy character of the water furnished by the public works sometimes causes the supply pipes to become stopped. It is believed that with clear water no such difficulty would be experienced. The chief duty of the inspector is to clean out the mud so deposited. The effect of the flush is not only to wash out the sewer, but also to force air through the house-drains, which it has been frequently observed to do with considerable power.

"*Rain-Water.* The flow of water in sewers is perceptibly increased in time of rain. The rise and decline are so sudden as to make it appear that water enters directly from roofs or yards, rather than by seepage from the ground. It is contrary to law for rain-water to be discharged directly into the sewers, but this is sometimes done, notwithstanding the law and the inspection of city officials. It should be considered that, with these very small sewers, even a few infractions of the law would produce a marked effect.

"*Overflow.* During winter it has been found that a large amount of water is wasted by leaving taps running to avoid freezing in the pipes. To provide for such waste water, *and for this purpose only,* five overflows were made, three on the east side and two on the west, discharging into the Bayou. These overflows are built above the tops of the main sewers, and only come into use when the mains are overcharged.

"*Subsoil Drainage.* The effect of the subsoil drains is very marked in reducing the level of ground-water. This is noticeable in making house connections with the sewers, in laying street pavements, and in the general condition of the surface of the ground. It was specially observed in the winter and spring of 1884, which was an unusually wet season, that the streets did not become so bad, and dried away much more quickly, than they used to do before the subsoil drains were laid.

"*Sanitary Effect.* The change in the atmospheric condition of the city is very marked since the removal of privies and cesspools from back-yards and alleys. The practice of throwing slops on the ground has been discontinued to a great extent, since the sewers have afforded a more convenient

[1] The whole length of lateral sewers is more than thirty miles.—G. E. W., JR.

[2] Every third hand-hole is carried up to within two feet of the surface, with a stand-pipe.— G. E. W., JR.

means of disposal. The contrast is very great from the condition conspicuously observed before sewers were built.

"*Neither in removing obstructions, in cleansing the main sewers, nor in connecting house drains is the odor of sewer-gas ever observed.*"

Mr. Baldwin's report is sustained by the following certificate, signed by all the city officials who have ever had anything to do with the construction or care of the sewers since Major Humphreys and I ceased to control them.

"We hereby certify to the correctness of the statements as made in the above report.
Niles Meriwether, *City Engineer*,
Anthony Ross, Jr., *Supt. Sewers*,
J. F. Fischer, *Asst. Supt. of Sewers*,
A. J. Murray, *Chief Asst. Engineer*."

A recent communication from Major Humphreys to *Engineering News* fully sustains Mr. Baldwin's statements. Major Humphreys not only carried the Memphis work well toward completion, he made plans for the application of the same system in a number of other places, and he had full control of the construction of the system in Norfolk, until all its essential features were established.

On the whole, there is thus far reasonable ground for satisfaction with the progress the system has made. In the discussion of the Odell paper in 1880, I said:—

"I submit to the world as the best work of which I am capable this system of sewerage, now working in Memphis. That it is by any means perfect in its details, I do not pretend. That these details will not be greatly improved by the efforts of others, it would be fatuous to suppose. Had I had more money to spend in Memphis, some of them would have been more complete than they are.

"At the same time, I am convinced that the main features of that system are strictly correct; that they afford the only relief yet devised for the defects of the prevailing methods of town sewerage; these methods being the outgrowth of traditions which ante-date the rudiments of sanitary knowledge; and that some of us will live to see the day when the Memphis system shall have supplanted the storm-water system as completely as the present development of the storm-water sewer has supplanted the huge irregular culverts of thirty years ago."

While I do not claim especial credit for what I have done in this case, I naturally desire to avert the effect of mistaken criticism. Referring therefore to the adverse comments already alluded to, I desire to meet it by a more correct statement of the points at issue.

It was said: "Anyone, however, who has seen separate sewerage systems as used in England since 1852 will not discover any novelty in Memphis, except in quite unessential details. . . . The owners of some houses manage to turn their roof and yard water into them, to an extent which increases their flow very materially during rains, and has compelled the building of special overflows from the sewers into the creek or bayou in order to relieve them during such rains; a common custom in England. . . . Stoppages have occurred to an extent which make it necessary to build man-holes every few hundred feet along the lines, likewise as generally recommended in England. . . . In two cases the city was even compelled to build catch-basins along the line to prevent the constant silting up of the sewers from the washing of certain stables. . . . No very essential alterations have to my knowledge been made, but these are sufficient to stamp the Memphis sewerage works as no longer being a type of the patented 'Waring System,' but of the English system as nearly as could be expected of such works, which hardly ever encounter exactly the same conditions. The difference between the two systems at the outset is in fact almost infinitesimal. . . . While I consider the automatic flush-tanks excellent contrivances, and have often recommended them, I do not think it is well to rely on them entirely or to use them everywhere. *English engineers do not altogether depend on them*, and the experience in Memphis I think, likewise confirms the wisdom of this course. One person was engaged for the exclusive purpose of looking after the 184 tanks of which he inspected 50 every day, and regularly found several out of order."

The critic concludes thus: "The present operation of the Memphis system while it is as good as any city or town suitable for its application could wish it to be, is yet no better than it would have been had it received its true name at once, and from the start been built in exact conformity with English practice. Had not the man-holes and overflows been added, the system would on the contrary have given a good deal of trouble. The present successful operation is, in my opinion, not due to any novel features but rather to *their subsequent abandonment*, and to the careful and intelligent management of the works at the hands of Mr. Meriwether, City Engineer; Mr. A. Ross, the Superintendent; and Mr. Fischer, the General Foreman of the sewers."

We are distinctly told by the Memphis officials [named above], by Major Humphreys,[1] and by Mr. Baldwin, that the overflows into the bayou were built *only* for the purpose of relieving the mains from the excessive flow caused at certain times by the wasting of the public water. The relieving of the mains from rain flow was *no part of the motive*. The amount of rain-water admitted is relatively insignificant: it might be and it ought to be stopped. Any attempt to flush these sewers with roof-water even to one-tenth the extent usual in England would cause the inflow of sewage into houses on many of the lines, long before the main is reached. Above the highest overflow there is a large district, much of it compactly built up, that is in no wise relieved by these additions. A fair study of the *system* as working there should be confined to this district, which has two main systems, one with 38,000 feet of sewers, and the other with 47,000 feet.

Along the lines on which stoppages have occurred, there are four man-holes on one six-inch lateral within a length of 700 feet, and there are two on another six-inch lateral 300 feet apart. Two others were built on an eight-inch sub-main laid at great depth, at the time of construction, and as a precaution. The first six of the man-holes constitute an average of one man-hole to each 30,000 feet of the whole system of laterals. The two others were not built for the reason given. This is the only foundation for the statement that stoppages "made it necessary to build man-holes every few hundred feet along the lines."

The "catch-basins along the line" are not along the line at all, but on private branch drains used under peculiar conditions.

In the discussion that followed the reading of Mr. Odell's paper, there was a general expression of opinion that the novel features of the Memphis system ought to be carefully watched for a sufficient time to determine their value. Mr. Bogart said "should it prove the decided success which is believed in and hoped for by many, we may congratulate ourselves that this has been first accomplished in the United States." Mr. Croes, who was very active in the discussion said: "The flush-tank is the one feature in the sewers constructed at Memphis, which renders the system adopted practicable;" and again, "these details are of so much value to those who will have to pass judgment on the system as applicable to different places, that it is hoped that some engineer will examine into them, and report the facts;" also, "I do not understand that the entire separation of sewage and storm-water which Mr. Waring advocates, and which is carried out in Memphis, and recommended for Newport, Stamford, and other places, has been practised anywhere in England."

The *Local Government Chronicle* (England), said, speaking of some details of the work, that this "can in no way affect the main principles of the scheme, which, now that it has been found a success, and now that it has been publicly supported by two such authorities as Mr. Rawlinson and Mr. Field, certainly deserves, and will probably receive a fair trial on the part of the Local Boards." M. Lavoinne, an Engineer-in-Chief of the *Ponts et Chaussées*, familiar with English practice said: "the propositions of Mr. Waring, setting aside the systems of sewerage in usage, etc." Again, he recommends trials "in the new direction indicated by Mr. Waring." M. Lavoinne wrote me in 1880, that he thought the Memphis system solved the sewerage problem of Paris. The work since done there has been in pursuance of this gentleman's suggestion, and is largely due to his interest in the subject. Mr. Rogers Field, at the meeting of the Sanitary Institute of Great Britain in 1880, in the discussion of the Memphis system said: "These conditions are altogether unprecedented, and we can therefore hardly judge of the works by the rules applicable in ordinary cases." These expressions seem to me to suggest marked differences from the English Separate System which had been in use since 1852. These differences should have manifested themselves to any observer who had the least knowledge of sewerage works.

The statement that English engineers "do not altogether depend" on the use of automatic flush-tanks might have been made much stronger. Practically they do not depend on them at all. I am confident that when the Memphis works was established, only one English engineer had used them at all on sewers, and that he had used less than a dozen of them, and in no case as I used them.

The person referred to was not engaged "for the exclusive purpose of looking after the 184 flush-tanks," but almost exclusively for looking after the pipes by which they are supplied with water. The tanks are fed by such a very small stream that the very unfit muddy water supplied has a tendency to silt them up.

It seems to me that no intelligent person could, after such an examination of the Memphis work intimate, as this observer does, that it is now "in exact conformity with English practice."

Not one of the original features of my whole plan has been abandoned, except the fresh-air inlet, and this was used only on the first few lines. Neither has any one of these features been modified. As I devised and executed the sewers of Memphis in 1880, so have they been carried out to this day; and all of this success *is* due to the "novel features," there first introduced.

The extent to which the system first introduced in Memphis has been, or is about being adopted in this country is sufficiently well known to those interested in such subjects. A considerable experiment with the system, including improved methods of house-drainage was made in Paris in 1883, under my direction, and at the cost of the municipality. This work is carefully described by M. Ernest Pontzen, Civil Engineer, who was in immediate charge of the work. I translate the following from his "Conclusions":—

"The first application of sewerage according to Waring's system, made in Paris in 1883, in a quarter where all of the unfavorable conditions are combined, has been a complete success.

"The establishments drained by Waring's system leave nothing further to be desired in a sanitary point of view, and the *ensemble* of the drainage works has not, during the five months it has been in operation given rise to the least complaint. The water-closets in the court-yards

[1] Major Humphreys says: "Nearly all of the overflows that now exist were built while the sewers were in my charge, and by my direction; not at all because of rain-water in the pipes, but because, by an error in designing them in not making sufficient allowance for waste, the 12-and-15-inch mains were made too small for the service, and became overcharged during the waste of water in winter."

are no longer offensive, and their presence would not be suspected; the conduits of the system have never required any special cleansing; no deposit has been formed in the collecting sewer in the Rue de Rivoli at the mouth of the main, and the air in this main constantly renewed and passing only over recent matters moving in a rapid current of water, has no odor.

"The officers of the city and the members of the Municipal Council more particularly interested in the improvement of the sewerage of Paris have watched the experiment with interest, and I am permitted to say that the good services rendered by the combined arrangements introduced by Mr. Waring contributed largely to the influence which led the Municipal Council to decide in its session of the 11th of April, 1884, that the preliminary official inquiry which is now to be made, and which is the prelude of a definitive decision as to the method of sewerage for Paris, should relate both to the direct discharge of household wastes into the existing sewers, and to their removal by separate sewers.

"It seems certain that within a short time the entire suppression of vaults and movable receptacles for fæcal matter will be decreed, as well those which receive and retain excremental matters as those which attempt a division, and are intended only to retain the solid portions; and that the immediate removal of all excremental matters and household liquids will be accomplished by their direct discharge beyond the limits of the city.

"These substances will be discharged *into the sewer*; wherever the condition of the sewers is suitable, they will be sent *through the sewer;* that is to say, by special conduits located wherever possible in the interior of the large sewers, where their immediate delivery into the sewer itself would not be admissible; these special conduits to deliver *into* the sewer as soon as a point is reached where the necessary conditions for the rapid and complete removal of the discharge of such affluents is assured.

"This is one of the great advantages of Waring's system of sewerage that it can as well be established in isolated sections, constituting an auxiliary and an economical complement of the great system of sewers suited to receive fresh fæcal matter and household waste, as it can, by itself alone, be extended for the complete drainage of whole quarters, or of entire cities.

"Whatever may be the extension of a series of sewers according to Waring's system it retains always, by reason of its exclusion of storm-water, the great advantage of requiring only small diameters and reasonable inclinations in which the volume of flow undergoes only slight variations, and for the cleansing of which relatively small quantities of water suffice.

"The establishment and maintenance of a system of sewers according to Waring's system has therefore in all cases the advantage of being economical.

"Paris, May, 1884."

THE NEW BUILDINGS OF VIENNA.[1]

It has taken but a quarter of a century—from 1859 to 1884—to transform the "Glacis-Gruende,"[2] which formerly consisted of a waste strip of ground dividing the city of Vienna proper from its encircling suburbs, into an imposing and many-branched succession of streets, without a rival, perhaps, in any modern European town. This great work of extending the city seems now concluded, and it is time to consider the artistic results of an activity which has made Vienna the advance-post of contemporary German architecture. In attempting such a consideration it is imperative, of course, that we should use the æsthetic gauge that was imposed by the actual necessities of the case. No matter how rich in public works a city may be, no matter how consistently its monumental structures may follow one or another recognized style, its general architectural characters will always be determined by those buildings which are most numerous and most important to its civic existence—in a word, by its dwelling-houses. Now the modern dwelling-house—or, to speak more correctly, the house which is built to rent is, at all events, in Vienna, a unit in a wholesale productivity, a child of that speculative spirit which does not seek its *criteria* in æsthetic rules, and, at best, it cannot be more than a compromise between an artistic idea and an investment of capital. Bearing these facts in mind, we may feel well satisfied with the multiple circle of houses that constitute the "Ringstrasse" of Vienna. It was a piece of good fortune for the city that, when all its material conditions necessitated a wide-spread architectural activity, it possessed a little band of artists whose talent was great enough to turn the stream of speculation into a semi-artistic channel. There was soon developed on Viennese soil a formula for the modern apartment-house, which results in a dignified and harmonious disposition of façade, vestibule and stairway, and this in spite of economical materials and ornamental details which commonly show the hand of the mechanical artisan alone. This formula grew up under the dominating influence of Theophil Hansen, and was inspired, therefore, by the relics of Grecian art, brought into as good accord as might be with the demands of high interest, of mortgage values, and of other commercial factors. It was varied and developed by a number of talented architects, and the result is a rather thin, rather mendacious, and, sometimes, ill-understood Renaissance style which, however (considering its aims and means), makes a very respectable appearance. In this way arose the Viennese type of apartment-house which, in spite of certain fantastic essays of very recent date, still preserves its supremacy, and has been adopted or imitated even beyond the borders of Austria.

But alongside of this sort of commercial building, architectural *art* has gone its own way. A somewhat extended series of public buildings marks the stages it has traversed, and may, in a certain sense, be considered as mile-stones of its progress. But the goals which it had in view have only been reached just now—in three great buildings which have been completed, and put to use within the present year. These are: the Rath-Haus (City-Hall), the University and the Parliament-House—buildings in which the three most important among architectural styles have been clearly crystallized, and which are lifted from the domain of local chronicle into that of general artistic history by the grandeur of their disposition and the nobility of their detail, as well as by the names of their creators.

The most extensive of these palaces is the University, the last work of Heinrich von Ferstel who died just before the close of the past year. To the confusion of all the "romanticists" he had deserted to the Renaissance army after having created, while still hardly more than a youth, a typical Romanesque example in the National Bank and, in the Votiv-Kirche, the most splendid Gothic structure of our century. But the Renaissance of Ferstel has nothing in common with the decorative fashion that was developed chiefly by Gottfried Semper. Ferstel aimed at producing his effects by means of a well-calculated harmony of proportions; of an emphatic outlining of constructive features; and of a strong accentuation of his structure by ornamental details at once simple and flat. Following the example of fifteenth-century buildings he found in brick a means to give his noble simplicity a warm and effective basis. Thus he worked in the Austrian Museum, and in a succession of similar structures, but the problem presented to him in the University could not be solved after the same fashion. The manifold practical necessities of a great school absolutely prescribed the division of his structure into various masses. Therefore, he was obliged to desert the early Renaissance in favor of that "high Renaissance" style which allows the architect to treat his façades with much more diversity. Ferstel has divided his structure into four parts—a front with markedly varied lines; two side-fronts and a posterior façade. And to each of these he has given an individual accent of its own. All four divisions repose, however, on a uniform, boldly-rusticated base, and are united by projecting corner bays crowned with domes into an organic whole, the essential unity of which is further insisted upon by the harmony of all the outlines, and of all the ornamental details.

The richest and most effective portion of the exterior is the façade, which faces the "Franzenring." In order to relieve the monotony of its great length (510 feet) Ferstel has recessed the central portion, and crowned it with a lofty mansard roof. The lavish use of pilasters in both stories, the powerful *attica* with its many statues, the massive projecting cornices and the wealth of decorative detail gives this front a festal accent, which immediately proclaims its purpose. It contains the chief assembly-rooms of the University, grouped around the *Aula* or the great hall, which is a majestic apartment with a gallery supported by thirty-two Corinthian columns. In the two side wings are contained the forty-six lecture-rooms, together with other class-rooms and minor apartments, in their totality affording accommodation for some six thousand students—which figure is in excess by about two thousand of the number now frequenting the institution.

The posterior portion of the building is wholly appropriated to the library. It is a huge hall, which rises through the entire height of the building, without external windows, and divided from the other portions of the structure by a massive fire-proof wall; the same desire to obviate all danger of a conflagration is also shown by the interior construction which is entirely of iron gratings. These gratings form thirteen superimposed stories, connected by iron staircases, and affording place for half a million volumes. The two reading-rooms accommodate five hundred and twenty desks.

But the University building displays its true beauty only when we pass through its three-aisled vestibule into the central arcaded quadrangle, which is unequalled in all the domain of modern architecture. It measures 212 feet in length by 150 in breadth; forty-six bold arches lead from it into the wide-encircling cloister where debouch the superb stairways. It is wholly unornamented save for the columns which adorn its three stories, the three orders being successively introduced according to the Roman fashion. Its imposing effect results wholly from the nobility of its proportions, and the remarkable feeling for space which guided the pencil of the designer. It is

[1] Translated from an article in "*Die Gegenwart*," by Siegmund Feldmann.

[2] The strip of ground formerly called the *Glacis-Gruende* and now the *Ringstrasse*, was originally occupied by the encircling fortifications of the city.

worthily completed by the three-branched state stairway, and the five-branched one for general use. And equally happy is the arrangement of the subordinate courts, staircases and passages. Wherever one may stand an impressive and beautiful perspective unrolls itself — and this is in architecture the surest sign of a talent which does not work by the careful addition of detail to detail, but *creatively* conceiving its result at once and as a whole.

The Parliament-House of Hansen seems like a solidified dream when it is compared with the effective reality of the University, so thoroughly infused with the very breath of modern life. Since the death of Schinkel and Leo von Klenze, Hellenism has existed merely by dint of weak compromises; only the idealizing spirit of Hansen has steadily adhered to its fascinating anachronisms. Inclination, training, and natural endowment have made him the last survivor of the Periclean age. He has always professed the cult of "pure form," and in this Parliament-House, his ripest and richest work, all the traditions of Attic soil spring and bloom once more. A mighty flight of steps leads up to the building, which is surrounded by Corinthian columns of a shining marble resembling that of Paros. The three projections of the principal front appear like temple façades crowned with gables. The caryatides which support the balconies of the narrower fronts are taken directly from the Erectheum. A beautifully designed palmette frieze runs beneath the dentils of the main cornice, and on the flat roof stands a very Olympus of figures in bronze and stone. Yet in spite of the diversity of its elements, the whole building, especially when it is seen from a proper distance, is impressive by reason of its noble lines, dominated by the portico of the main entrance; of the monumental grandeur of its proportions; and of that pictorial grace which Hansen knows how to spread over all his works.

But the plan — the disposition of the interior divisions — is less satisfactory. An imposing peristyle, surrounded by twenty-four monolithic marble columns, divides the building into two equal parts, one of which is occupied by the Upper and the other by the Lower House, while the apartments for the delegations, which include members of both Houses, form the continuation of the peristyle. But Hansen must not alone be held responsible if we here perceive a certain incongruity between artistic success and practical convenience. On this point the architect had no models which he could consult. He stood before a virgin problem, the difficulty of which will only be understood by those who are acquainted with the complicated mechanism of parliamentary customs. Moreover, this problem was rendered still more difficult by the demand that both Houses should be united under a single roof. It was thus impossible that the building should be centralized. A parallel disposition was prescribed, which threatened to prove monotonous in the highest degree. Hansen has cleverly avoided this danger by the interpolation of the above-mentioned peristyle; but in comparison to the cramped dimensions of the other divisions it absorbs an immense amount of space, and how useless it is we see from the fact that no better name has been found for it than that of "*Ruhmeshalle.*"

This "Hall of Fame," however, will indeed be such in so far as its builder is concerned, for it is without doubt one of the most beautiful interiors of the world. We may set the narrowest possible limits for the use of Grecian architecture in modern times; we may bring up against it all sorts of theoretical objections; but this result silences all doubt. Especially important is the proof it gives of the praiseworthy audacity of Hansen in clothing an immense structure, destined for distinctively modern uses, *wholly* in the art forms of Greece. He does not turn to his Hellenism merely for his superficial decoration; he grasps it also in its constructive elements, which, as we know, are extremely scanty, and deny the architect many things. Yet nevertheless he has surmounted all difficulties and erected his mighty work in entire renunciation of the aid of vaults and arches. Whatever is thus lost in the way of perspective effect and changeful composition, he makes good by means of color. He has sought to revive not only the forms but the polychromy of Grecian buildings, and thus to set at rest a conflict that has raged for the past ten years. Whether or no he has been quite successful may remain an open question. It is doubtful whether any antique interior ever wore just this aspect, and whether an archæologist would say amen to the work of the Viennese master. Yet it is very certain that the advocates of white walls are driven from the field. Gilded capitals carry the entablatures, the ornamentation of which is relieved, tenderly yet brilliantly, upon a deep-toned ground; the walls are painted throughout in *succo lustro*, after the Pompeiian manner; the marble quarries of every land have been robbed to furnish shafts, pavements, and all accessories; and this intermingling of hues and shades, this splendor of gold and color, produces a magical effect. Hansen uses his polychromatic materials in as masterly a way as does Makart the colors of his palette, ennobling their extreme richness by the exercise of the highest artistic taste. There may be some ground for seeing in the Parliament-House as a whole only an interesting experiment; but by this one quality — by the manner in which its interior is finished — it is raised to high importance and becomes one of the most conspicuous architectural sights of the century.

But the University and the Parliament-House furnish only the side scenes for the great square whose background is filled by the new Rath-Haus. This is an enormous building enclosing seven courtyards, with open arcades on its ground floor, an imposing loggia which rises through two stories, and a tower which is only exceeded in height by the spire of St. Stephen's church. It is a splendid bulwark of self-conscious civic power, and its evidence establishes Friedrich Schmidt in the first place among contemporary Gothic builders, a place which had been accorded him, indeed, ever since the death of Viollet-le-Duc. But the Gothic he uses is in no sense of a kind to draw tears of joy from a purist, or to justify Semper's opposition to "romantic" town-halls. The artist acknowledged as much himself when he declared on one occasion that he could not quite say to what style the Rath-Haus should be ascribed. "But if there is any one quality characteristic of the building," he added, "it is the *modern spirit* which in it finds full expression." The "modern spirit" is a hard thing to grasp, especially for the architect, since he thinks and works only in a concrete way. But now that the structure stands complete before our eyes, we feel the meaning of Schmidt's expression. When he set himself to build a Gothic town-hall, he saw very clearly that old examples would give him no help on the practical side of his problem. In the Middle Ages people gave plenty of space to no one but the Creator; themselves they were content to crowd into narrow little low-ceiled apartments, which modern needs and habits have vastly outgrown. In this new town-hall, for instance, immense *salons* for festal purposes were required, as well as convenient and airy passages, and wide vestibules with branching stairways of great size. For such results the palace architecture of the sixteenth century offered the earliest models. Without stopping to consider how the contracted Gothic style might be reconciled with such unwonted extension of plan, Schmidt resolutely seized upon this Renaissance type, and in its spirit constructed the skeleton of his building, while the ornamentation, the variable play of form, and, in a word, the whole artistic development speaks of Gothic art. Gables and canopies and pinnacles accent the silhouette of the structure; pointed arches connect the columns and appear in the façade; and the broad windows of the projecting bay show the characteristic tracery. But the supports and framework of the structure, all that really raises and binds it together, acts entirely in the spirit of Renaissance construction. This organic intermingling of two contradictory styles stamps the work of Schmidt as a true achievement. In it certainly does speak the "spirit of modern times;" for the artist has cast into a novel shape antiquated forms bequeathed to us by conditions of life that no longer exist, and in solving this problem he has surely won himself a lasting fame.

Almost fifty years of energetic labor have elapsed between the day when they were first conceived and the day when the last stone of these three buildings was laid in place. The result has crowned the effort. Vienna may well be proud of these creations of native talent. But the monumental activity of the new quarter does not here come to an end. Just opposite the Rath-Haus will stand the new Burg Theater, built of snow-white stone; not far distant the elegant domes of the two Royal Museums will lift themselves against the sky; and from their windows one will gaze upon the wide square where the colossal new wings of the Palace will extend themselves. In these three works, even more extensive and splendid than those just finished, Gottfried Samper has left the city a noble legacy. But all is still chaos in the museums and the theatre, and the new porticos of the Palace have scarcely risen above the level of the soil. It will be a long time before the last hammer-blow and the last chisel-stroke shall have sounded — a long time before we shall be able to speak in detail of the results we now anticipate.

THE ILLUSTRATIONS.

STORE AT CORNER OF WASHINGTON AND ELM STREETS, BOSTON, MASS. MR. J. A. FOX, ARCHITECT, BOSTON, MASS.

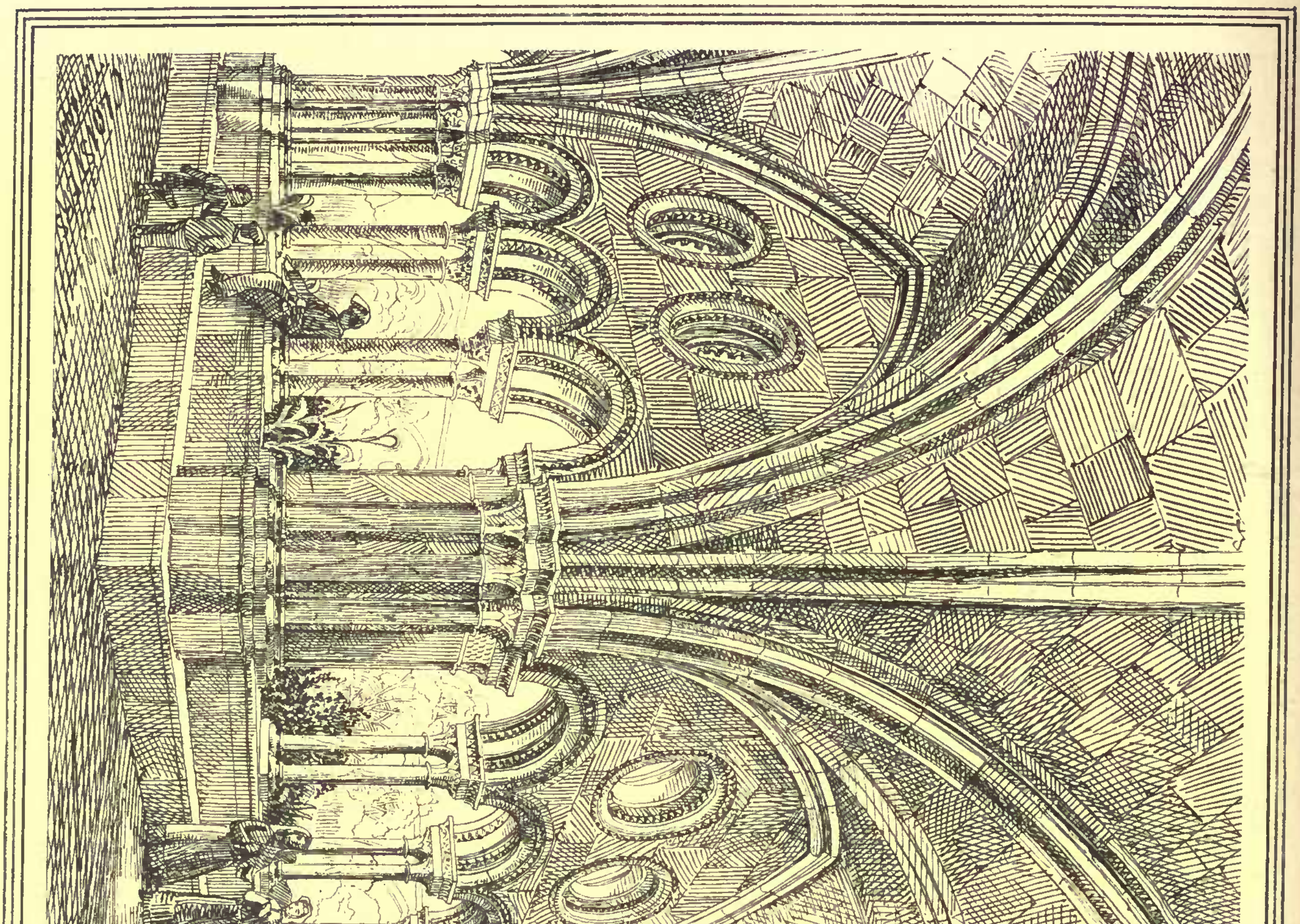
THE CLOISTERS, ENTRANCE TO THE CHAPTER-HOUSE FROM THE CLOISTERS, AND CAPITALS FROM THE CATHEDRAL, TARRAGONA, SPAIN. SKETCHED BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

For description see article on "Spanish Architecture" in our next issue.

RESULTS OF TESTS OF THE TRANSVERSE STRENGTH OF BEAMS. — PLATE XI.

For description see article on the "Transverse Strength of Timber."

Popularity of English Museums. — If any proof were needed of the increasing utility and popularity of our museums it would be found in the report for 1883, just issued by the *Science and Art Department.* We find in that interesting paper an abundance of facts like these: That the visitors to the South Kensington Museum were last year 1,093,810, as against 961,726 in 1882; that the visitors to the Edinburgh Museum exceeded those of the previous year by close upon 18,000, while those to the Dublin Museum exceeded the visitors in 1882 by no less than 47,000. The Bethnal-Green collections were visited by nearly half a million people, being some thousands more than in the preceding year. As many as 16,000 objects of art were sent out on loan to provincial galleries during the year, the visitors to which numbered more than two and a half millions. These are eloquent figures, and they should encourage the Government in their praiseworthy desire to devote a fair share of the national revenue to making the national collections as perfect, as useful, and as well worth seeing as possible.—*London Times.*

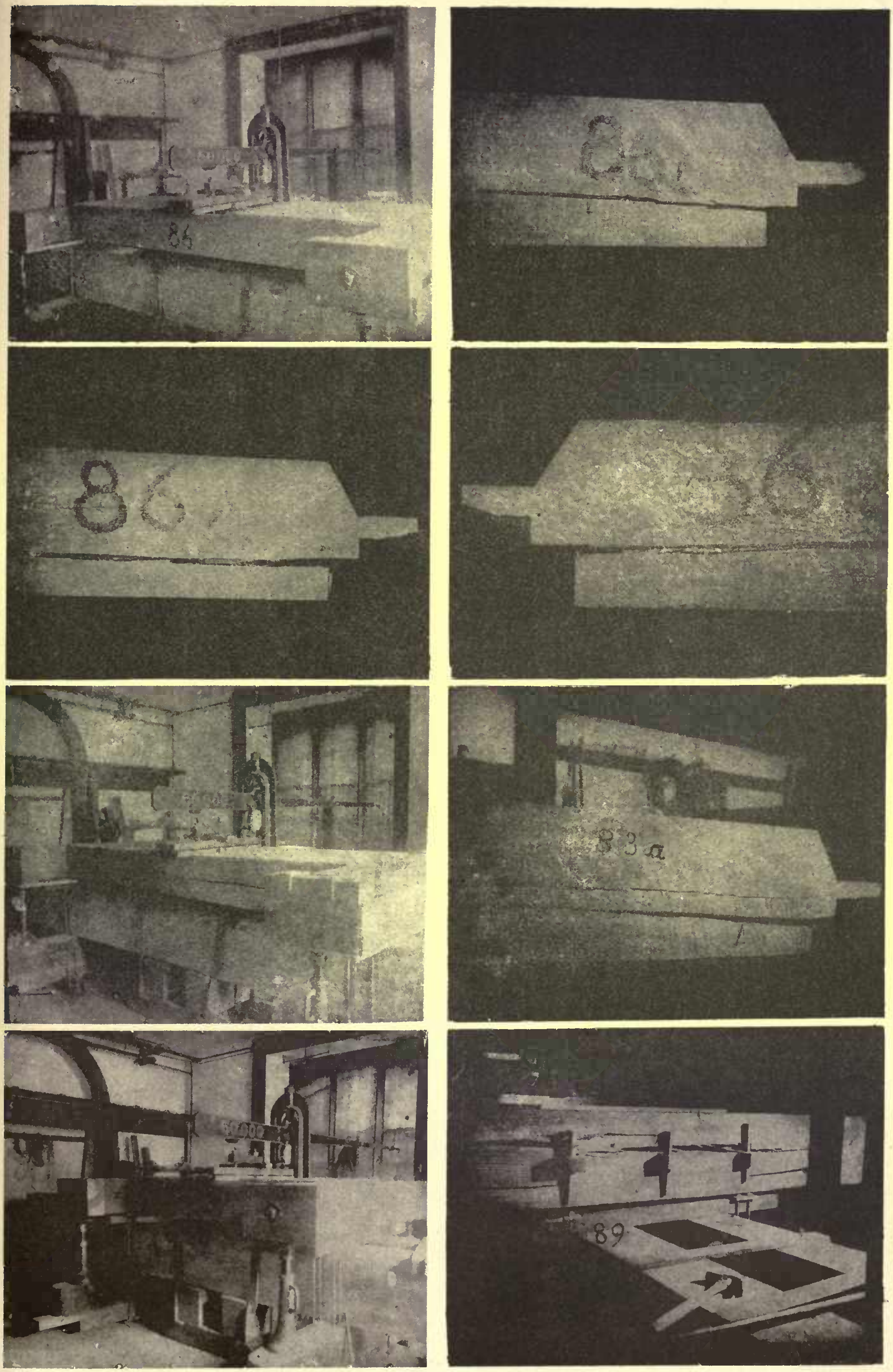


Cathedral Tarragona Spain: The Cloisters:

The Heliotype Printing Co. 211 Tremont St. Boston.

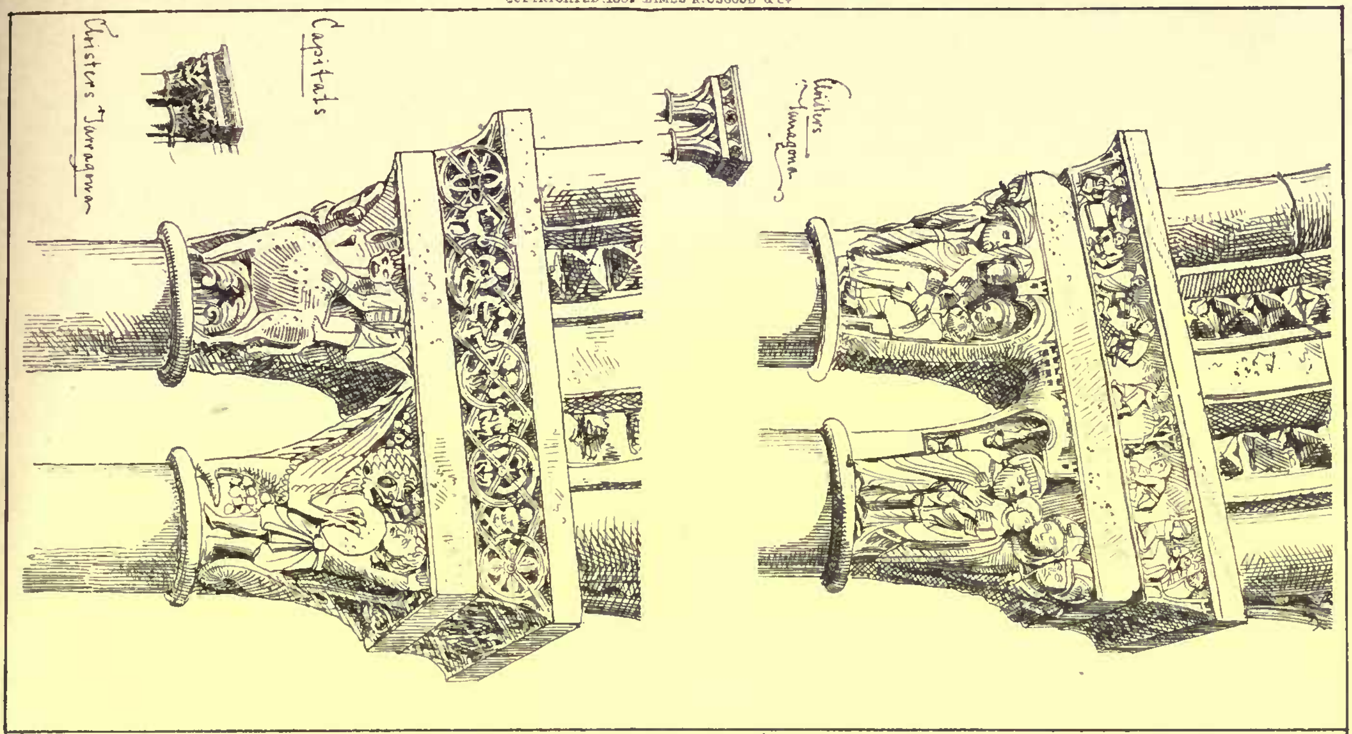
STORE CORNER WASHINGTON AND ELM ST'S BOSTON. JOHN A FOX ARCH'T

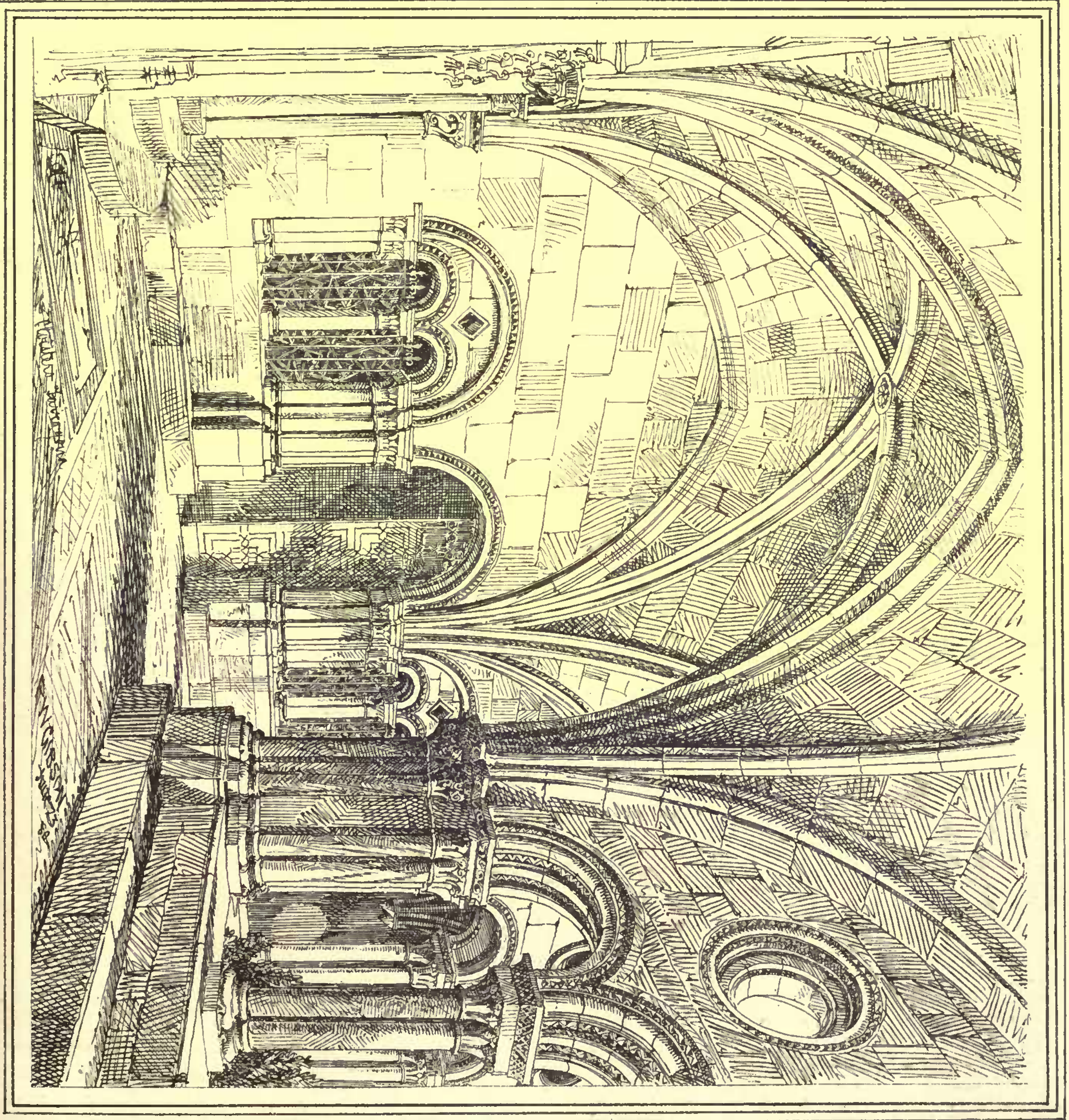
The Heliotype Printing Co. Tremont St. Boston.



Transverse Strength of Beams. Plate II.

PHOTO CAUSTIC. HELIOTYPE PRINTING CO., BOSTON





Cathedral Tarragon Spain: — The Cloisters and Entrance to Chapter House:

The Heliotype Printing Co. Boston.

SANITARY PLUMBING.[1] — XXVI.

BELL-AND-SPIGOT JOINTS (*Continued*).

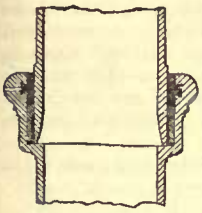
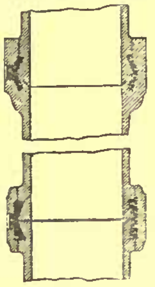


Fig. 136 — Bell-and-Spigot Joint with Groove.

FIGURE 136 represents a form of bell-and-socket joint devised to keep the lead from being drawn out of the socket by the longitudinal expansion and contraction of the pipe. The socket has internal annular grooves for the purpose, and a pour-hole for the lead. A sleeve of lead is also pushed down to the bottom of the socket to keep the yarn or jute out of the pipes. These refinements may serve to remove some of the minor objections to the bell-and-spigot joint, but they increase the cost and labor. The groove in the socket increases considerably the labor of casting the pipe, and the advantages do not, on the whole, seem to justify the increased outlay.

Figures 137 and 138 give another form of bell-and-spigot joint devised with the same end in view, but in this case the pressure for calking is applied at an opening in the side. A groove is formed around the spigot end of the pipe, and a corresponding groove round the inside of the socket, and these grooves coming opposite one another when the spigot of one pipe is placed in the socket of the other form together an annular chamber into which the melted lead is poured through the opening or gate in the socket. The calking is intended to be done by an iron mandril driven into the gate. It is doubtful if, by this process, a tight joint could be obtained, and the metal thoroughly calked at the points most distant from the gate.


Figs. 137 and 138. — Bell-and-Spigot Joint with double Groove.

Figures 139, 140 and 141 show bell-and-spigot joints calked by using cold lead rings forced in place by hammering. In the first figure the outer surface of the spigot end of the pipe may be cylindrical or wedge-shaped, tapering towards the body of the pipe, and having grooves or depressions formed round the part which enters the socket

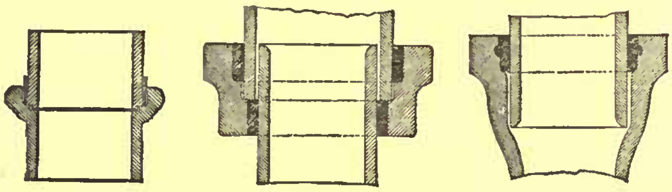


Fig. 139. Fig. 140. Fig. 141.

Bell-and-Spigot Joints with cold Lead Packing.

of the adjoining pipe. The extremity of the spigot is of less diameter than the rest of it, thus forming a shoulder to abut against the shoulder inside the socket. The socket has a groove or depression formed internally, and at their inner end a double shoulder for the shoulder and end of the spigot to rest upon. A band of lead, wedge-shaped or tapering, is inserted between the spigot and the socket, and is forced in from the outside by hammering or by other means; the lead thus may be made to fill the grooves or depressions, respectively, on the socket and on the surface of the spigot, in order to form a tight joint. An India-rubber, or other elastic packing-ring, may be used in combination with the lead, and then the grooves or depressions in the socket may be dispensed with.

In Figures 139 and 141 the lead may be used either cold or melted, as desired. The socket at the lower part is made only large enough to just receive the spigot. Above, it is enlarged enough to hold the lead packing. An internal annular groove is formed on this part to better secure the lead. The packing is either run in, as is usual in a molten state, or by winding a lead wire several times round the spigot, and afterwards calking it in the same manner with the molten-lead packing. The end of the spigot is rounded internally to prevent abrasion of telegraph wires, when the pipe is used for their conveyance. In the second figure a joint is shown between pipes of different sizes. This joint is also made with a portable collar, so that the pipes may be separated, when desired, without breaking them.

Finally, Figure 142 shows a bell-and-spigot joint devised for thin wrought-iron pipes to be calked in the usual manner. One end of each pipe is bell-mouthed for the reception of the spigot-end. A ring or sleeve is driven over the bell-mouth so as to bring one edge of the ring about even with the edge of the bell-mouth. This is then hand-calked in the usual manner.

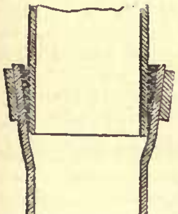


Fig. 142.— Bell-and-Joint with Strengthening Ring for thin Pipes.

(*b*) *Machine-calked Bell-and-Spigot Joint.*

Figures 143 and 144 represent a joint calked by hydrostatic pressure. This form of bell-and-spigot joint, though subject to the objections already described as inherent in all bell-and-spigot joints having inelastic packing where great variations of temperature are encountered is, nevertheless, free from the difficulties attending hand calking. In the interior of the bell a groove is cast (Fig. 143) about one-half inch square in cross-section, with rounded corners, and within it is a cast-lead ring or gasket flush with the interior surface of the bell. A clear space of, say one-eighth inch all around, is allowed between the spigot and the bell for easy entrance. The end of the spigot is thickened. It is guided into a concentric position with the bell by the conical or tapering form of the interior of the latter. When the sections are entered, a forcing-jack is screwed into a threaded opening in the bell, and a thick, semi-fluid material is thereby forcibly injected into the opening, finding its way between the lead gasket and the bottom of its groove, partially displacing the gasket therefrom, and forcing it into tight contact with the spigot at all points of its circumference. The forcing-jack is then removed, and a screw-plug inserted.

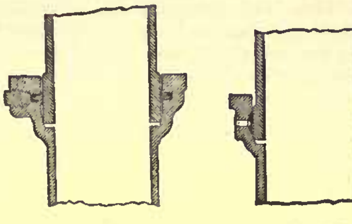


Fig. 143. Fig. 144.
The Machine-calked Bell-and-Spigot Joint.

By this method of calking the power is scientifically and uniformly, if not directly, applied, and by the use of an enormous hydrostatic pressure a tight joint may be obtained without the need of manual skill. All the lead is utilized, none being wasted, as in hand calking, and no lead-melting on the spot is required.

The forcing-jack is strong and simple, weighing about fifty pounds, and can be managed by a single ordinary workman.

The forcing material is coal-tar pitch, thickened with whiting and sand, or with clay and coarse iron borings.

Inasmuch as the pressure is applied only at a single point on the circumference of the bell, the calking is greatly facilitated in contracted places.

This method of calking requires but a small proportion of the labor of the calked joint, much less lead, and does away with the need of oakum.

Figure 144 shows a somewhat improved form of this joint.

The most conspicuous difference between the two forms is that there is no groove in the bell, but instead the groove is made in the gasket itself, as shown in the drawing. The gasket lies in a double-inclined seat in the bell, and comes flush and level inside. When the forcing compound is injected, the effect is to force the two wedge-shaped sections of the gasket apart, driving each into its seat firmly and solidly. The power is thus used to better advantage, it being applied to forcing the gasket into the inclined spaces between the spigot and the bell.

(*c*) *The Ball-and-Socket Joint.*

Figures 145, 146 and 147 represent three forms of ball-and-socket joint. Its object is to facilitate the laying of pipes in places difficult of access. The pipes adjusting themselves to inequalities of surface without impairing the joint. In the first of the three figures the spigot-end of the pipe is cast with bands or projections for the pur-

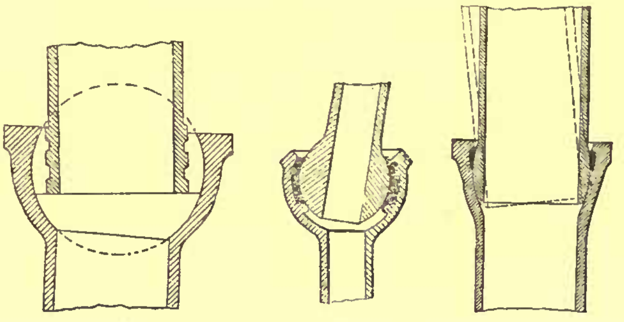


Fig. 145. Fig. 146. Fig. 147.

The Ball-and-Socket Joint.

pose of retaining more securely a packing of lead, which is poured in after this spigot-end has been placed in the socket-end of another pipe. The socket-end has internally the form of the zone of a sphere.

In the second figure the spigot-end is made spherical, and is smooth, while the socket is grooved. The socket in both figures is reduced in diameter at the opening, in order to prevent the packing from being drawn out. The second joint is obviously more difficult to cast than the first. The first joint has no proper provision for preventing the oakum from being pressed into the pipe in the process of making the joint. Both joints have the disadvantage of leaving large pockets below the end of the spigot for the collection of sediment. It is better to use various forms of cast bends to obtain changes of direction in plumbing than to adopt the ball-and-socket joint.

The third figure in this series is a great improvement on the others. It forms partly a rust and partly a lead joint. The ends of the pipes require to be turned. This would form a joint which would be permanently tight, and is by far the best bell-and-spigot joint yet described.

Rust-joints in bell-and-spigot joints of the ordinary form, are formed by filling the space to be calked with a mixture of sal-ammoniac and iron borings. When set, the joint is tight, if the space

[1] Continued from page 18, No. 446.

between the spigot and the hub is not too great. If the space is small, so that the irons are nearly or quite in contact, this filling makes a line of pipe one continuous and rigid piece. "It is for this reason," says Bayles, "that many plumbers object to them."

They assert that a pipe united with rust-joints cannot be taken apart without great danger of destroying it, as the breaking of a well-made rust-joint is an extremely difficult operation, and that if it is necessary to open the pipe at any point the whole may be destroyed. Rust-joints can be separated, but it is a delicate and difficult task, involving much care and labor, and one always attended with some danger to the pipe. With regard to the difficulty of separating them, it does not seem to me much greater than in the case of well calked lead-joints. The only way to get a lead joint apart is to melt it, and the pipe is often so placed that the plumber dare not apply fire to it. In such case it must be broken. In the joint under consideration the lead renders the joint tight until the rust forms at the lower part. After this rust has once united the bell and spigot, no changes of temperature would affect the tightness of the joint."

(*d*) *The Rubber-Ring Joint.*

Rubber joints, or those in which rubber gaskets are used between the bell and spigot, may be made tight as long as the rubber retains its elasticity. The gaskets are made of vulcanized India-rubber, cylindrical in section, so that they will easily roll, when slipped on the end of the pipe. But to procure India-rubber well cured is difficult, and the material has not been used to any great extent in this country, though it is said to have had some success in the West. Figure 148 shows this kind of joint. The spigot has a ring or shoulder on its end, and a groove just within the ring. The rubber ring is stretched over the shoulder and placed in the groove. A second shoulder or collar is cast on the spigot beyond the groove, to prevent the rubber from being blown off under high pressure. The rubber ring is forced up to this shoulder when the pipes are put together.

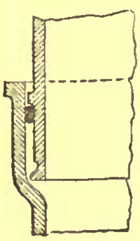


Fig. 148.—Rubber-Ring Joint.

(*e*) *Soft-Packing Joints.*

Under this heading are included all joints packed with red lead, putty, cement, or other material which is plastic when applied. Joints well calked with *red lead* may be made tight against slight pressure, and are permanent so long as they are not subjected to strains, jars, or alternations of heat and cold. *Putty*-joints are used only in cheap plumbing work; they have no resistance, and are nowhere to be recommended. The same remark applies to mortar joints, which "are, if anything, worse than no joints at all, because they give rise to a mistaken sense of security among those who are so ignorant and at the same time so credulous as to believe whatever a dishonest contractor may tell them. With the expansion and contraction of a pipe, mortar or cement cracks, and leaves the joint practically open. I would condemn with equal severity joints made with Portland cement when lengths of cast-iron pipe are to be united. This cement is probably the best substance for uniting lengths of earthen pipes for land drainage and other purposes, but it is not adapted to iron. It is pervious to both gases and liquids to some extent, and as it expands and contracts differently from iron, it soon cracks and crumbles, leaving the joint open.[1]

"*Sulphur-and-pitch* joints have been made with a composition consisting of equal parts of these substances. This composition is used to some extent in the arts for making joints analogous to those in soil-pipes, and if we must have cheap and bad work, there is no doubt that sulphur-and-pitch joints would be far better than those made with putty, mortar or cement. Other cheap substances might be used, but when the plumber ventures any experiments in this direction he should be sure that the material he uses is not decomposed by sewer-gas, that it contains no volatile constituents, and that in drying it does not shrink or crack, or become rigid and inelastic."

In one form of joint designed for cement or other soft packing, several shoulders are made on the bell and spigot corresponding with each other, and the spigot-end has a projecting shoulder corresponding with the outer end of the bell. To make the joint, cement is placed on the spigot end of the pipe, which is then inserted into the bell until it comes to a bearing. This packs the cement and forms the joint. Or the filling material may be poured in through holes in the circumference of the bell; the holes also serve to keep the filling material from moving.

Figure 149 gives another form of soft-packing joint. Neither of these joints is capable of withstanding the hydraulic test, however long they may be allowed to set. The joint consists of a double socket. Near one end of the pipe, and around the outside, a cupped or recessed collar is formed, which, with the continuation of the pipe, forms a socket. At the other end of the pipe is formed a smaller socket. The joint is made by forcing the projecting inner ring of the first socket into the socket of the following length, until it butts tight against a shoulder formed inside of the small socket. The outer ring of the smaller socket then enters the larger socket, forming, with the packing, the joint.

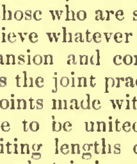


Fig. 149. — Soft-Packing Joint.

Figure 150 shows a third form. This joint is, however, designed more particularly for use with earthenware pipes. A tapering ring of plaster-of-Paris or cement is cast on the end of the spigot, by the use of carefully-turned moulds. The socket-end has a corresponding ring cast on its internal surface to exactly fit the ring on the spigot. The ends of the pipe are then covered with coal-tar, grease, tallow, paraffine, or other suitable varnish or lubricating material, and inserted one within the other. The joint is dependent upon the accuracy of the fit of the two ends to render it air and water tight.

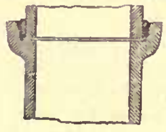


Fig. 150.

Figure 151 represents a bell-and-spigot joint with soft packing, in which bolts are used to hold the joint together and compress the packing. A collar is slipped over the spigot-end of the pipe before the spigot is inserted into the socket. Part of this collar is to enter the mouth of the socket and compress the packing therein. Any suitable means can be employed for forcing and keeping the collar against the packing. By using loose sockets and collars, plain pipes may be jointed in this manner.

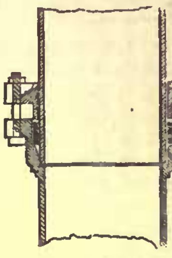


Fig. 151.— Bell-and-Spigot Joint secured by Bolts.

Figure 152 illustrates a soft-packing joint put together by threaded rings. The socket-end of the pipe is cast with an external screw-thread, and has an internal annular projection. The spigot has a small external annular projection near its end. A nut or collar is screwed on the socket and compresses the packing by means of a projecting rim. The spigot covered with a packing-ring is slipped into the socket. The collar, having been previously slipped over the spigot is then screwed on the socket, and the annular projection on the collar squeezes the packing into the socket against the projecting rim. The annular projection on the end of the spigot is intended to prevent the accidental withdrawal of the pipe from the socket. Between the packing-ring and the bottom of the socket there is sufficient space to allow the spigot a certain amount of longitudinal play.

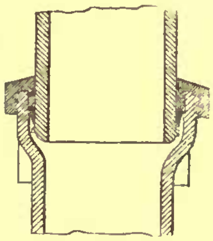


Fig. 152.— Bell-and-Spigot Joint secured by a Threaded Ring.

Figures 153, 154, and 155 represent one more soft-packing joint. The object of this device is to form a plumber's joint on cast-iron pipes, without calking and without turning, threading or finishing

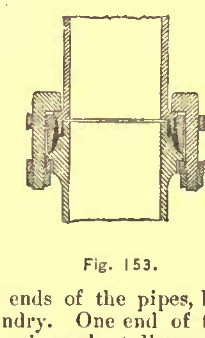


Fig. 153.

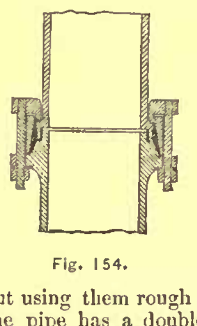


Fig. 154.

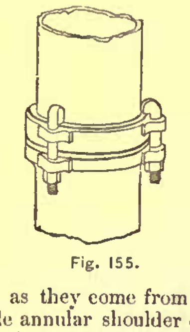


Fig. 155.

the ends of the pipes, but using them rough as they come from the foundry. One end of the pipe has a double annular shoulder cast upon it a short distance from the end; the other end has a smaller single annular shoulder cast at the extreme end of the pipe, and at the outer edge of the shoulder a small annular projection. A ring of metal is placed on the second or outer shoulder of the end of the lower pipe to be joined, which has the double shoulder uppermost. This ring forms with the end of the pipe a triangular or wedge-shaped annular groove, which is then filled with packing. The annular projection at the end of the upper pipe is then forced into the packing in the groove, and forms the joint. The packing consists of a rubber or lead ring which is placed on the inner shoulder of the lower pipe, and is surrounded by putty, cement, or other suitable water and air tight packing. The pipes are brought together by means of screws passing through lugs or ears on the detachable ring or rings, as shown in the drawings. This contrivance allows either pipe to be turned on its axis in any direction when setting it, to accommodate the branches and bends used by plumbers in piping a house. This joint was devised by the writer. It is, however, too complicated. If a rubber ring is used under the spigot, embedded in the putty for protection, it will stand a very heavy water pressure; but with soft packing alone it is not capable of standing the hydraulic test, even though the best of red lead is used, and allowed ample time to harden. It is therefore best to abandon this and all other forms of soft-packing joints for plumbing purposes.

Art Treasure Trove.—Dr. Holmes, the Queen's Librarian at Windsor, has lately discovered in one of the cupboards of the print room, a large number of very fine drawings of the Elgin marbles, which were executed in Greece about 1810, for the Diletante Society. They were sent to Carlton House in 1813 to be inspected by the Prince Regent, and were not returned, and some years later, having been forgotten, they were removed to Windsor, where they were stowed away in the library, and there they have remained for about sixty years.—*London Truth.*

[1] "*House-Drainage and Water-Service.*" James C. Bayles.

STAIRCASES.[1] — V.

FIRE-PROOF STAIRCASES.

ALONSO CANO'S STATUE OF ST FRANCIS D'ASSISI

THE staircase, in all high structures, where many stories are superimposed owing to the expense of land, or to the exigencies of modern requirements, as in factories, hotels, theatres, tenements or houses, and such like, becomes an adjunct of material importance, deserving of much consideration at the hands of the architect. In buildings of the character indicated, where many lives are jeopardized in the event of fire, safe exit from varied levels is an essentiality. The best system of plan to secure this, and one's primary idea of what is necessary to give a sense of complete security and immunity from risk, is, no doubt, that of isolation, so as to keep this, the chief flue in a house, shut off, or away from the main building — in fact to introduce the compartmental system. Safety is attained best, therefore, by means of numerous isolated staircases, connected with the main building by fire-proof passages shut off by protected double iron doors on the various levels; in plan, after the Roman model of a double returning flight with central wall, surrounded by walls built of brick and terra-cotta, or brick faced with stone,[2] and constructed of fire-resisting materials otherwise. These staircases to be of ample size, well lighted, having the steps and landings composed of vitrified materials as an aggregate, supported on vaulting where necessary, and having strong hand-rails on each side formed in the thickness of the inclosing walls. In many buildings this method of construction, however, cannot be obtained owing to causes outside the control of the architect; in many others it is unnecessary. Partial isolation — as we see in many of the châteaux of mediæval France — can often be applied with advantage; while where neither of these systems can be conveniently utilized, the materials employed in the construction of internal staircases of such erections as we have referred to should be carefully studied, so as to secure as safe a means of escape from the upper floors as modern experience and research has made us acquainted with. The well-known fire-resisting and non-conducting properties of a Portland-cement concrete — the improved cement of Mr. Hyatt[3] composed of materials that have been subjected to the action of fire, as broken brick, ballast, clinkers, burnt clay, slags, or pottery, which when subjected to the most intense heat for a prolonged period merely leads to a slight vitrification of the surface,— may safely be pointed to as a material pre-eminently suited for fire-proof staircase construction. The previous calcination of the materials used is an important factor.[4] The security of the steps, especially in geometrical staircases is one of the most vital points. Where the plan is that already pointed to as affording the maximum of safety and stability, ordinary widths may be without support, and constructed *in situ* or built-in as ordinary stone. Where wide, raking concrete vaulting or iron bars may be used, and where geometrical stairs are employed, iron bars embedded (so as to prevent unequal expansion) in the centre of the step, either horizontally or in combination with raking, may be employed to increase the power of resistance to a transverse strain or sudden shock. Where marble, granite, or other brittle materials (which break into shivers with a very moderate heat) are used for the steps, the structural support may be brick piers or columns, with flat raking arches running longitudinally, which would afford protection to the steps from below and form a safe exit even though they were destroyed. Iron girders employed to support the end next the open newel or for landings must, of course, be enveloped in fire-clay blocks, or embedded in fire-proof concrete to prevent destruction; while any wood-work used may have its inflammability greatly reduced by being coated with asbestos paint, painted with alternate coats of silicate of soda and limewash, or be saturated with injections of iron, zinc, lead, or other chemical substance. The artificial stone just patented by Mr. Matthew Allen, composed of burnt clay mixed with Portland cement has been successfully and extensively used for the construction of fire-proof stairs. Ordinary close-grained sandstones possessing homogenity of structure — as liver-rock from Craigleith, Minera, or other stone free from lamination or deleterious matter — possess fire-resisting qualities of a high order.[5] Careful selection, however, is necessary, as laminated stones split, while soft limestones when subjected to great heat becomes calcined, and on the sudden application of a cold douche collapse instantly. Stone, while lasting as a rule sufficiently long to allow of escape, splits and disintegrates with considerable rapidity when subjected to intense heat (like gravel or other concrete in which silicious material enters as a component part[6]) is apt to nip off at the wall line at the junction of the heated and cool portions without warning, carrying ruin and destruction below, unless supported with iron beams protected as before described. Solid timber is favorably known as a fire-resisting material where the angles and edges are protected, and only one surface presented to the action of the fire. Steps constructed thus of a series of wood joists of varying size screwed or spiked together, having the under-side protected by flat-headed nails or wire netting to form a key for a strong coat of plaster, are practically fire-proof.[7] The treads and risers may be covered with teak, oak, or other ornamental wood.

Wood has a springiness and kindliness which other materials want, and is not so exhausting to mount, especially when solid steps are used, and this consequently makes it a favorite in the construction of ordinary staircases in private houses. They are much safer than ordinary stone, and Captain Shaw bears witness to the fact that firemen can avail themselves of these for gaining access to the best available positions better and more safely. Though they add fuel to the fire, and may ignite the clothes, they at least give warning of failure which stone invariably does not. Where used in houses for the principal, the back stair should be within easy access, and constructed of fire-proof materials. Terra-cotta naturally stands fire well, and might be used for stairs with advantage; granite, marble, and iron are inadmissible. Wrought-iron, as already stated, unless completely embedded in fire-proof concrete, twists and bends with great heat, and allows the structure to collapse, while cast-iron, though standing it longer, splits and goes to pieces on the application of cold water. In France, fire-proof stairs are constructed "with L-shaped wrought-iron carriages having the thick sheet-iron risers fixed to the carriages with angle-plates, and bolted. The soffits are formed of iron bars placed below the risers and fastened to the carriages; on these bars thin iron rods are laid, and this skeleton carries the plaster, which is generally filled up solid, to the under side of treads, which may be of slate, terra-cotta, brick, or stone."[8]

PROPORTION OF STEPS.

The ratio of the height of a step to its tread is a question on which a considerable amount of ingenuity and wisdom has been expended, too frequently with but little effect, if one may judge by the many disagreeable and dangerous specimens that everywhere abound. We may recapitulate the elementary truth that, the greater the breadth of a tread, the less should be the height of a riser, and *vice versa*. It is a mechanical fact sufficiently patent that we cannot lift the foot high and go forward much in the same step. Sir Balthazar Gerbier, in his "*Counsel to Builders*," says: "The composing of a fit and easy staires is a masterpiece, fit in respect of the place, convenient if the steps be broad, and low rise, for a straight ascending or descending (without bending of the sinews), gives most ease to the body, which doth rest easier on his bones than on sinews." The striking of this happy medium in breadth and height, which will secure ease and comfort to all who ascend, and serve as a rule of proportion for general application, is the branch of our subject which we wish shortly to consider here. Let us take counsel with a few authorities.

Palladio says: "The steps ought not to exceed 6″ in height, and if they be lower they must chiefly be so to long and continued stairs, for they will be so much the easier, because one needs not to lift the foot so high; but must never be lower then 4″. The breadth of the steps ought not to be less than one foot nor more than one foot and a half."[9] In the staircases of Italy the treads are usually broad in comparison with the rise, as, *e. g.*, in the Panciateche Palace at Florence, where the relation is 21″ over the nosing to $4\frac{3}{4}$″. In the lower flight of the Farnese Palace stair, the steps measure 2′ over the nosing, by 5″ rise at the back part of the step. In the oval staircase at the Barberini Palace; where the steps are carefully radiated to preserve a uniform width at the balustrade abutting on the open newel; the steps measure 21″ x $4\frac{1}{2}$″. Sometimes, however, we have an uncomfortable proportion used, owing to the disregard of a proper relation between tread and rise, as in the Bachiocchi Palace, Bologna.

François Blondel in his "*Cours d'Architecture*," gives the following formula which has been quoted by Gwilt: —

Let $x =$ the space over which a person walks with ease upon a level plane, and $z =$ the height which the same person could with equal ease ascend vertically. Then if h be the height of the step, and w its width, the relation between h and w must be such that when $w = x$, $h = o$, and when $h = z$, $w = o$. These conditions are fulfilled by equations of the form $h = \frac{1}{2}(x - w)$, and $w = x - 2h$.

Blondel assumes 24″ (French) for the value of x, and 12 for that of z. If these values be substituted in the equation $h = \frac{1}{2}(24 - w)$, and $w = 24 - 2h$; and if the height of a step be 5″, its width should be $24 - 10 = 14$″. All of which is pretty much the same as saying that the common rule of twice the height added to the tread should be equal to 24″. Viollet-le-Duc gives a good angle of ascent as 22°, being equivalent to say, 0.28 to 0.30 centimetres for the tread, and 0.15 to 0.20 centimetres at the utmost for the rise of each step. Nicolson allows a $5\frac{1}{2}$″ riser to a 12-inch tread, and recommends this as a standard whereby others may be regulated; thus a step of 10-inch tread would have a rise of $6\frac{5}{8}$″, one of 6″ a rise of 11″, of $9\frac{1}{2}$″ a rise of 7″, and so on. Newlands also advises this proportion, and expresses a useful formula thus: —

Let T be the tread and R the riser of any step which is found to have proper proportion, then to find the proportion of any tread t and riser r, $\frac{R \times T}{r} = t$, or $\frac{T \times R}{t} = r$; or, assuming 12″ x $5\frac{1}{2}$″ as a convenient proportion, we have these two quantities multiplied

[1] The Institute Prize Essay, 1884, by Thomas Purves Marwick, A. R. I. B. A., published in the *Building News*. Continued from page 21, No. 446.

[2] "No enclosure built entirely of stone can be considered fire-proof."— Captain Shaw.

[3] "*Experiments on Portland Cement Concrete*," by Thaddeus Hyatt, Esq.

[4] R. I. B. A. Conference, 1878.

[5] Mr. Samuel Trickett.

[6] Paper read before the Civil and Mechanical Engineers' Society, by Mr. Charles Drake.

[7] Evan's and Swain's patent, 1876.

[8] "*Building News*."

[9] Vicentine feet and inches, one foot of which = 13.6″ English.

together = 66, which, if taken for a constant numerator, may be thus applied: —Rise in inches $= \frac{66}{\text{Tread in inches.}}$ Assuming 10″ to be the denominator in this case, 6⅝″ would be the rise. Nearly the same result as the above is obtained by setting down two sets of numbers, each in arithmetical progression; the first set showing the width of the steps ascending by inches, the other showing the height of riser descending by half-inches, thus :—

Tread in inches.	Riser in inches.	Tread in inches.	Riser in inches.
5	9	12	5½
6	8½	13	5
7	8	14	4½
8	7½	15	4
9	7	16	3½
10	6½	17	3
11	6	18	2½

Gwilt, Richardson, Hurst, and Molesworth practically agree. The latter gives the maximum and minimum heights and width for ordinary examples :— Riser not more than 7″ nor less than 5½″, and treads not more than 12″, nor less than 9″. Mr. J. J. Stevenson advocates a rise of 6″ or 6¼″, with a tread of 12″, "as when less it requires as much exertion to ascend, while a greater number of steps are necessary." The most pleasing gradient for ordinary purposes is by common consent and experience assigned to a tread of 12″, and a rise of 5½″ to 6″, and where the width and height permit, this should undoubtedly be the basis on which calculations should be made, without any elaborate and intricate formulæ which but confuse, perhaps, without definite benefit or result. Subtle refinements, in such matters, are frequently too clever to be useful. Proportions will vary according to the method and purpose of application, the amount of traffic, and also with the space at command, which should always be the result of careful calculation. In a straight staircase of successive flights, with landings at intervals, forming a noble and stately approach to some public building, as in Klenze's Museum at St. Petersburg, Soane's Scala Regia, or Gärtner's Library at Munich, it is in perfect harmony, and lends an unmistakable air of grandeur, when long, low, broad steps are used. It is customary to have the first tread of a stair broader than the rest, and to graduate the succeeding two or three until the general average be reached, but risers should never vary in the length of a flight, as a want of uniformity leads almost invariably to accident. It is usual, also, to give all steps a slight "kilt" or slope of about ¼-inch to a 12-inch step, which eases the ascent. In a winder the ½-inch is given at the widest part, and less at the newel, the step being worked $\frac{3}{16}$ thicker to secure uniformity. Sir Henry Wotton, in his "*Elements of Architecture*," published 1624,[1] says on this subject: "That the breadth of every single step or stair be never less than 1′, nor more than 18″. That they exceed by no means ½-foot in their height or thickness, for our legs do labor more in elevation than in distension; these, I say, are familiar remembrances; to which let me add, that the steps be laid where they join *con un tantino di scarpa;* we may translate it 'somewhat sloping,' that so the foot may in a sort both ascend and descend together, which though observed by few, is a secret and delicate deception of the pains in mounting." External flights of steps must, of course, be made broader and lower than internal examples, otherwise they will look steep, as we see in the approaches to the Palace of Xerxes, in the gardens at Versailles, and in many other celebrated examples.

THE GOVERNMENT *VS.* A LEARNED SOCIETY.

THE Secretary of the Engineer's Club of Philadelphia reported at the last meeting upon the relations of the Club to the Custom-House and Post-Office, but delays his final report, as certain matters in relation thereto are still subject to controversy. Documentary and other evidence is on file, however, to show that the following are among the remarkable conclusions which have been reached by our Government officials.

By the Custom-House : —

1. *That engineering societies, the objects of which are "the professional improvement of its members, the encouragement of social intercourse among men of practical science, and the advancement of engineering in its several branches," are* ***not*** *scientific societies.*
2. *That the liability of a package to duty depends upon its* ***size.***
3. *That the Transactions of the Institution of Civil Engineers of England are subject to customs duty, and that the Transactions of the North of England Institute of Mining and Mechanical Engineers* ***are not.***
4. *That the transactions of the Institution of Civil Engineers of England are worth about* ***three cents each,*** (sic transit ad valorum mundi!)

By the Post-Office : —

1. *That, while* TWO *cents per pound is the rate accorded to the general press, including certain pictorials about which all respectable people seem to have one opinion, a society, the object of which is the dissemination of useful knowledge, must pay one cent for each two ounces and* FRACTION THEREOF, *or over eight cents per pound, on a publication issued as its own Proceedings.*
2. *That this society is not entitled to* "THE SAME LOW RATES THAT ARE EXTENDED TO THE GENERAL PUBLIC" *under the recent law, making one cent for four ounces the rate at which an individual can post a newspaper.*

The report of the Secretary was referred to the Board, with power to act.

[1] Sir Henry Wotton (1568-1639), was the ambassador of Elizabeth at Venice, and acquainted with Palladio. His "*Elements*" (first published in 1624) were also embodied in "*Wotton's Lives and Letters,*" 1685, and are remarkably interesting.

TRANSVERSE STRENGTH OF TIMBER.[1] — XI.

CONCLUSION.

THE tests already enumerated are all the experiments on transverse strength that were made in my laboratory before June 1, 1883, and the tables, averages and conclusions contained in the *American Architect* of December 8, 1883, were based upon those alone. Since that time the experiments have been continued, and besides furnishing additional confirmation of the conclusions already deduced, they have also confirmed certain other conclusions which might fairly have been drawn from the earlier tests alone, and which I propose to mention now.

Some of the tests of this year have also exhibited results of such importance in practice, and so much at variance with generally preconceived ideas on the subject that it seems to be my duty to refer to them.

MODULUS OF RUPTURE.

In the *American Architect* of December 8, 1883, I stated what seemed to me fair to assume as the modulus of rupture of such *spruce* as is found in ordinary use. In the case of *yellow-pine* I omitted to give expression to my own conclusions, leaving the reader to decide for himself from a perusal of the results. I will now say, however, that for the *modulus of rupture* of *yellow-pine* of fair quality I should not feel justified in using a number greater than 5000 pounds per square inch, especially for large sizes, such as 9″ x 14″, 12″ x 16″, etc. My reason for this conclusion is that, although the average modulus of rupture derived from the tests already enumerated is 6984, which is altered by including the later tests of such stock as is commonly to be found in the market to 6707; nevertheless, we have in the case of beam No. 59 a modulus of rupture of 5300, notwithstanding the fact that this beam was quite free from knots, cracks, crooked grain, and other defects, and had been selected by a builder as one of exceptionally good quality.

CONSTANTS FOR DEFLECTION.

Next, in regard to deflection, we have for values of the *modulus of elasticity* deduced from the immediate deflections, *i. e.*, from those assumed by the beam immediately upon the application of the load, without allowing time to act.

		Minimum.	Maximum.	Mean.
From the tests already enumerated.	Spruce,	897961	1572470	1306760
	Yellow-Pine,	1256286	2146821	1779517
From the entire series of tests on ordinary stock.	Spruce,	897961	1587646	1329479
	Yellow-Pine,	1162467	2146821	1669339

The fact that the strength of a structure is the strength of its weakest part, should lead us to select for use in ordinary cases for immediate *modulus of elasticity* a number less than the average.

Whether it is best, in any particular case, to use a number any greater than the minimum, I leave the reader to determine from the circumstances of the case, and a perusal of the tests. Moreover, it should be distinctly understood that when the above values are used in computing deflections, the deflections are those that will be assumed by the beam immediately after the application of the load, while the deflections of the beam after the load has remained on it for a certain length of time will be greater.

MODULUS OF ELASTICITY TO BE USED IN COMPUTING THE DEFLECTIONS OF BEAMS AFTER THE LOAD HAS BEEN ON FOR SOME TIME.

A perusal of last year's time-test (beam No. 34), and of the time-test made this last winter (beam No. 73) tend to show that in computing the final deflection of a beam under a given load we ought to use a modulus of elasticity no greater than three-fourths (and two-thirds would be safer) of the values given above.

In the latter time-test the immediate modulus of elasticity was 1715880, while that computed from the deflection of the beam after being subjected to about one-fourth its breaking weight, for one month's time, was 1343918, which I think bears me out in the above conclusion. The beam was a 4″ x 12″ yellow-pine.

LONGITUDINAL SHEARING.

Another matter to which I have referred is the longitudinal shearing, of which we have had a number of examples.

I have computed, as must have been already noticed by the reader, for each individual test, the greatest intensity of the shear at the neutral axis at the time of fracture. I will give a table showing these results, and we must observe that, in the case of those beams which gave way by shearing the figures given represent the shearing strength of the wood along the grain; while, in the case of those that did not give way by shearing, it is fair to assume that these numbers are less than the shearing strength of the wood.

[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology. Continued from page 224, No. 437.

TABLE OF THOSE THAT GAVE WAY BY LONGITUDINAL SHEARING.

Spruce Beams.

No.	Width and Depth.	Span.	Intensity of Shear.
22	3⅞ x 12	14′	202
24	3 x 12	14′	190
31	3⅛ x 12	18′	154
35	6 x 12	18′	117
36	2 x 11⅞	7′ 2″	248
46	3¾ x 12	10′ 2″	233
		6)	1144
		Average,	191

Yellow-Pine Beams.

No.	Width and Depth.	Span.	Intensity of Shear.
30	3 x 13⅞	14′	273
32	4 1-16 x 12 3-16	18′	242
33	3 15-16 x 12½	18′	153
50	4 x 14 1-16	21′	172
92	6 x 12	6′ 8″	397
		5)	1237
		Average,	248

SPRUCE BEAMS WHICH DID NOT FAIL BY SHEARING.

No. of test.	Maximum intensity of shear at fracture.
3	181
4	301
5	174
6	230
7	308
8	170
9	141
10	106
11	208
12	126
14	105
15	304
16	277
17	465
18	202
19	138
20	160
21	137
23	108
25	123
26	155
27	167
28	134
29	129
37	169
45	133
49	205
60	406
66	228
70	206
72	174
90	272
Average,	199

YELLOW-PINE BEAMS WHICH DID NOT FAIL BY SHEARING.

No. of test.	Maximum intensity of shear at fracture.
47	359
53	179
54	203
56	185
57	182
59	133
62	231
63	211
64	161
65	183
67	196
68	273
69	112
71	223
74	173
75	230
76	231
77	519
78	108
81	238
82	343
84	164
85	270
87	172
88	156
91	282
92	397
Average,	224

One would naturally expect to find the intensity of the shearing stress at fracture less, in the case of the beams that did not fail by shearing, than in the case of those that did, and this is seen to be generally true (making allowance for different qualities) both in the case of spruce and hard-pine.

The notable exceptions seem to me to be, in the case of spruce, beams Nos. 4, 7, 15, 16, 17, 60, 90, all of which have this intensity very large. If these be omitted from the list the average for those that did not give way by shearing would be 160 pounds per square inch, which is less than 191, the average for those that did.

In the case of yellow-pine the notable exceptions are beams Nos. 47, 77 and 92, and if these be omitted the average for those yellow-pine beams that did not fail by shearing would be 197 pounds, which is less than 248.

Moreover, it is to be observed that in the case of the spruce, Nos. 4, 7, 15, 16 and 17 were all of smaller dimensions than those used in practice.

In the face of these apparent exceptions, which I am unable to explain, I prefer not to state at present any definite rule for the guidance of one who wishes to take the shearing force into account in his calculations, but rather to leave him to use his judgment in connection with these results for any particular case.

It will also be observed that these shearing forces are less than those obtained from the experiments on direct shearing along the grain made at the Watertown Arsenal, and this is naturally to be expected, for the shearing in their case took place along a section that was perfectly sound, while in these cases it took place at the weakest point.

FRAMING-JOINTS.

In the tests already described in the *American Architect* a number of headers were tested with the load applied on top of the headers, and one test (No. 52) was made where the tail-beams were inserted, so that the load was brought on the header at the bottom of the mortises, where it is actually applied in practice.

Since that time we have had the following tests of yellow-pine headers: —

It will be seen from these tests that the first of these headers had for its breaking weight, 10916 pounds, and the second, 13163, or in each case one-half the load on the floor. To institute a comparison I will say that if a 6″ x 12″ yellow-pine header 6′ 8″ long, with four tail-beams 18′ long were to support a floor, the floor surface would be 96 square feet, giving 48 square feet to be supported by the header; this, if the floor were loaded with 100 pounds per square foot, would bring upon the header 4800 pounds, or about one-half the breaking weight of a header only 5′ 4″ long, whereas, I imagine that it would have been commonly supposed that with such a construction for 100 pounds per square foot of floor we should have provided an unnecessarily large margin of safety.

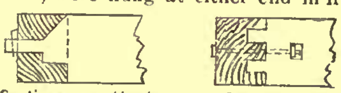
As to the fact that the header supported in stirrup-irons has less than that which was framed; this must be due to a difference in the quality of the timber, and it would be unfair to conclude from only two tests that the second was a stronger mode of construction than the first, even as far as the header itself is concerned.

As to any calculations that have been proposed for such a construction, I know of none except those proposed by Hatfield in his "*Transverse Strains*," and these, as any one who will consult the book will see, are so utterly wide of the mark that it would be an inexcusable piece of stupidity in any builder to allow himself to be guided by them.

The fact, also, that a 6″ x 12″ yellow-pine beam 5′ 4″ long bore 48000 pounds centre load, equivalent to 96000 distributed without breaking, while the header broke at 10916, shows what an enormous weakening is caused by cutting mortises, and how much strength would be gained by avoiding all framing, and using stirrup-irons to support the tail-beams in all cases where they cannot be supported on top of the header bearing the latter.

No. 83. — Test of yellow-pine header, by means of floor, by Messrs. Appleton, Baldwin & Callahan, April, 1884.

The headers, 6″ x 12″, span, 5′ 4″, were hung at either end in iron stirrups from trimmers, 6″ x 12″ x 20″, which, in turn, were supported on jacks. The headers were mortised in three places (16″ on centres) for three 3″ x 12″ yellow-pine tail-beams 10′ in length.



Section across Header, showing Mortise. Section across Trimmer.

The load was applied at the centre of the tail-beams, and divided equally among the three by iron bridging.

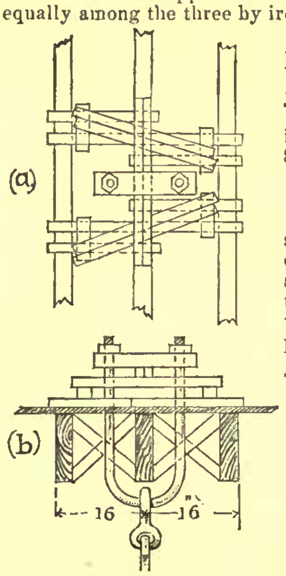
The tail-beams were cross-bridged in two places, 6′ apart, by 2″ x 3″ spruce bridging, and also floored over with 1′ yellow-pine plank.

Weight of tail-beams, bridging, flooring, etc., which was supported by header, 833 pounds.

Weight of north header, 106 pounds.

Weight of south header, 122 pounds.

Headers: heart pieces, coarse grain — sappy. North one had a few season cracks extending from mortise to mortise on outside. Tail-beams, medium quality, two of them having sap-wood on edges; the third was much coarser, but contained more pitch, being heavy.



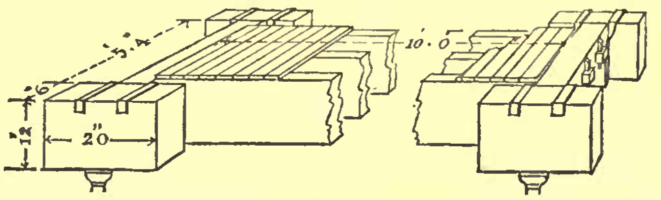
Plan (a) end Section (b) showing Method of Bridging.

*15366 pounds.	Cracks heard in north header.
19866 "	Loud cracks; season cracks opening in north header.
21366 "	North header giving way; load dropped 500 pounds, cracks ⅛″ wide.
26366 "	South header began to show cracks.
26366 "	Centre tail-beam broke off below tenon at south end. Load dropped 1500 pounds.

North header virtually gone at 21833 pounds, so each header bore $\frac{21833}{2} = 10916$ pounds.

The tail-beam which did not break was the one having the coarse grain; was heavy and full of pitch.

* Weight of yoke and iron bridging = 366 pounds.



No. 86. — Test of yellow-pine headers, by means of tail-beams and floor, April, 1884. Messrs. Dearborn, Fitch & Purinton.

The headers, 6″ x 12″, span, 5′ 4″, were mortised at each end into the trimmers with a double tenon and joint-bolt. Trimmers supported on jacks as before. Three tail-beams, 3″ x 12″, span, 10′, were mortised into the headers with tusk and tenon, and pinned.

Section across Headers showing Tusk and Tenon Mortise. Section across Trimmer showing Double Mortise and Joint-Bolt.

The load was applied at centre of tail-beams, and distributed equally over the three by means of bridging (see No. 83).

Tail-beams cross-bridged in two places with 2″ x 3″ spruce, and floored over with 1″ yellow-pine plank.

A. Dry, well seasoned, fine grain.

B. Cut from same stick.

C. Coarser grain, pitchy.

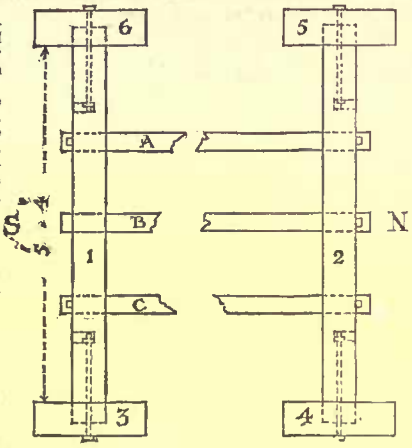
1. Heart piece coarse grain; pitchy; few knots.

2. Knotty, especially near mortises; coarse grain; season cracks; heart.

Weight of tail-beams, bridging, flooring, etc., which was supported by headers = 763 pounds.

No deflections taken.

*14366 pounds. North header heard to crack internally.
*24366 " Tail-pieces, *A* and *C* began to crack under lower tenon (north end).
*24866 " A few minutes later *A* broke under tenon (north end).
*24266 " *B* broke in the same way. Then before the amount of load fallen could be ascertained *C* broke in the same way.
*13366 " Borne after all three were broken.



Tail-pieces, *B* and *C*, were slightly cross-grained from appearance of break.

For further experiments with the same headers and trimmers see No. 89. The headers, as far as could be seen, were uninjured.

* Weight of yoke and iron bridging = 366 pounds.

No. 89. — Test of headers in floor (yellow-pine). Headers and trimmers were the ones used in No. 86, and were framed in the same way.

Three tail-beams, 3″ x 12″, 6′ 6″ span (inside measurement), were framed into headers with a tusk and tenon joint, and then pinned.

The experiment was precisely the same as No. 86, with the exception that instead of 10′ tail-beams being used, the length of these was 6′ 6″.

No deflections taken.

Tested by Messrs. Dearborn, Fitch and Purinton.

*20150 pounds. Season cracks in north header began to open wider.
*26325 " North header broke through the middle, following the line of mortises, then held 18825 pounds.
South header cracked but little.
* This weight includes half the weight of bridging, floor and tail-beams (325 pounds).

"DAMP COURSES."

Henderson, Ky., July 8, 1884.

To the Editors of the American Architect: —

Gentlemen, — What do you consider the best material for a "damp course?" Slate has been in use for a long time, I know; is there anything better for use in sixteen-inch walls? O. F. N.

[The "Bitumen Damp Course" of the New York Mastic Works, 35 Broadway, is, we believe, a very serviceable material to use, and can be had of any width or length.—Eds. American Architect.]

THE OFFICIAL FILING OF PLANS.

New Orleans, July 2, 1884.

To the Editors of the American Architect: —

Gentlemen, — Please inform me which principal cities of the States have ordinances requiring the filing of copies of the plans and specifications of buildings to be filed with the city authorities. An ordinance of this kind has just been passed here, and I should be thankful for information as to how far such requisition is in practice North.

Yours, etc., James Freret.

[New York is the only city in the country, so far as we know, which really requires the filing of copies of the plans and specifications of new buildings with the municipal authorities. In one or two other places, if we are not mistaken, this is nominally, rather than actually required; but in most cities which have a building ordinance nothing is necessary but submission of the plans to the inspector for approval, either with or without the filing of a specification. We will take leave to say, however, that we think the New York rule a very good one, giving the inspector much more real control over building, and, what is quite as important, enabling him to study at his leisure points of too much difficulty to be decided at a hasty glance, and giving him often the means of ascertaining, if he wishes, the character of the constructions which adjoin a proposed building. — Eds. American Architect.]

A SCHOOL-HOUSE FLOOR.

Springfield, Mo., July 9, 1884.

To the Editors of the American Architect: —

Gentlemen, — There is considerable discussion here as to the strength of the floor of a school-house, which is being erected here; many protesting that it is not strong enough. The architect says, "that owing to his peculiar mode of construction it is sufficiently strong." The joists are 2″ x 12″, yellow-pine, 1′ 4″ from centres, and 31′ long. Bridging 5′ apart. Between supports on top of these is laid a floor of 1-inch boards, on which is spread paper for the purpose of deafening. On top of this is placed 2″ x 3″ strips, over which the finished floor is nailed. No trussing or bracing of any kind is given to the joist. I cannot imagine how he gets the needed strength with his mode of construction.

Will you please give me your opinion of the capacity of the floor as described above, through the columns of your paper?

Respectfully yours, W. E. Foley.

[The floor is not strong enough. It would bear with safety the weight of desks and children in a quiet school-room, but would shake under the movement of classes, and might, if a crowd should gather in a vacant part of the room, give way altogether. There is nothing about the mode of construction, as described, which assists the strength of the beams. — Eds. American Architect.]

THE EFFLORESCENCE OF BRICKWORK.

Montreal, July 9, 1884.

To the Editors of the American Architect: —

Dear Sirs,—"The efflorescence on brick-work." Your correspondents have referred to this efflorescence as a *sulphate*. I am not a chemist, and therefore speak with deference, but in England it is usually spoken of as "saltpetring," which is a *nitrate* of potash and is supposed to be due to the potash (one of the resultants of the firing, whether wood or coal be used) combining with the nitrogen of the atmosphere. It is sometimes spoken of as nitrate of soda; the action of the two salts exposed to the atmosphere is not dissimilar. I would suggest as a possible remedy the soaking of the bricks in water, to wash out the salt, and drying in the open air prior to use, as a simple artificial weathering. I am, yours faithfully,

Thos. C. Sorby.

COURT-HOUSE CONSTRUCTION.

Staunton, Va., July 5, 1884.

To the Editors of the American Architect: —

Gentlemen, — I am anxious to obtain the latest information on the construction of court-houses and jails, and, in fact, almost all kinds of public building; same to be in the shape of drawings with description either in book-form or on plates.

I feel confident that you can furnish the information, and in all probability the works themselves.

I have also thought that you may have published plates with description, etc., along with some of the copies of the *American Architect,* from which an amount of information could be gotten. Should this be true, I would be glad if you would forward them, with the cost.

Immediate attention to this will greatly oblige,

Yours respectfully, J. E. Tinsley.

NOTES AND CLIPPINGS.

An Honor for Captain Eads.— Captain James B. Eads, the distinguished engineer, has just received notification that the Society of Arts in England has awarded to him the Albert medal "for distinguished services in the science of engineering, by which the great water-ways of America have been opened to commerce." This medal has been heretofore voted to Faraday, Lesseps, Napoleon III., Bessemer, Sir William Thompson, etc., but Captain Eads is the first American to obtain the honor.

Ruskin on "Second-rate Art."— A student asked Ruskin, "What is the good of second-rate art?" "I am glad you have asked me that question," replied the professor. "Fifth-rate, sixth-rate to a hundredth-rate art is good. Art that gives pleasure to any one has a right to exist. For instance, if I can only draw a duck that looks as though he waddled, I may give pleasure to the last baby of our hostess, while a flower beautifully drawn will give pleasure to her eldest girl who is just beginning to learn botany, and it may also be useful to some man of science. The true outline of a leaf shown to a child may turn the whole course of its life. Second-rate art is useful to a greater number of people than even first-rate art—there are so few minds of a high enough order to understand the highest kind of art. Many more people find pleasure in Copley or Fielding than in Turner. Most people only see the small vulgarisms in Turner, and cannot appreciate his grander qualities."

The Strikes of the Year 1883.— The year 1883 was memorable for the number and magnitude of its strikes in New York city. At no time since April 15, when the carpenters and cigar-makers made a demand for higher wages, was there a week in which some workingmen were not out on strike. The strikes were among people whose employment was as follows: Carpenters, cigar-makers, (both strike and lock-out), cigarette-makers, Cuban cigar-makers, cigar box-makers, Custom-House-laborers, house-painters, coal-shovelers, telegraphers' brotherhood, stovemen, dress-and-cloak makers, building trades, silk-ribbon weavers, tailors, printers, carpet-weavers, book-binders. The cigar, cigarette and cigar box-makers that were on strikes numbered 19,500; there were 10,000 on strikes in the building trades, 4500 carpet-weavers and 2000 book-binders. The total number of strikers was 44,950, and they all lost 366,150 days' work and $674,500 in wages. The cigar, etc., makers lost 163,600 days and $314,500 in wages: the 1500 telegraphers lost 43,500 days and $75,000 in wages; those engaged in the building trades lost 25,000 days and $95,000 in wages; the silk-ribbon weavers lost 11,250 days and $20,000 in wages; the carpet-weavers lost 77,000 days and $100,000 in wages. Ten strikes were successful, five were failures, one was partly successful, and two have not been heard from. The compositors gained by their strike an average of $2 a week; the painters gained $1 a day; the telegraphers lost their strike, but they have had concessions made to them on account of it; the Cuban cigar-makers obtained an increase of $2 a week. In 1878 the carpenters were receiving from $2 to $2.25 a day, but every year since they have forced an advance of 25 cents or more a day, and last year they gained 25 cents more. The trades-unions of England have gathered and published masses of statistics on this subject, which show that all steps in progress there and all their improvements of condition, during the past fifty years, have been made through the agency of strikes, some of which have been of vast extent, of long duration, and carried on under fearful suffering. Trades unions claim that it is just so in this country, and has been so in recent times. It is evident from the nature and tendency of things that, as each employer deals with scores and hundreds of employés and as employers combine, workmen will also combine that they may act equally as a unit.— *The Manufacturer.*

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CONTENTS.

THE next Annual Convention of the American Institute of Architects is to be held at Albany, N. Y., beginning on Wednesday, October 22. At the last convention held in Providence and Newport, so strong a desire was expressed by many members for an opportunity to study the remarkable buildings now in process of erection at Albany, that the Trustees decided to make an effort to arrange for the next meeting of the convention there; and the effort proves to have been successful. To say nothing of the interest of the buildings in and near Albany, the routes by which the city is reached, from New York and the south by way of the Hudson River, from Boston and the east through the Berkshire Hills, and from the west by the lakes and the Mohawk Valley, are particularly interesting, and those who have never been in the capital of New York State would do well to plan for a trip which will give them leisure for enjoying the journey as much as possible. The details of the meetings of the convention are not yet arranged, and will form the subject of a future announcement, but the Trustees have, with reason, thought that the members would be glad to know as long beforehand as possible the place where it is to be held, and have sent a brief notice accordingly.

THE New York bricklayers have chosen what they think is an opportune time to demand that the number of hours in a working day shall be reduced from ten to nine, and to enforce their demand by a general strike. Although the ordinary absurd claim is made, that a man will do as much work in nine hours as in ten, no one, either among the builders or their men, pretends to believe anything of the sort, and the strike is universally regarded as a round-about way of obtaining an advance of ten per cent in their pay. It is much to be hoped that this will be the final result, and that the bricklayers will continue to do their full day's work, at wages somewhat better than those which they now receive. There must be many among them who can see that the enforced reduction of their working time, at the dictation of leaders whose interests are in every respect opposite to their own, would be a grave misfortune. Sooner or later the scale of wages must conform to the work done to earn them, and whether the general rate is high or low, the man who is content to do only nine-tenths as much work as other people must make up his mind to see himself rewarded with only nine-tenths as much respect and nine-tenths as much comfort and happiness as his neighbors enjoy.

A CASE of real hardship inflicted by telegraph poles is reported from Boston, where, not long ago, the Western Union Telegraph Company took advantage of the quiet of a Sunday to place its poles along the sidewalk of Friend Street, a narrow but much-frequented street in the business part of the city, close to four railway stations. The peculiar Boston fashion of making sidewalks about half wide enough for the people who use them is carried to its height in Friend Street, and although the roadway is sufficiently spacious to accommodate not only the traffic which belongs to it, but, like most Boston streets, to furnish stable-room also for the cart-horses who peacefully munch their oats in the place which human beings need so much, the unfortunate pedestrians who take that route to and from the railway stations have found themselves on rainy days, since the telegraph poles were erected, obliged to close their umbrellas every few steps, the distance between the poles and the front walls of the buildings not permitting the passage of an open umbrella. In fact, as was shown by testimony given before a committee of the city government, the distance from the poles to the wall of a large and popular carriage warehouse fronting on the street is thirty-four inches, which, as our readers can ascertain by measurement, is ten inches less than the width of an open twenty-six-inch umbrella, and about a foot and a half less than that of perhaps the majority of the umbrellas which try to get by. In some places the space seems to be still less, a witness testifying that in front of his manufactory the telegraph pole occupied one-third of the sidewalk; and one person, who had observed the people going through the street to and from the railway stations, found that one-third of the pedestrians who passed his place of observation were obliged to step from the sidewalks into the gutter to get by the poles. To add to all this discomfort, the representatives of the insurance companies, who inspected the street soon after the poles were put up, have given notice that on account of the increased risk from running of telegraph wires so near the buildings the rates of insurance on all the property on the west side of the street will be raised twenty-five per cent on the first of next August, unless the poles are removed before that time. The buildings which line the street are occupied to a great extent for manufacturing costly goods, and such an increase of insurance rates would be a heavy tax on their owners and lessees. The representatives of one firm alone, in remonstrating against the use of the street for poles, showed that the increase in premiums which their presence involved would cost him and his partners five hundred dollars a year in cash, without securing for them any benefit whatever, and, if the right of the telegraph company to occupy the sidewalk should be sustained, without any hope of indemnity. Such a case as this certainly deserves serious attention. The Massachusetts courts have shown themselves watchful in protecting private property against the invasion of corporations, and it will be interesting to learn what they think of the rights of owners of real estate in the streets and sidewalks in front of their buildings.

WE would like to call the attention of real-estate speculators to a story which appears in some of the late English journals. Astute as some of our business men are, it must be confessed that they have not yet learned all that is to be known in the way of making money at other people's expense. Some forty years ago a certain builder in London bought a large tract of land in the suburbs of the city, and laid it out as a burial-ground. He was prudent enough to avoid the formal consecration of the ground, but had a chapel built upon it, and sent out a great number of circulars, calling attention to the advantages of his "North-east London Cemetery." The beautiful burial-grounds now commonly set aside in the vicinity of large cities were then hardly known, and the "North-east London Cemetery" soon became a very profitable piece of property. In eleven years twenty thousand bodies were interred there, or, rather, were consigned, with a handsome fee, to the care of the owner of the cemetery, who saved himself the cost of unnecessary excavation by piling the coffins one above another in the same grave, eight being his limit for a stack of adult remains, while children were allowed to accumulate to nearly double that number. In 1855 the cemetery was closed by order of the Government, and further interments forbidden. By that time, however, the city had extended so far out into the suburbs that the disused burial-ground began to have a prospective value for house-lots, and the proprietor, like the far-seeing business man that he seems to have been, began at once to modify the character of the place, so that all associations likely to prejudice the mind of purchasers might be effaced before the land came into the market. With this view the gravestones and monuments were pulled up, the surface of the ground leveled, the chapel demolished, and a quantity of rubbish dumped in various parts of the place, to give it the characteristic air of vacant London lots.

CUSTOMERS for the land soon appeared, and a part of it was sold, but just as the purchaser was about to commence building on his lots, some one, who knew the former character of the place, interfered, and he was obliged to desist. The Metropolitan Board of Works, which answers in London to the Department of Buildings in our large cities, kept watch over the transformed cemetery, and refused to authorize the erection of any structure upon it. The vigilance of the Board seems to have been effectual, for it was not until 1883, nearly thirty years after the ground had been prepared for market, that the successor of the original owner began to build houses upon it, notwithstanding the refusal of the Board to give him authority to do so. In accordance with the usual procedure, the offender was summoned before the court, where a curious discussion took place. The by-law of the Metropolitan Board, under which the complaint was made, forbids the erection of buildings upon land "which has been filled up or covered with material impregnated with obnoxious matters;" and the question before the court was whether a plot in which twenty thousand corpses still lay buried could be described as having been "filled or covered with material impregnated with obnoxious matters." In the opinion of the judge it could not properly be so described. Although he recognized the importance of the case, he believed that the by-law was intended to apply to instances where artificial rubbish, impregnated with injurious matter, had been used as a foundation for houses; and the extension of this to apply to a burial-ground was a technical mistake. He expressed his willingness, however, to grant an order for bringing the case before a higher court; and the prosecuting attorney, who seems to have been rather disconcerted at the result of his efforts, gave notice that an application would be made for such an order, remarking, with considerable reason, that if there were no remedy against such operations as were in progress at the old cemetery, it was time that the municipal authorities should know it.

A CASE very similar in some respects was decided in Philadelphia a few days ago. Our readers will remember the disastrous fire at the Randolph Mills in that city, by which several persons met a dreadful death through the neglect of the person responsible for their safety to provide proper means of escape; and many will recollect also that one or more suits were brought against the owner of the estate for indemnity for the loss suffered by those who were thus deprived of the comfort and support which they were entitled to receive from their children or other relatives, or were themselves maimed or injured. One of these, which has been for a long time in litigation, has now been decided adversely to the plaintiff in the highest court of the State. There could be no doubt of the justice of his claim for compensation from the person to whose fault he owed his injury, and the judge himself expressed his regret at the loose and uncertain language of the statute, which had misled the complainant into making his demand upon the owner of the land, instead of upon the lessee, who had built the mills in his own way upon territory held on a ground-rent, and was, therefore, in the opinion of the court, the owner intended by the statute. As the judge remarked, a ground-lease might run for a term of hundreds of years, and it could not be that the Legislature intended to make the owner or inheritor of the freehold responsible for the acts of persons with whom he might have had no direct dealings whatever, and over whom he had no control.

AT the Congress of Architects, recently held in Paris, a proposition was submitted to the members, having in view the formation of a fund "for the defence of the interests of architects." The idea of establishing a fund, formed by small regular contributions from the members of the profession, out of which should be paid the cost of legal proceedings for enforcing the rights of architects too poor to resist injustice unless aided in some such way, was discussed at the local Congress of Architects held a few months ago at Nice, and a committee was then appointed to consider the subject and report at the Paris meeting. The provisional scheme prepared by the committee was laid before the Congress by M. Hermant, not for immediate action, but to obtain the informal opinion of the members; and as this proved to be very favorable, it is likely that further steps will soon be taken to carry out the plan. The proposition made by the committee was that the protective association should be placed under the auspices of the Société Centrale des Architectes, the most dignified and comprehensive professional body in France. All members of this society, or of the departmental societies which are affiliated with it, would be admitted to the protective association without question, on signifying their wish to enter it; those not members of professional societies would be received only after a favorable vote in the standing committee on admissions.

EACH member of the protective association would be required to pay an admission fee of six dollars, and annual dues of about two dollars and a half, and would be expected, in addition to these dues, to assign to the association any surplus funds which the award of a court might leave him in possession of, after his actual losses and expenses had been repaid to him. In return for this the association would undertake or assist in the defence of its members against fraud or injustice, under the restriction that the cases to be maintained with the help of the association must be approved by the members of the administrative committee, to whom all necessary documents and information relating to the affair must be submitted for examination. A month would be allowed for this examination, in which the standing judicial committee of the Société Centrale would assist, and only those cases would be undertaken which should have a general interest for the profession. The plan proposed that no organization should be attempted until three hundred architects should have signified their desire to join the association. From the interest taken in the subject, both at Paris and Nice, it is likely that this number of subscribers would easily be obtained, and the association, starting thus with a fund of twenty-five hundred dollars, would become at once a powerful element in professional life.

OUR readers will remember the ingenious gentleman in Philadelphia, who, when he heard that the tax-gatherer was approaching, put his pictures into a room by themselves, and claimed that being thus displayed in a "gallery" they were not taxable as furniture, or indeed, under any other denomination known to the law. We are not quite certain whether it is the hero of this performance, or some other person holding similar views on the subject, who, after a long struggle with the assessors, has just succeeded in establishing his theory by a decision of Court. The Act of the Pennsylvania Legislature, which describes the classes of objects to be taxed, specifies "household furniture" as one of them, and the question brought before the court was simply whether pictures were "household furniture" or not. A good deal of erudition seems to have been expended on the matter, and it was made pretty clear that according to the usage of the best masters of the English language, furniture does include pictures, as well as other ornaments; but the judge found, on examination of adjudicated cases, and other evidence, that for forty years the law had been interpreted, not only by the public, but by the assessors, as intending to include under this head only housekeeping appliances, and not articles serving exclusively for ornament; and in delivering his opinion that this ought to be taken as the true meaning of the Act, he expressed the hope "that the exigencies of the State would never require the taxation of Art, which all civilized men, in all ages of the world, have sought to encourage and develop."

THE people of Paris have for a long time felt the inconvenience which is presented by most crowded city streets, — that during the middle of the day the throng of carriages and wagons often keeps women and children who wish to cross from one side to the other waiting for many minutes, to their great inconvenience, or, if they are courageous enough to try to thread their way through the moving crowd of vehicles, exposes them to great danger. The Parisians seem to have understood that bridges like the one built over Broadway a few years ago would not be satisfactory, and the municipal government has never allowed itself to be persuaded into erecting them; but a proposition has recently been made which meets with much more favor. The new plan contemplates bridges across certain crowded streets, differing from the old Broadway bridge in spanning the whole width of the street, from building to building; and in being approached through the buildings which serve as piers on each side. The appropriation for public uses of the small portion of a house or shop needed for erecting a stairway would not be a costly matter, and the increased length of a bridge spanning sidewalks as well as roadway would involve no difficulty in construction; so that, in cases where such bridges are needed, the suggestion seems to be a valuable one.

SPANISH ARCHITECTURE.[1] — XVIII.

TARRAGONA.

ON the way to Tarragona I stopped a few hours at Lerida, and found it a small city stretching along the banks of its river, the Segre, at the base of a steep hill. One long street constitutes nearly all there is of Lerida, but it is not a straight succession of rectangular blocks. On the contrary there are bends and windings as numerous as in a natural stream, and so it is not a monotonous or uninteresting street after all. The old stone bridge — it seems as if a Spanish city would not be complete without its picturesque arcades of mouldering stone-work — is badly broken by a flood, and the gap is filled with light modern lattice-girder work in iron, a lamentable illustration of the way art is now divorced from engineering, not only in its own angular hideousness, but in its utter want of harmony with its surroundings.

A little farther on is found the cathedral, a disappointing building in Corinthian Renaissance. The old cathedral, although about the first thing seen in approaching the city, is the last visited, because it is perched upon the summit of the almost precipitous hill, three hundred feet above everything else, and because the French desecrated it in 1707 and made of it a great fortress, which it has ever since been, and much red tape and military machinery has to be put in motion for a stranger to get admission. It was formerly a noble building, much resembling in style the cathedral at Tudela, but more massive, and in some parts of an earlier type. It differs from most others in having an extraordinarily large and lofty cloister at its west end (an unusual position) and in the situation of its steeple, which stands most irregularly at the extreme south-west corner of the cloister. This tower is octagonal in plan, and not one of its sides is parallel with any of the walls of the building. It is nearly detached from the cloister-walls, and is so successful in effect that when the architect of the Micalete at Valencia was sent to various cities to observe and study before he designed, he took this for his prototype, and even copied the peculiar angle at which it stands. There is very much beautiful work here, and it is unfortunate that it should be so obstructed and degraded as it is, — but this commanding site bore a fortress long before the cathedral was raised upon it. The Romans made a stronghold there; but the first church was of the sixth century. The Moors, too, conquered and were conquered there, and in 1203 the cathedral which now stands was commenced in the presence of the king, Don Pedro II.

Another journey across an undulating country covered with wheat and vines, not always the most fertile of lands, but showing signs of the industry of the Catalonians, who differ as much from the haughty Castillians as they do from the indolent Andalusians, and who love both so little that they would welcome independence. Soon the sight and sound and perfume of the beautiful Mediterranean Sea were encountered again and were very welcome this scorching midsummer day. The city of Tarragona was for a little my abiding-place, and very happy were the days spent in and around its neglected old walls; sketching in those noble old cloisters, where there was always shade and nearly always a movement of air, and where the peace-giving cigarette was not forbidden, or rambling out beyond the gates, upon roads whose dusty lengths were qualified by plenty of time to cover them; and over craggy hillsides by goat-paths or no paths at all, and at other times reading, or bathing in some delightful little bay, with walls of rock and floors of sand, enclosing a choicest bit of solitude for an amphitheatre, with the deep-blue sea for a stage, and solitude instead of the noisy play of the civilized world. The Mediterranean is indeed blue. I used to think some of its pictures were exaggerated beyond any possible natural coloring, but under certain skies and lights the water is of an intense ultramarine hue.

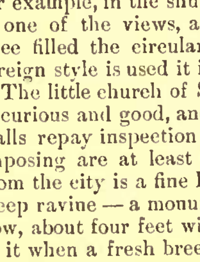
To return to my legitimate subject, the city is not particularly attractive as a whole; there is an unfinished air about the modern portions, and an untidy, neglected look in the old. The station stands in the midst of a dusty yard, now piled with massive stones and mounds of rubbish, in the masons' hands for some improvement. The streets seem to lead vaguely to no particular points, the port (although every Mediterranean port has some attraction for the artist) is dirty, and at the higher end of the city, where the *paseo* overlooks the sea, the fortified scarp is rutted with rains and strewn with refuse. It is best to go into the lovely country or else into the cathedral. This is a splendid early Gothic building, no doubt dating from the thirteenth century, although its archives have not yet yielded to modern search any very distinct dates. Its style is the perfection of that simple first period of Gothic, except for some of the earliest parts, which are of the rounded-arched transitional period. It was of this that Mr. Street wrote: "I thought I saw one of those openings which are now and then almost accidentally given us for the infusion of new vigor and greater spirit into our own works. It is no copying of a Spanish work that I should wish to see attempted, but only a deliberate determination on the part of the builder of some building in England to emulate the grand solidity of this old Spanish church, and if he feels that this is too rude and unpolished for an overcivilized age like ours, then let him take a lesson from the same old Spanish work, and show the extent of his refinement in the subtle delicacy of the sculpture with which he adorns it." This is very strong praise, but it is very good advice, because the subject merits the approbation. The cathedral is a well-proportioned, massive edifice, composed of nave and aisles in five bays, transepts, and three chapels with circular apses, the central being of course the *capilla-mayor*. The eastern apses are apparently somewhat earlier than the rest, although not enough so to be of distinct style, yet there is much of Romanesque character in them. The view of the interior is taken from the south aisle looking into the *capilla-mayor*. It will be noticed that the expedient of the paired shafts before mentioned (Tudela) is used here with the same good results. The effect of the stilting of main arches upon a die of masonry above the capitals is very good, although it is uncommon.

The north transept is curious. There are two transverse ribs to the wagon-vault, and each diminishes the size of the transept by its own depth, the second bay being about two feet narrower than the first, and the third the same less than the second. The effect upon the perspective is quite considerable, and it seems to me to be legitimate; it is very satisfactory. The transept circular windows are filled with rich glass, not faultless in design, but with a fine, sparkling use of white glass in small pieces among deep colors. The nave is simple and grand; the vaulting shafts are paired the same as those at the crossing. It is a pity the lancet clerestory is not continuous; its small openings and simple forms harmonize better than the fourteenth-century windows of geometric tracery which have been introduced in most places. Many of these windows are filled with plates of stone between the mullions, pierced with small trefoils and quatrefoils, and these little openings, filled with gem-like stained glass, have in this climate of brilliant light a charming effect. The vaulting (except north transept and apses) is simple quadripartite. The lantern over the crossing is good in detail, but squat and graceless in proportions. The doorways are very fine. The exterior has been much obstructed by later buildings, and nowhere can be seen in any complete beauty. The cloisters are magnificent. Perhaps it will be best to let the illustrations supply detailed information (see the illustrations published in our last issue). Suffice to say that in all the carved and sculptured details there is such infinite variety and unfailing delicacy that their examination is like that of a masterpiece of poetry. There are interesting traces of Moorish influence, too, as, for example, in the shutters of the windows to the chapter-house seen in one of the views, and in certain remains of the traceries which once filled the circular openings above the arches. Wherever the foreign style is used it is done with all necessary harmony.

The little church of S. Pablo, with diminutive Romanesque façade, is curious and good, and many of the towers and bastions of the city walls repay inspection; they are in all stages of ruin; and when not imposing are at least picturesque. In a valley about three miles from the city is a fine Roman aqueduct in two tiers of arches across a steep ravine — a monument in a wilderness. The top is a pathway now, about four feet wide, and demanding a steady nerve to make use of it when a fresh breeze rustles down the hills. The water channel has disappeared except for some traces, and (of course) the people call the whole work the "Puente del Diablo."

[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 304, No. 444.

THE WORK OF THE MISSISSIPPI RIVER COMMISSION.



THE United States Commission, which was required "to take into consideration, and mature such plan or plans and estimates as will correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River; improve and give ease and safety to the navigation thereof; prevent destructive floods, and promote and facilitate commerce, trade, and the postal service," has a very important and difficult task. Some account of the problems with which this body have had to grapple, and the very gratifying practical results of their labors, will no doubt be interesting.

The work is executed by the Secretary of War, through officers of the engineer corps, under the general supervision, and in accordance with the plans of the Commission with respect to the things to be done and the methods of working, while the contracts, disbursements, and accounts are under the supervision of the chief of the engineers in charge.

What is the nature of the obstacles to be overcome? What are the methods employed? and what has been the success?

Were the river channel empty, its condition would surprise almost every one. A journey down stream would be over a succession of sand-hills a hundred or a hundred and fifty feet in height, and so steep that often a horse would find hard work to climb them. The tops of these hills are of course the bars so much dreaded by the steamboatman at low water, as then they often reach within five feet of the surface. These hills have been deposited particle by particle below every bend in the stream. Most of them are not high enough to trouble the pilot, but below Cairo there are some forty of them that are. These are distributed in groups, each group occupying stretches — technically called "reaches" — of from twenty to forty miles of the river's course. Ten-foot channels upon these bars is the least depth that will answer the needs of commerce; fifteen feet are needed, and twenty are hoped for. To get even ten feet, the tops of these hills must be lowered from three to five feet. To do this so that it will stay done is the problem.

The plan adopted aims at reducing the width of the channels over these hill-tops or bars. This, of course, will increase the speed of the current and its power to "scour" out a deeper track for itself. As the river sweeps round a bend, its swiftest flow and its main attack is upon the concave side, because the bank there heads it off, and turns it in a new direction. After taking this new direction it keeps it until a bend on the other side turns its again. Between these two points of course the main current must cross the general bed of the stream, and it is here that a decrease in velocity causes deposit. In these spaces between the bends islands frequently divide the stream into several channels. One of these, which should be three-fifths of a mile or more in width, is selected, and the other channels are closed. The agent depended upon for this is simply the water itself; by driving piles across the channel to be closed, and weaving poles and brush among, or placing mattresses of wattling against the piles, the flow is very much retarded, and a deposit of sediment begins, and in most cases two or three seasons will raise the surface a little above low-water mark. Then a spontaneous growth of willow binds and preserves the new bank.

To stop the undermining and washing away of the bank on the concave side of a bend — for of course this eroded material will be deposited as sediment somewhere below, and probably help build bars — the same use is made of piles driven in front of the endangered bank and some distance out in the stream. They are often driven through twenty feet of water, and the same depth into the mud below. Against them and among them are woven the poles and wattling mattresses. The piles are driven by hydraulic pressure, and the banks which they guard are also graded down to a suitably gentle slope by the action of water which, properly forced in jets, grades for 3½ cents per cubic yard, when the same work done by hand would cost from 12 to 20 cents.

These wattling mattresses are woven by steam to any length desired, with willow brush for woof, and large poles, iron-rods, or wire for warp, in boats as long as the width of the mattress. These curious boats are anchored across the current, and as the mattress, often 150 feet wide, and from 200 to several thousand feet long, is woven, it floats overboard and down stream. When in place, its inner edge rests on the under water edge of the bank, and its outer edge is supported at a height just a little below low-water level. It is held in place by stones. The mattress stops undermining below water, and the grading down of the bank stops it above. Up to the line of willow growth a covering of loose stones helps to hold the bank, and above that line, of course, the willows are the chief reliance.

A word as to the difference in the treatment of ordinary floods, such as may be expected every year, and such extraordinary ones as those of the last two or three years. The Commission believes that it is best not to allow the river to open new channels in ordinary floods, but to confine it within banks, so that it shall scour out the channel when it is shallow. But with an extraordinary flood, the plan is to open for it such new channels as shall, with the least damage, reduce the stage of water, so that levees and the plantations behind them may not be ruined. This work to be effective must be done upon a scale large enough to take in hand simultaneously an entire front needing treatment, otherwise the water may get in behind the work done and tear it out. The plant already designed and constructed, although not yet adequate, has cost over a million of dollars. There are the steam mattress-boats, snag-boats, floating machine and repair shops, and boarding-houses capable of accommodating 2,000 men; coal, stone, and brush barges, pile-drivers, etc.; 333 boats in all.

The success of the work has been very great. In one chute, Elmo, which had to be closed, there has been a deposit on the average of 6½ feet, covering 500 acres; in another, 5½ feet, covering 240 acres, and so of many others. The partial closing of these chutes already has greatly increased the flow in the main channels, and has cut down bars from six to ten feet. The deposit produced by the obstructtion across Baleshed chute was 33,000,000 cubic yards. A depth of fifteen feet was maintained during a time of unusually low water in the thirty-five miles of the Lake Providence reach, so that for the first time the immense boat *J. M. White* was able to make regular trips during the entire season.

There seems no reason to doubt that this work has been done efficiently, on sound principles, and economically, and that it has been kept out of politics is a necessary corollary. When the country about the headwaters of the tributary streams, and especially of "Old Muddy" the Missouri, becomes settled, and a more enlightened public opinion insists that all land liable to the eroding action of water shall be kept covered with forests, and that the concave banks of river bends shall be protected by face-works similar to that described above, rivers will not be so loaded with mud. Until then such work as that done by this commission will be a continuing necessity. — *New York Evening Post.*

THE DRAINAGE OF DWELLINGS.[1]

THOSE who wish really to learn about a given subject, and not merely to acquire a set of technical terms and phrases for the purpose of impressing other people with a false idea of their knowledge, should bear always in mind the golden rule of the student, to read books written by persons who know what they are writing about, and leave carefully alone those compilations, popularizations and abreviations constructed by professional book-makers out of a mass of mingled information and misinformation, which they do not know how to sift or make useful. In no branch of science are works of the latter kind more numerous than in that of sanitation, and it is with real relief that after the perusal of so many books and papers devoted to the comic, the enthusiastic, the educational and the astute misrepresentation of the subject, we come across a book so thoroughly sincere and practical as this of Mr. Gerhard's, every page of which, from one cover to the other, shows the unmistakable mark, not of the ordinary pseudo-scientific writer, lavish of the technical terms which he hopes may conceal his ignorance from his readers, but of the thorough master of his business, anxious to impart as much as possible of his own knowledge, in the plainest words and with the simplest illustrations.

In speaking thus of the book we give it the highest praise that, in our judgment, can be accorded to a technical work; and if we find here and there a point which we think might be improved in a later edition, it must be understood that this does not in the least affect our opinion of it as being the best manual of modern house-drainage work for the use of non-professional persons yet published.

To take up first the faults, small as they are, — we trust that in the next edition of the book the cuts will be improved. Fortunately for the student there are a great many of them, but the quality is extremely variable; some of them being borrowed from circulars or other books, and showing, in consequence, different styles of execution, while others seem to have been drawn expressly for the present work, and reproduced in a very coarse and unattractive manner. Rough as they are, however, they are clear, and the student in search of knowledge ought not to be fastidious.

We need not dwell long upon the introductory chapter, in which the objectionable character of sewer-gas, and the comparative advantages of pure air are adverted to with commendable brevity, Mr. Gerhard evidently preferring to get about his work with as little theorizing as possible. Six or eight pages are quite sufficient for his dealings with sanitation in the abstract, and on the ninth he plunges at once into the concrete, in the shape of a bath-room of the common type, whose nastiness he exhibits and explains as graphically as could be desired. This is always an excellent way of teaching the details of plumbing work, as a preliminary acquaintance with the foulness and feebleness of the sanitary appliances of fifteen years ago serves far better than anything else to make clear the intention of the improvements which have been subsequently introduced. After the general drift of sanitary effort has been pointed out, particular appliances are taken up, beginning with pipes and traps. Concerning the former there is not very much to be said, but we are glad to see Mr. Gerhard's confirmation of the remark so often made in these columns, — that unless the manufacture of cast-iron soil-pipe, particularly of the kind sold as double-thick, is speedily improved, architects and engineers who wish to get plumbing properly done will be compelled to adopt some other material for the purpose. In regard to traps, we are a little inclined to quarrel with Mr. Gerhard for describing and illustrating so many forms which, although common in England, are not to be procured here. As we know from experience, a young architect who likes to understand and control the drainage plans for his building is very likely to be led in this way into the mistake of providing access pipes, or intercepting traps, as an essential part of his system, for which he is subsequently compelled to devise make-shift substitutes with brick man-holes, and improvised combinations of common forms of drain-pipes, which are neither efficient nor cheap. It is not very easy, in writing on such subjects, to draw the line between articles which can and those which cannot be readily procured, but some indications on that point are of great value to those who read for the purpose of finding guidance in practical work.

From traps Mr. Gerhard passes on to drains, and these lead very naturally to sewage-disposal, cesspools and sewers. This subject is a little scattered, the evils of vicious methods being shown in one chapter, while the newer and better ways are treated of in another, in a different part of the book. Considered together, the two chapters form an excellent treatise on sewage-disposal on a small scale, and this alone would make the book of value to all householders in places beyond the reach of regular sewers. It is hardly

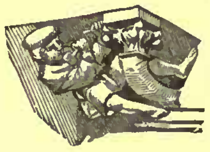
[1] "*Hints on the Drainage and Sewerage of Dwellings*," by Wm. Paul Gerhard, Civil Engineer. New York: William T. Comstock, 6 Astor Place. 1884.

necessary to say that Mr. Gerhard totally condemns the leaching cesspool, and advocates subsoil-irrigation as a substitute, giving a good deal of detail in regard to the best way of planning an irrigation system, which is all the more valuable for being put forward without any of that questionable enthusiasm which does so much to discredit innovations of this kind. Indeed, we think that Mr. Gerhard might have been a little warmer in his commendation of disposal by subsoil irrigation without outstepping the bounds of the strictest moderation. For instance, in speaking of the soils best suited to such treatment, he informs us that "the system works best in a sandy or gravelly loam, but even in heavy clay soil it has been used with tolerable success." We should be inclined, from one point of view, to invert this, and to say that the merits of subsoil irrigation, and especially its superiority to the leaching cesspool, were more apparent in a heavy clay soil than in any other. In fact, for country houses well supplied with plumbing, which have the misfortune to be situated upon small lots in a stiff clay soil, we believe from some little experience that this system furnishes the only practicable relief from the intolerable annoyance of cesspools continually choked, and running over or backing up filth into the house. Even in the most compact clay, the soil near the surface is more or less friable and absorbent, while grass grows with such vigor upon it as to increase materially its capacity for taking up sewage; so that, if a sufficient extent of absorptive pipe is provided, we have never known serious difficulty in disposing of house waste, with, at the worst an annual inspection of some of the lines of pipe, in ground which was nearly water-tight three feet below the sod, so that an ordinary leaching cesspool would fill up every two or three weeks.

The sewers, cesspools and traps disposed of, Mr. Gerhard expatiates upon the "internal drainage" of the house, into the details of which we will not attempt to follow him. It is enough to say that every variety of plumbing appliance which the architect can safely use, including some which, though not yet found in our market, give valuable indications of the course of improvement, is here described with admirable intelligence and discretion.

No matter how ignorant of the subject, or of the technical terms, the reader may be, he cannot fail to understand everything that the book contains, and, on the contrary, no matter how skilful and experienced he may be, he is certain to find much that will be interesting and valuable to him.

THE MEDIÆVAL ARCHITECTURE OF BRABANT.[1]



WE have here a dozen numbers of an architectural work, whose chief interest is perhaps archæological, but which has its attraction also from an artistic point of view. The book describes in detail a series of buildings, mostly churches, of which we know no full record elsewhere,—mediæval buildings in the smaller towns in the valley of the Meuse, about Liège and Aix-la-Chapelle, and on the borders of the old duchies of Lorraine and Brabant. With them is given a variety of ornamental work in stone, wood, and metal, from sources in the same region. The plates are simply and clearly drawn to scale, with apparent accuracy, and a fulness which is excellent for historical comparison, or for the imitation for which the author, perhaps too fondly, offers them. The careful letter-press comment shows labor of love, and if this elaborate collection of data does not always fix the history of the buildings as they are shown, that is no more than happens with others that are more important and better known. German ecclesiastical history is full of precise notices of foundings, consecrations, burnings, pillagings, and rebuildings: it would seem that nothing could be easier than with building and comment juxtaposed to make out a clear account of what is left to us of all the noted examples. But when it comes to fitting the buildings and the commentaries to each other, it is found so far from easy to say what relates to what, that the cases are comparatively rare in which the student can make sure of an unquestioned date for existing work; often he finds the judgments of his authorities centuries apart.

The churches here represented are comparatively small and simple, as is natural in towns of no great wealth or political importance; but two or three of them (those at Aldeneyk, Süsteren, St. Odilienberg), are worth an architect's attention, for the simple charm of proportion and arrangement, and all have a value in the study of architectural history. As might be supposed, they are German in character; only in one (Aldeneyk) do we find suggestions of French detail in the capitals, corbels, and string-courses of the choir, which show the crocket forms of the thirteenth century. Their period varies apparently from the eleventh century — the author even says the tenth — to the fourteenth. The most interesting, naturally, are the oldest. In these we find the peculiar frontispiece, as it were, of the early German churches, hiding nave and aisles; in Süsteren with two western towers, in Alderney with one, and in this last case the form, well known on the Rhine, of four gables leading into a pyramidal roof set diagonally on the tower. We also find (at Süsteren) the arrangement better known in Saxon churches (Quedlinburg, Gernrode), of piers and columns alternating in the main arcades, the columns, as in Heiningen and Echternach for example, carrying sub-arches under a relieving arch that spans from pier to pier, one of the best types that German Romanesque evolved. The columns bear the early German form of cushion-capital, the so-called *würfel-knauf*, and the shafts apparently have no taper. This church, which is substantially of one period, being the oldest and on the whole the most interesting, has also, in the choir arcades, an isolated pair of pseudo-Corinthian capitals, such as would hardly be found farther east in Germany, so closely do they sketch the capital of the original order, the two rows of leaves, the volutes, the *caulicoli*, and even the rosettes being all present, blocked out in rudimentary unindented form.

The plans approach the typical Italo-German form, the more complete having nave and aisles, transepts, and now one apsidal chapel, now three. In the church of St. Odilienberg, which its Prior in 1614 called "the oldest monument in the country," but which has passed through vicissitudes that hardly leave anything older than the twelfth century visible in Mr. Fisenne's drawings, we find in plan a singular arrangement, the two slender towers that flank the central apse being so wedged in, as it were, that they thrust aside the lateral apses. Unfortunately it is not in all cases so easy to eliminate from the drawings the modern restorations accomplished or proposed as to picture the original aspect of the church. One thing that deserves mention in speaking of this church is the discovery, under the pavement, of the foundations and other fragments of two *ambones*, the only ones, we believe the author is justified in saying, that have been found north of the Alps.

Two churches of the fourteenth century, the Dominican church at Maastricht, and the parish church of Cornelimünster, show in a simple way the type adopted at that period in the low countries; the round pillars instead of clustered piers, the simulated triforium in panels running up to the clerestory sills, but here with stone vaulting, which one is by no means sure of finding even in the important churches of Holland. A queer slice of building called the Old Rathhaus of Maastricht, and a shrine or *sacraments haüslein* from the old priory at Meersen, almost as elaborate as the famous one in St. Lawrence at Nuremberg, are perhaps the most interesting things among the other numbers, which contain in considerable abundance the kind of native Gothic detail that is more admired in Germany than out of it.

[1] *Kunstdenkmale Des Mittel Alters.* ["*L'Art Monumentale du Moyen-age*"], Aufgenommen und gezeichnet von L. von Fisenne, Series I, Nos. 1-6; Ditto, Series II, Nos. 1-6. Aachen [Aix-la-Chapelle], Rudolf Barth, 4to. German and French text and plates.

THE ILLUSTRATIONS.

OLD HOUSES AT PERIGUEUX, FRANCE.

HOUSE OF W. H. JEWETT, ESQ., MONTCLAIR, N. J. MR. A. F. OAKEY, ARCHITECT, NEW YORK, N. Y.

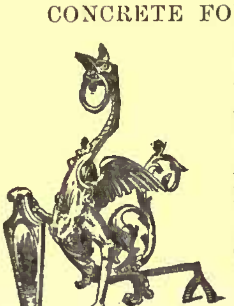
ALTERATIONS TO HOUSE AT HINGHAM, MASS. MR. C. S. LUCE, ARCHITECT, NEWPORT, R. I.

CAPILLA MAYOR, TARRAGONA CATHEDRAL, SPAIN. SKETCHED BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

FOR description see article on "Spanish Architecture."

HOUSES NO. 272 MARLBOROUGH STREET AND NO. 282 NEWBURY STREET, BOSTON, MASS. MR. W. W. LEWIS, ARCHITECT, BOSTON, MASS.

CONCRETE FOR MARINE CONSTRUCTIONS.



IN the Aberdeen Breakwater and the Harbor Works at Brest, concrete blocks of moderate dimensions were adopted, weighing in the former case from 7½ tons to 24 tons, and in the latter 100 tons each.

As an example of the use of extremely large blocks, a short reference may be made to the manner in which a considerable length of deep-water quay wall has been constructed at Dublin. The position of the works is extremely well sheltered, and interruptions due to bad weather are consequently reduced to a minimum. The contents of each block averages about 193 cubic yards, which at 14 cubic feet to the ton, gives a weight of about 370 tons. Each block is about 29 feet in height, and is built in wooden casings to the section of the wall, battered on the face, and with horizontal offsets at the back, each block representing 12 lineal feet of quay wall built to a level of 3 feet above low water. The blocks consist of rubble masonry set in cement concrete, guaged in the proportion of one part Portland cement to seven parts sand, and very coarse gravel or shingle, and are built upon a specially constructed wharf at a short distance from the site they are intended to occupy permanently. A block takes from three to four weeks to build, and is considered sufficiently consolidated to move after ten weeks. A large iron pontoon or float, also of special construction, is used for lifting and transporting the blocks. This pontoon is 130 feet in length, 48 feet wide, and 14 feet deep, and is provided with two pairs of massive and lofty shears-legs, one pair forward, the other aft. The cross-head of the former, which is 54 feet above the deck of the pontoon, carries two sets of heavy four-sheaved pulleys, through each of which, and a corresponding pair of hanging pulleys, a pitch chain is reeved. The lower pair of pulley-blocks are furnished with projections which grip the upper tee-heads of four round iron suspension-bars passing through the masonry, and provided with tee-heads on their lower extremities, bearing on cast-iron girders or washers built into the bottom of the block.

The after shear-legs support a counterbalance consisting of a tank filled partly with concrete, and partly with water; the latter, by being pumped into or out of the tank, affords the principal means of lifting and setting the blocks in their position. The first part of the lowering, however, is accomplished by means of the pitch chain already mentioned, which is connected to powerful crab winches on the deck of the pontoon. These winches, together with a centrifugal pump and several surging-heads, are driven by a 14, nominal, horse-power engine.

The foundation for the blocks is prepared first by dredging, the excavation being subsequently completed, and the bottom very carefully levelled by means of a large diving-bell, which is also of special construction, and consists of a cast-iron chamber 20 feet square, and 6 feet 6 inches inside height, with a vertical tube and air-lock. The bell or chamber is suspended from a suitable shears placed on an iron float containing the engine, air-pumps, winches, etc. With a diving chamber of this description, the bottom — which when ready for the block is about 26 feet below low water, and has an area of about 250 square feet — can be levelled with the great accuracy absolutely necessary for the satisfactory setting of such large blocks in quay walls where irregularities in the face are inadmissible.

With the aid of the special appliances above described, an average of 400 lineal feet of blocks per year can be laid in still water, which is equivalent to 6500 cubic yards, or allowing 300 working days to the year, about 22 cubic yards per day. The actual progress has been somewhat less (about 364 lineal feet per annum) owing to slight interruptions of various kinds.

The cost for the special plant required for the lifting, transporting, and setting of the blocks has been as follows: —

Floating shears	£18,783
Block wharf	4,610
Chain-testing machine, moorings, and sundry small items, about	2,607
Total	£26,000

The cost of the blocks standing on the wharf is given as £16 per lineal foot, or about 19 *s.* 8 *d.* per cubic yard for labor and materials.

Lifting, transporting, and setting the blocks, including maintenance of shears, float, and block-wharf, also shifting moorings, etc., has been £3 10 *s.* per lineal foot of block, or say, 4 *s.* 4 *d.* per cubic yard. If interest at 5 per cent per annum be added to the cost of the plant (£26,000) and one-fourth the first cost deducted as the approximate selling value of the plant, at the end of five years, the proportion of cost of special plant will be 16 *s.* per cubic yard, and similarly at the end of ten years, 10 *s.* per cubic yard, and at the end of fifteen years, 8 *s.* per cubic yard.

Summarizing these results for convenience of comparison, the cost of the various items connected with the block-work is as follows: —

	£.	s.	d.	
Quantity of block-work deposited in place per year	6,500 c. yds.			
Approximate cost of special plant required for manipulating the blocks	£26,000			
Cost of blocks, materials, and labor	0	19	8	p. c. yd.
Lifting, transporting, and setting of blocks, including maintenance of float and block-wharf	0	4	4	"
Proportion of cost of special plant at end of five years	0	16	0	"
Proportion of cost of special plant at end of ten years	0	10	0	"
Proportion of cost of special plant at end of fifteen years	0	8	0	"
Total cost at end of ten years' work, exclusive of cost of levelling foundations	1	14	0	"
Total cost at end of fifteen years' work	1	12	0	"

The large size of the blocks used at Dublin involved the levelling of the foundation with great care and accuracy; for this purpose the large diving-chamber before described has been found to work satisfactorily; its cost, however, was considerable, amounting to £5,454, which would preclude its use on any but works of considerable extent. The cost of excavation, including the maintenance of bell, float, and machinery, is given at £3 per lineal foot of block, which is equivalent to about 3 *s.* 8 *d.* per cubic yard of block-work. If to this is added the proportion of the cost of this item of special plant, after fifteen years of continuous work, which amounts to about 1 *s.* 8 *d.* per cubic yard of block, the total cost of excavating and preparing the foundations will be about 5 *s.* 4 *d.* per cubic yard of block-work, or about £51 per block.

The details of the system adopted at Dublin have been most carefully elaborated by Mr. B. Stoney, the engineer of the works, from whose valuable paper on the subject most of the preceding information has been extracted.

The breakwater at Kustendjie, on the western shore of the Black Sea, affords an instance of the successful use of 30-ton concrete blocks. Each block is 6 feet high by 5 feet wide, and of a length equal to the width of the breakwater, which is 18 feet at the bottom, and 12 feet at the top; the blocks are laid with a slope towards the shore of 45 degrees from the vertical, somewhat similar to those used in the Manora breakwater at Kurrachee (which will be subsequently referred to), and laid on a similar foundation of loose rubble stone. The concrete used at Kustendjie consisted of the following:

	Parts.
Broken stone	5½
Sharp sand	2½
Portland cement	1

Taper bolts 2 inches in diameter were used to lift and lower the blocks, the nuts and washers remaining permanently in the block; this arrangement, however, does not compare favorably with that adopted at Dublin and elsewhere. The blocks were lifted and set, by means of a timber gantry carrying a travelling winch. The foundation was first roughly levelled, and the operation subsequently completed by divers with the aid of iron set squares. The cost of this breakwater is not given, so that the method of construction employed cannot be compared in this respect with those already referred to.

The blocks were lowered into their places when from twelve to fourteen days old. — *Engineering.*

SANITARY PLUMBING.[1] — XXVII.

II. THE SLEEVE-JOINT.

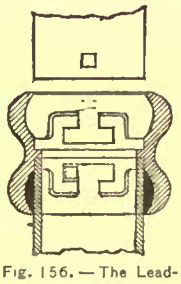


Fig. 156. — The Lead-Packing Sleeve-Joint.

THE object of the sleeve-joint is to form a connection between pipes having plain ends without flanges, hubs, threading or projections of any kind. The first division under this class is: —

(*a*) *The Lead-Packing Sleeve-Joint* illustrated in Figure 156. This joint was devised for use with wrought-iron pipes in which it was desired to form connections like those on ordinary cast-iron bell-and-spigot pipes and avoid weakening the pipe by thread-cutting. It produces an even, smooth interior, of the same diameter with the pipe, and could be made to form in part a rust joint. The lugs, or rivets on the ends of the pipe, engage in the recesses in the couplings, and form a resistance to longitudinal strain. The joint can be calked like the ordinary bell-and-spigot joint, though the space around the spigot is somewhat smaller than in the latter.

(*b*) *The Plain-Ring Sleeve-Joint.*

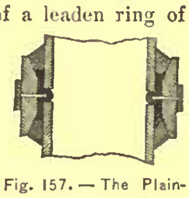
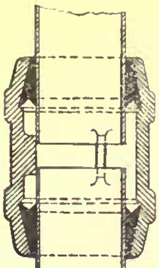


Fig. 157. — The Plain-Ring Sleeve-Joint.

Figure 157 shows a lead-packed joint designed to be made with lead in its cold state, aided by cement. The joint is somewhat complicated and difficult to make. It is composed of a leaden ring of peculiar construction, two cast-iron coupling-rings, cement for solidifying the joint, and a hoop for covering the coupling-rings. The leaden ring is a band of milled or rolled sheet-lead with a groove in the centre. To form the ring, the band is cut to the length corresponding with the outer circumference of the pipes to be connected. It is then bent into the form of a ring, and the two ends are soldered or burned together by means of a blow-pipe. The ring is placed over the ends of the pipes and pressed tightly against it by light blows of a hammer, or by means of a metallic band with pincers, or by a cramp in such a manner that the lead shall be thoroughly embedded on each pipe. In the groove in the leaden ring temporary sheet-iron discs, formed in two parts and held together by hooks, are then placed. The two coupling-rings are then pushed against the disc, which by resisting allows of and facilitates the junction, at the same time preventing the groove from being flattened or closed. The junction being completed, the disc is removed and the outer hoop is placed over the whole, and cement is put in the empty spaces between the coupling-rings and the pipes beyond the lead ring. The groove in the leaden ring is designed for the purpose of giving a certain flexibility to the joint, and allowing of expansion and contraction of the pipes, but it is nevertheless subject, in this respect, to the same criticisms as we have made in regard to the lead-packed bell-and-spigot joints.

Figures 158 and 159 represent a sleeve-joint in which rubber is used for packing. A hollow cylinder or shell is constructed of brass, iron or wood, and has belts cast upon it for additional strength. The ends are bevelled or inclined inwards towards the pipe, so as to contract the opening for the insertion of the pipe, and to form recesses into which are forced annular conical India-rubber rings or other similar packings, which may have any desired angle. These rings or packing are so formed that when internal pressure is applied they press against the contracted ends of the cylinder to form a tight joint. Webs are provided within the cylinder to give rigidity to the joint, but when flexibility is desired, the webs are omitted.

Fig. 158.



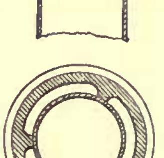


Fig. 159. — Sleeve-Joint with Rubber Packing.

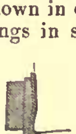
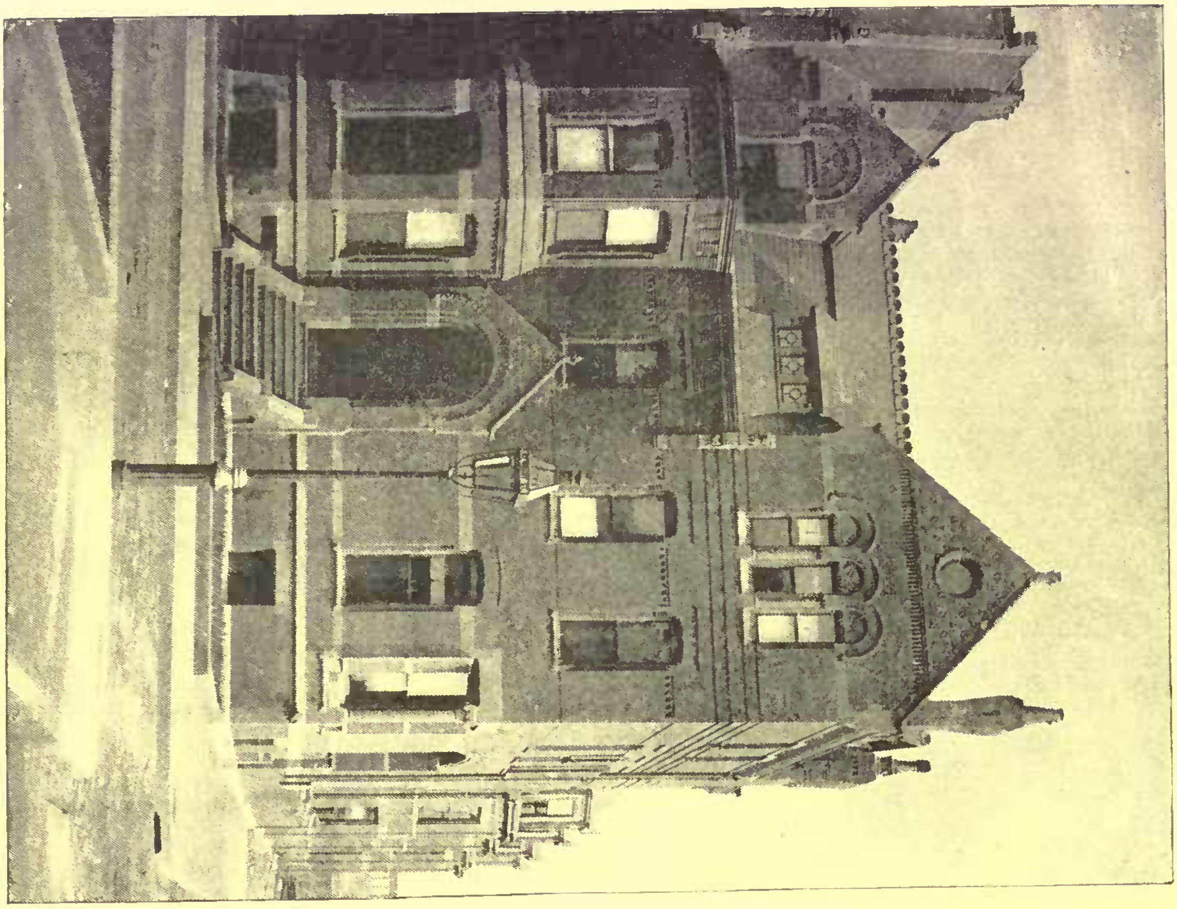


Fig. 160. Sleeve-Joint with Cold-Lead Ring.

Figure 160 shows one side of a pipe having a cold lead packing-ring. The pipe is shown in elevation and the packing and clamping rings in section. The ends of the pipe are here provided with slight enlargements or collars. A strip of lead, shaped to fit the enlarged ends, and having a central rib underneath to project into a space left between the ends of the pipes, is lapped around so as to embrace the ends of the pipes. A circular band or collar is then tightened round the lead by a "press collar," and finally all is secured by binding-rings. The ends of the pipes abut against the central rib of the lead and prevent

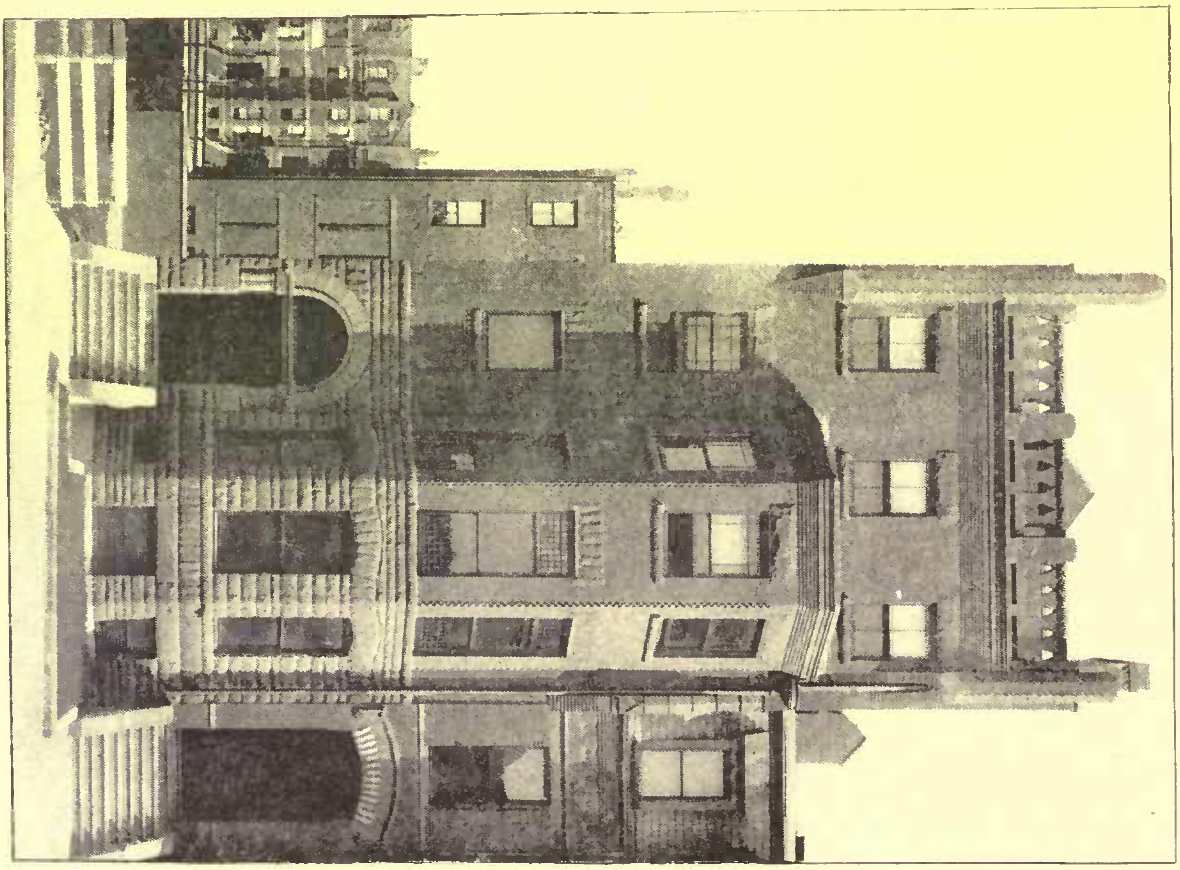
[1] Continued from page 32, No. 447.



House No. 282 Newbury St.

Boston, Mass.

W. W. Lewis, Architect.



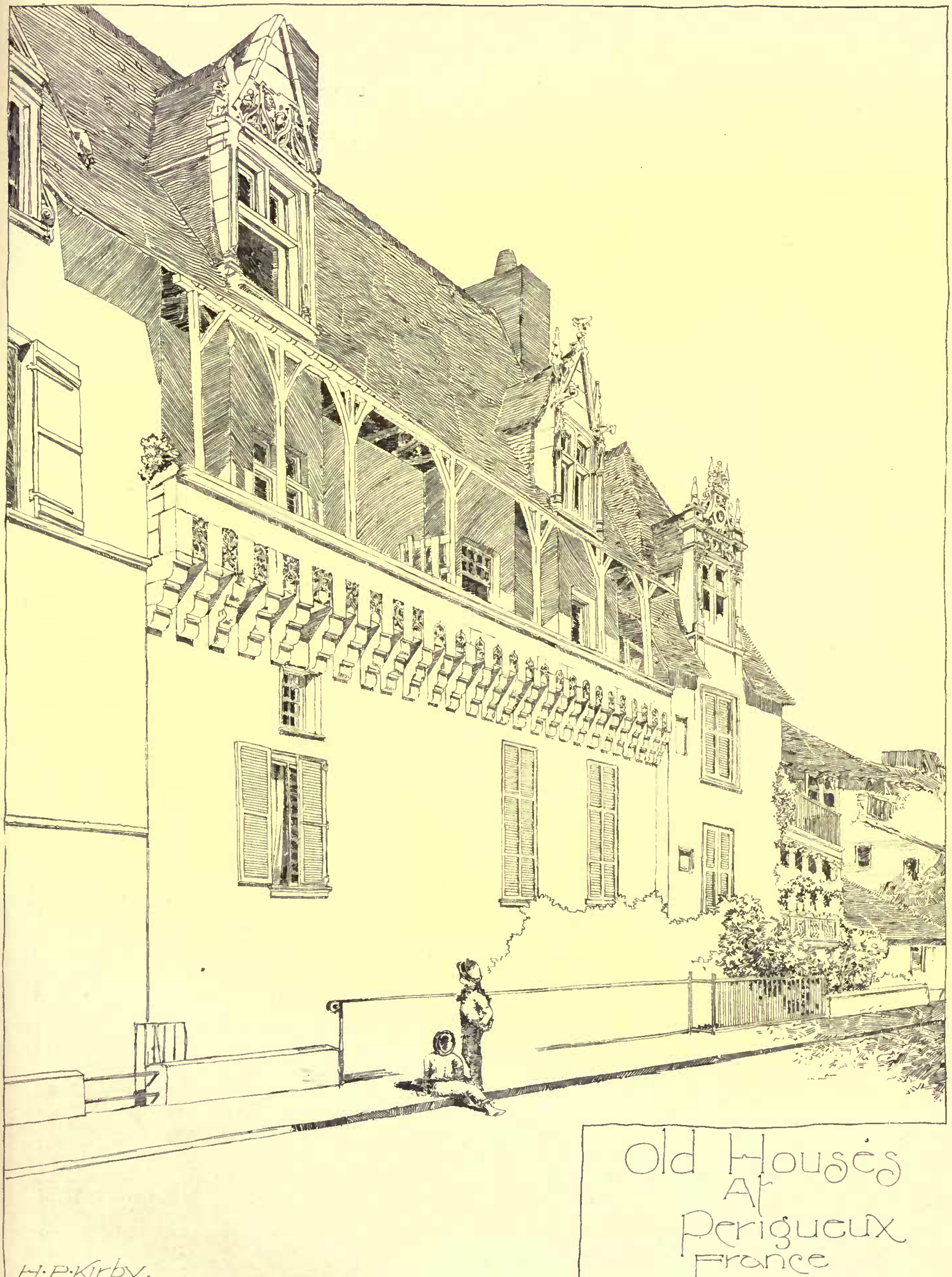
House No. 272 Marlborough St.

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

House at Hingham, Mass. Alterations by C. S. Luce.

House at Montclair. N. J. for Wm. H. Jewett Esq.
Alex. F. Oakey Architect. 140 Nassau St N.Y.

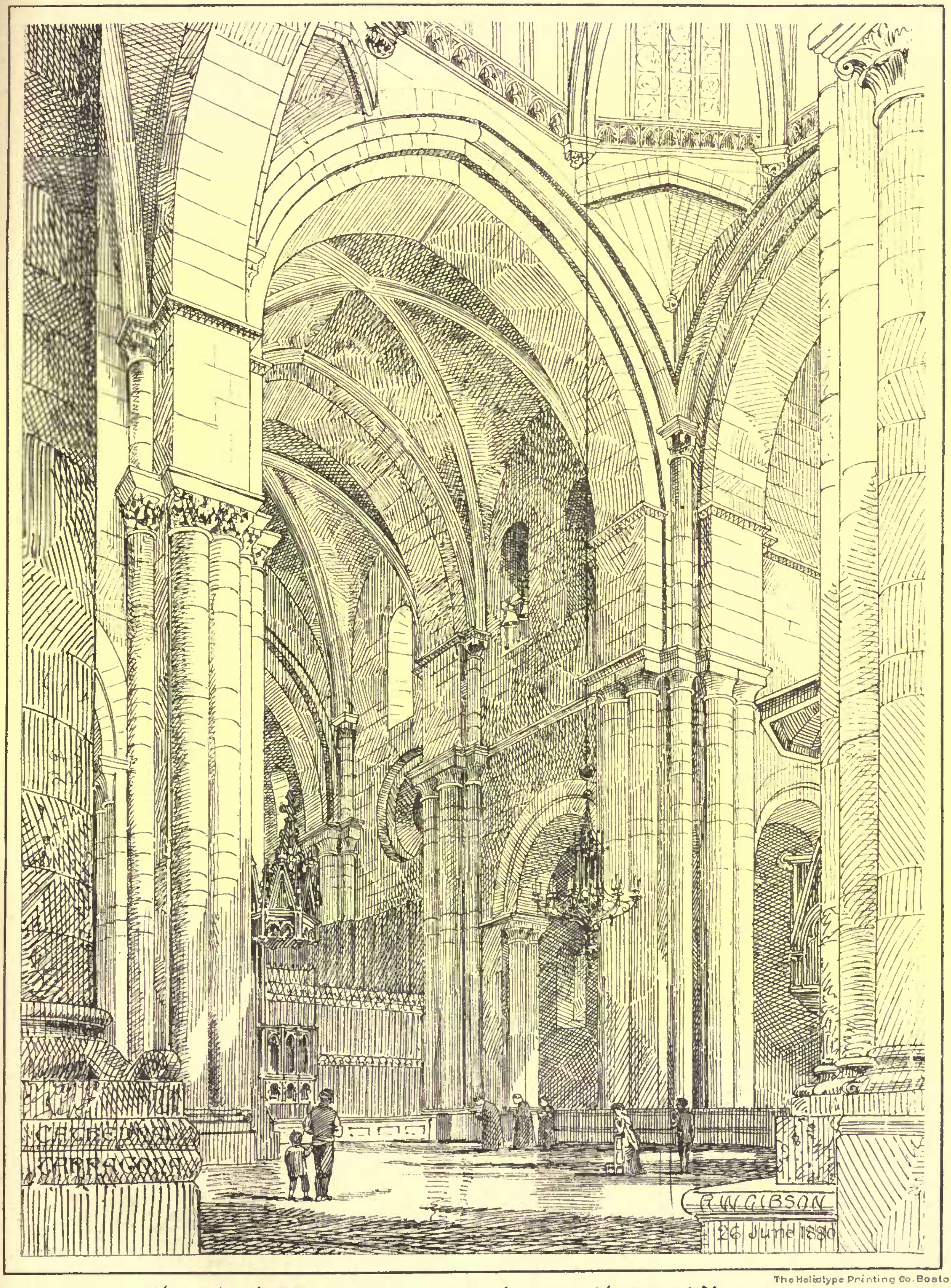
The Heliotype Printing Co. Tremont St. Boston.



Old Houses At Perigueux France

H·P·Kirby. Drawn from a Photo

The Heliotype Printing Co 211 Tremont St. Boston.



The Heliotype Printing Co. Boston.

Cathedral Tarragona Spain : Capilla Mayor.

shifting of the packing when the binding rings are driven on. These rings are formed to fit the outer surface of the pipe, in order that their binding pressure may be equally distributed.

Figure 161 shows a sleeve-joint in which the ends of the pipe are grooved or corrugated and connected by means of a lead ring compressed into the corrugations. This lead ring is of double conical form externally, and has at the middle of its length an internal annular rib which forms an abutment for the ends of the pipes to be coupled. The joint is completed by forcing over the opposite ends of the leaden sleeve, conical clamping-rings, which, when driven home by means of a hammer or cramp, will compress the lead into the annular grooves. Collars, brackets or ears may be cast on the pipes at some little distance from the ends, to prevent injury to the joint or pipe in ramming the earth about it when it is used under ground.

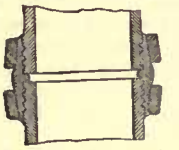


Fig. 161.—Sleeve-Joint with corrugated Pipe-ends and cast-Lead Ring.

Figures 162 and 163 show a sleeve-joint in which a rubber band is used for packing, secured by means of an elastic metallic strap. The India-rubber in a broad band is made to embrace the two ends of the pipes. Over the band is then placed a metallic strap, which is drawn together by means of screws or wedges. The tightening of the strap forces the India-rubber band into a number of annular grooves with which the strap or the ends of the pipe are furnished.

Fig. 162.

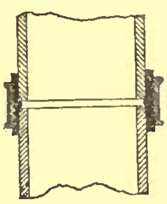
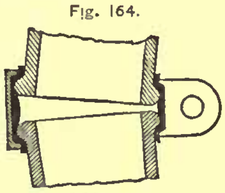


Fig. 164.



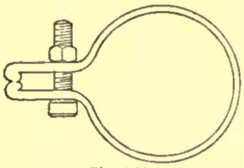


Fig. 163.

Sleeve-Joint with Rubber Band secured by wrought-iron Strap.

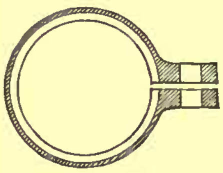


Fig. 165.

Sleeve-Joint with bevelled Coller.

Figures 164 and 165 show a joint similar to the last, except that a small bead is formed on the ends of the pipes, and the sleeve is bevelled, or wider on one side than on the other, to enable the pipes to be connected on an angle. The edges of the metallic collar used to compress and hold the rubber packing sleeve are turned down, as shown, so as to bring the packing close down over the beads. The collar is strained on by means of a bolt and nut, in the same manner with that in the joint preceding.

Figure 166 shows a sleeve-joint for cement or melted-lead packing. A movable or shifting sleeve or jacket is placed over the ends of the pipes, and has openings for the introduction of the packing. The ends of the pipes are grooved, and corresponding grooves are cast on the inside of the sleeve. These are intended to protect the pipes from longitudinal movement. The joint is bulky and expensive.

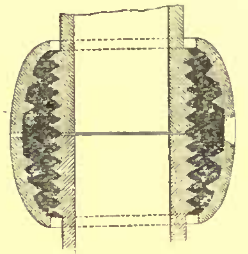


Fig. 166.—Sleeve-Joint for Cement or melted-Lead Packing.

(c) *The Divided-Ring Sleeve-Joint.*

Figures 167, 168 and 169 represent a sleeve-joint connected by means of half-rings bolted together. The general principle of this consists in lapping soft metallic or leaden packing round the meeting ends of the pipes, and forcing this packing into intimate contact with the surface of the pipes, by means of a screw clip or hinged collar, the pipe-ends externally, and the packing internally having annular grooves and ribs, which respectively bed the ribs on the pipes into the grooves in the packing, and *vice versa*, when the hinged collar or clip is temporarily closed around them by a screw. The collar is afterwards removed, and a hoop of wrought-iron, slightly conical internally, is driven on over the lead. Instead of using the lead alone, India-rubber may be used in connection therewith; the lead packing may be made conical to correspond with the collar and hoop, and the annular grooves and ribs on the pipe-ends may, of course, have an endless variety of shapes.

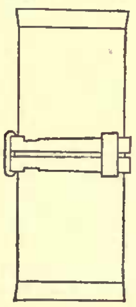


Fig. 167.

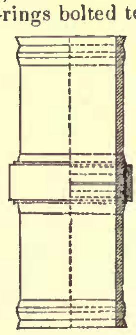


Fig. 168.

Fig. 169.

Divided-Ring Sleeve-Joints.

The use of divided rings and bolts enables the joint to be easily disconnected at any time. In Figure 170, the ends of the pipes have formed on them annular ribs or projections with intermediate grooves, and over these ends a vulcanized India-rubber belt is compressed by means of a metallic collar made in halves, and bolted as shown. The collar has corrugations corresponding with those on the pipes.

In this joint, Figures 171 and 172, the divided ring is clamped together in a different manner from the preceding, and the pipe-ends are entirely plain. The clamps are provided with internal ribs, and their uniting surfaces have projections and corresponding recesses to prevent misplacement, and the escape of the packing into the pipe under pressure. A packing of lead or other suitable material placed between the pipes and the collar, and between the two halves of the collar forms the joint by compression. In each end of the half-collars there is a depression or cavity, forming together, when the two half-collars are united, a box or chamber in which a piece or block of India-rubber is inserted and compressed. This closes the open space left between the ends of the half-rings, and prevents injury to it when the rings are drawn together.

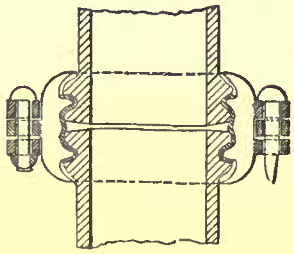
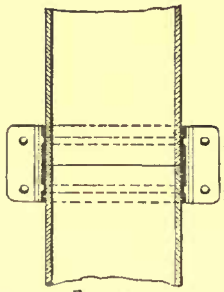


Fig. 170.—Divided-Ring Sleeve-joint with double Bolt.

Fig. 171.



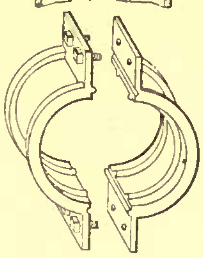


Fig. 172.—Divided Ring Sleeve-Joint.

(d) *The Bolted-Ring Sleeve-Joint.*

In the three accompanying figures, three separate rings are employed, and they are secured together by long bolts. The pipe-ends are quite plain. Two loose collars are slid, one on the end of each pipe. Then two annular packing-rings are slid on, one against the end of each collar, and next upon one of the pipes is slid a flat tubular ring. When the two pipes are placed end to end the ring is slid back over the joint one-half on one pipe, and the other half on the other, so that the tubular-ring covers the junction. By means of nut-bolts the two collars are then drawn towards each other, and the annular packings thereby compressed between them and the ends of the intermediate tubular-ring, and forced to expand laterally into close contact respectively with the surfaces of the two pipes forming the joint. The annular packings may be of vulcanized India-rubber, and made smaller in diameter than the ends of the pipes in order that they may have a tendency to close tightly round them, or a gasket saturated with tallow or red-lead in a plastic state may be employed.

In one form of the device the tubular collar has its ends enlarged so as to form sockets to receive the packing-rings, and the loose collars have corresponding shoulders cast upon them to enter the sockets, and press the packing-rings against the pipes.

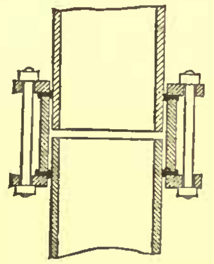


Fig. 173.

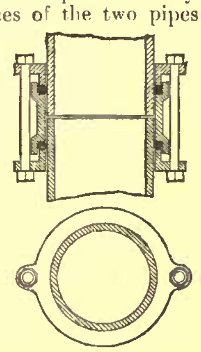


Fig. 174.

Bolted-Ring Sleeve-Joint.

III. — SCREW-JOINTS.

The screw-joint possesses great advantages over bell-and-spigot or sleeve-joints in being perfectly and permanently *tight* when made, provided the threading is of the proper kind. It is capable of withstanding the effects of expansion and contraction, and of all kinds of strains as well as of jars and settlement in the building, and it is compact, occupying really the minimum of space in a building.

Fig. 175.

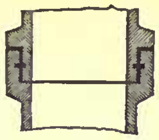


Fig. 176.

Screw-Joint with Flanges.

(*a*) Figures 175 and 176 represent the first class of screw-joints which we have designated as the *flanged screw-joint.* Its important feature consists in casting or constructing upon the spigot-end of a pipe two or more threads, the inside of the socket of the pipe to which it is attached being cast with corresponding grooves. There is also a collar formed on the spigot-end.

The complete joint is formed by covering the spigot and socket ends of the pipe with a layer of cement or other quick-setting substance of a like character, and screwing the two pipes together. By a slight turn or rotation of the pipes or either of them on their axis the connection is made.

Instead of casting or otherwise permanently attaching the threads upon the spigot-end of the pipe, the pipe may be moulded without threads, but instead with suitable grooves in which threads of steel, iron, or other suitable material are afterwards placed and secured.

The threading on this joint is, from its nature, too coarse to form a perfectly reliable joint under heavy pressure.

Figure 177 shows another form of flanged screw-joint, the threaded parts being on detachable sleeves. This joint might be included with equal propriety under the preceding class of sleeve-joints, inasmuch as its tightness is dependent rather upon rust or other packing between the sleeve and the pipes, than upon the threading. But inasmuch as the rust makes the pipe and its sleeve practically one piece, the joints becomes ultimately a true screw-joint. The joint illustrated in the figure is particularly intended for the connecting of soft-metal pipes, the pipes shown being practically "tail-pieces." A nut or loose collar, screw-threaded externally is passed over the end of each of the two pipes, and then by any convenient means, such as the forcing in of a conical plug, the pipe-ends are caused to expand, and the extreme end of each pipe is hammered out to form a flange against the end or annular surface of the collar. An internally-threaded annular band is screwed half its length on the collar of one pipe, and the collar on the other pipe is screwed into the other half length of the band until the soft metal ends come together tightly enough to form the joint.

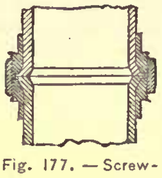


Fig. 177. — Screw-Joint with Flanges and Sleeves.

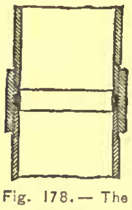


Fig. 178. — The Inner-Ring Screw-Joint.

In Figure 178 a simple form of screw-joint is shown, having as its object better resistance against pressure. The novel feature is the use of a metal ring inside the two ends of the pipes where the joint is formed, in connection with a packing-ring of suitable material. The end of the pipes are drawn together by means of a separate threaded ring or rings. The inside metal ring is bevelled slightly on the two edges, and the inner edges of the pipe-ends are bevelled to correspond so that the ring can only pass a little way into the pipes. By screwing the two ends of the pipe together, the packing is compressed against this inner ring, and the joint is formed.

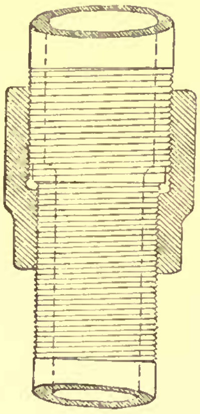


Fig. 179.—The Outer-Ring Screw-Joint.

Fig. 179 shows what we have called "the *Outer-Ring Screw-Joint.*" It differs from the ordinary coupling-ring or collar, in having the ends differentially threaded to correspond with similar threading on the pipes. In other words, the pitch of the screw-threads on each pipe-end is different. When the collar is turned round it advances more quickly on one pipe than on the other, thus causing the pipes to approach each other, and come into tight contact.

STAIRCASES.[1]— VI.

CONSTRUCTION.

In the construction of ordinary geometrical stairs — that is, of stairs having only one end supported in a wall with the lower edge of every upper step attached to the tread of the one next below it, so as to prevent vertical or inclined descent—it is essential that safety and security both in appearance and reality be provided. The principle, says Gwilt, is "that every body must be supported by three points placed out of a straight line, and, therefore, if two edges of a body in different directions be secured to another body, the two bodies will be immovable in respect to each other." In stone stairs safety and security are best attained by providing surrounding walls of sufficient strength, by giving each stone a grip of at least nine inches where possible, and by providing a liberal weight on the tail, or, where this is not practicable owing to openings over, by an iron beam passing over the top of the steps to prevent their tilting. The material selected should be hard, well-seasoned, fine-grained, durable and of homogeneous structure, free from fossil, shells or flaws, and from a good quarry, such as Craigleith, or the blue-gray bed of the Hailes.

If the step blocks have been quarried upright, the top part, as being the hardest and strongest, should be inserted in the wall, where, at the junction of the right-angled prism forming the step proper with the seat, the greatest strain or leverage is exerted. Each individual step of a geometrical stair has the back part of the upper edge worked at right angles to the plane of the soffit, called "bird's mouthing," piend, or "pen-checking," the corresponding part below being checked to fit over the upper ones. The thickness measured at the inner angle is proportioned to the length of projection, and is usually half an inch for each foot; the steps project from the wall, so that a step four feet long has two inches of check, and usually about one and three-fourths of an inch of rest or cover in. The ends in the supporting walls are left square as a seat; sometimes they project to increase the strength and enhance the appearance by showing a continuous stepped moulding along the wall, and they are firmly wedged in with slate, tile or oak, and have Portland cement grout run in to make the whole rigid. It is important that wedging or pinning-in should be carefully executed. We have found the necessary rigidity and security attained by the use of cast-iron tapered wedges. Each step has two inserted above the nose or strongest part, the thick end of one being first put in, and then the thin end of the other, the steps being kept a little slack on the outer nose of soffit or pen-check to enable one to be taken out without disturbing those above or below should it be broken by accident or carelessness. When the wedges are taken out, and the step is eased underneath, it can be very easily removed without affecting the general stability. If not tightly wedged up, the natural tendency of a step is, of course, to drop on the head, while some materials used for this purpose allow the steps after use to get slack and shake.

If iron be used, however, and a good stone inserted below, they remain immovable even under very heavy prolonged traffic. Tight wedging is also useful in preventing any settlement in a brick partition owing to the continuous vacancy of the stair raglet. The bottom step of upper flights should always start direct off an iron beam or other stable support; if a wall cannot be got, the lowest on the ground floor being slightly sunk to prevent its sliding on its bed, for though a certain measure of stability is owing to the rigidity of the first step, we have shown that each component part of the structure is to some extent independent, and able to support not only its own weight, but any moderate load that may be brought upon it. Stairs should not be built until the inclosing walls have settled and arrived at their bearings, the raggles to receive the steps being left built up in a temporary manner during the progress of the building. A portion of the wall above and below, and the steps themselves, should be built in cement mortar. Up to a width of six feet they are generally constructed of single stones; but, where this width is exceeded, or where narrower but subjected to severe usage, it is usual and necessary to support the ends on a wall, on raking iron beams, or on continuous raking arches with supporting piers, as in the example from Fuiances, Naples.

The greater the width the greater the leverage. It has been suggested, therefore (possibly from the example in the interior of the Orange Tower in Carpentras), to construct steps of any width of a pyramidal form of equal strength throughout, so as to form a bracket independent of any other support than the wall in which they are fixed. In long broad landings the central stones are formed of pieces wrought at the joints in the form of a long flat arch, or are joggle-jointed. Copper or slate dowels are also used. The plats should be well let under the jambs of doors, and supported where necessary by beams, iron brackets, or arches. Iron columns are inadmissible, as any expansion would nip the stones. In the case of intermediate landings where the upper flights start immediately off from them, and where only one end rests in a wall, great care should be exercised to support them well, as, interrupting as they do the continuity of the structure, they interfere with its stability, and where a sudden shock or vibration through a rush of persons occurring at a particular moment, coincident, perhaps, with a flaw or flaws in a step, may be the cause of disastrous failure. When constant traffic has gone on a stair for many years so as to wear down the central portion of the treads, what is technically called "piecing up" has to be resorted to. This should be cautiously done, perhaps with iron as a suitable material, the whole length of the steps. Cutting out a portion in the centre only weakens them to a measurable extent, and may — other circumstances being favorable — cause the stair to fall, as in the memorable example at the Polytechnic Institution twenty-five years ago, where a sudden vibratory shock took effect on the most vulnerable part, and set the whole collapse in motion. The pieced steps experimented on at the time were proved to break with a load of two and a half times less than unpieced ones.

Iron is being extensively used in the framework of staircases, as in a fine example at the Town Hall of Buda-Pest, in Austria. It is much used in the United States, with slate, tile, marble, or other material for the treads. On the construction of ordinary wood or newel stairs it is unnecessary to enter. Such is fully treated in Newland's and other works, while for setting out and other details reference may, in addition, be made to the works of Thierry, Normand, Merault, Goguet, Boutereau and Mahistre.

SITUATION.

The suitable and convenient disposition of a staircase has always been regarded as a difficult problem in interior architecture. In planning its situation much will depend on the object of the building and the purposes it is intended to serve. It may be noted that an idea of depth and spaciousness is secured by placing it well back from the entrance; of grand and impressive effect when it, along with the approach, are modelled after the examples of the Italian *palazzi;* and of cozy homeliness and picturesque feeling when it occupies a corner of a well-furnished and well-warmed hall, secluded from the entrance and arranged with the artistic eye of our forefathers of the sixteenth and seventeenth centuries. In dwelling-houses where the principal apartments are on the ground floor it will naturally be

[1] Concluded from No. 447, page 34.

modest in design and retired in position. Where these apartments are on the first floor its situation will be more evident, its importance enhanced, while its size and decoration will be proportioned to the scale of the building. Generally speaking, privacy is most desirable — in fact, essential for comfort, while that it be central, in convenient relation to the lines of thoroughfare and to the entrance is evident.

With the complicated department grouping of large mansions and public buildings arises the necessity for the careful subdivision of traffic. This points to the creation of subsidiary relieving stairs, which increase in number with the scale of the erection, and although their unnecessary multiplication is not to be recommended, there should be no hesitation in introducing them wherever traffic can be regulated or improved by their use. We need only further notice that in a town house it is most desirable to avoid the characteristic straight flight opposite the entrance door, either by reversing it, by placing the staircase crossways, or by some other method which the artistic instinct of a true planner will suggest for each special case, while it is nearly always advisable to carry the main stair up to the bedroom floors as materially enhancing their value.

FORM.

The form will be dictated by the purpose to be served, the taste of the designer, and the space set apart on the plan. Circular or elliptic stairs, unless large, are not advisable forms for the majority of purposes, and even then in elliptic examples it is difficult for the body to become used to the different radii. Wheeler says, "In practice oval staircases are tiresome if of continuous steps, for the body gets accustomed to the long sweep of the centre of the flight, and is embarrassed by the shorter radius at the turn, whereas with straight flights, even with winders at the turn, the change of motion is so abrupt that the limbs adopt it at once." When large, circular stairs are not so objectionable, provided the treads be properly proportioned to give a convenient treading line at the usual distance of eighteen inches from the hand-rail. This treading-line, however, can only be at one spot; resting-places are unsightly and break the continuity of the graceful sweep where used; but, otherwise, the swing of the body in mounting makes them easier in some respects than rectilinear ones of short flights. Good elliptic examples may be seen in Somerset House or the Ducal Palace at Genoa; good circular ones in the Palace of Caprarola or the numerous examples of Mediæval France. While variety in form may be made almost endless, for domestic purposes the simple, square, open newel is for nearly all purposes to be preferred.

Where windows are introduced they should not be radiated to the centre, but made to "dance," in order to preserve as good a width of tread at the newel as possible, where otherwise it would be narrow, uncomfortable, and dangerous. For a square stair, our master, Inigo Jones, at Ambresbury, in Wiltshire, has divided the space into four parts, two of which have been given to the stairs and two to the newel, which is a suitable proportion to observe. For circular or oval stairs Palladio directs that "with a solid newel the diameter should be divided into three parts, two being for the steps and one far the newel; where open, two for the steps and two for the newel, into seven, three being for the newel and four for the steps; while if the steps be circled they are handsomer and longer than when straight." In public buildings where the grand form of stair is used, consisting of a centre and two side flights, the width of the centre should equal the sum of the widths of the two sides, so as to accommodate the united streams of outgoers or incomers and prevent a block. Where space is valuable, the "double" and the "following" form of stairs may be introduced with advantage. Another method where economy of space demands the angle of ascent to be, say, 45°, in place of the half of that, a form of step is used with treads at two different levels. This was probably first used, as Viollet-le-Duc shows, by mediæval builders in France, and examples may be seen on the upper parts of the church of Saint Nazaire, in Carcassone, and in the transept galleries of the Cathedral of Notre Dame, in Paris.

THEATRES, ETC.

Staircases in theatres and such like buildings should be numerous and fire-proof; in their situation arranged so as to split the audience into sections leading away from the stage. They should contain short, straight flights of moderate width, without winders, single steps, or obstacles of any kind, having strong hardwood hand-rails at both sides, and with half-landings at the bottom of each flight of twelve or fourteen steps. The lower flights should be widened in proportion to the number of persons poured into them at different levels: thus, if a stair for four hundred persons be four feet six inches wide — the Paris Regulations fix four feet eleven inches as a minimum width — they should be increased by six inches for every one hundred persons up to a maximum of nine feet.[1] Wherever they are crowded it is as desirable to avoid too wide stairs (more especially when long, unless a central rail be provided) as it is in spiral stairs or winders. Relief should be sought rather by increasing the exit facilities in the shape of isolated extra stairs than by widening one or two. For schools, three feet six inches to four feet is the maximum width. The rule for such should be broad, wide landings and narrow stairs.[2]

[1] Report of Committee of Austrian Society of Engineers and Architects. Memo. by Prussian Academy of Architecture. Rules of the Metropolitan Board of Works.
[2] E. H. Robson's "*School Architecture.*"

LIGHT.

All staircases, more especially at the commencement and landings, should be thoroughly well lighted by an equally diffused light penetrating every corner. Where this cannot be attained by windows in the outer walls, a lantern light is the best substitute, and the well-hole should be sufficiently large to allow of the rays reaching to the lowest floor. Nothing can excel the power of vertical illumination. We see this illustrated better, perhaps, than anywhere else on looking up through one hundred and fifty feet to the "eye" of the Pantheon, every square foot of which we know satisfactorily lights three thousand cubic feet of space. Windows are, however, much to be preferred, where they can be got, for their cheerfulness, for their chances of a pleasant prospect, if stained glass has been sparingly used, for the sun's rays if the aspect happens to be good (though no one will sacrifice the rooms to secure this), and for the thorough ventilation obtained. "Dark staircases are unhealthy and dangerous."[3]

VENTILATION.

Staircases, more especially in town houses, must be thoroughly well lighted. Smells ascend through this central shaft to every room in the house with uncomfortable rapidity. To provide for their extraction if present, and to prevent their access is the first consideration. It is therefore essential that: (1) No sanitary appliances, unless they are carefully ventilated, be near it. (2) That the service of dinner should not pass through the principal or any bedroom stair.[4] (3) That the cooking-range in the kitchen should have a hood or chamber and extracting flues over for the speedy exit of smells. (4) That the kitchen itself be well ventilated and completely shut off by swing doors. (5) That the stair from the basement should not come up under the main stair, and that the dinner lift be well removed. Each room should have its own supply of air, and be independent of drawing any portion of its supply from the stair reservoir. This reservoir should be as often changed as possible, to prevent the contamination of the air in the upper apartments. Windows in the outer walls are best for this purpose. Where a lantern light is used — and this form is advantageous in protecting the house from darkness after a fall of snow — the sides should be made to open. An up-current may also be provided, and extracting ventilators used. It is very important that these matters should be attended to in the planning of staircases for hospitals, workhouses and structures of a like character. In the large tenements of flatted dwelling-houses erected in Scotland the practice of placing the stair in a central well having all the water-closets ventilated into it should, of course, be carefully avoided. Heat is always desirable for the staircases of private houses, either in the form of a cheery, open fire, or by a coil of pipes.

DECORATION.

On the architectural or decorative treatment of internal staircases we can scarcely touch further than we have already done. We may only mention that for magnificent examples of the application of veneering the walls with colored marbles, decorating the ceilings with exquisite stucco-work, or both with paintings in fresco, we naturally turn for inspiration to that Land of Art, Italy, where an exuberance of wealth makes selection a work of supererogation. For polychromatic treatment of the highest class we would cite the Library at Munich, and for panelled work, ornamental ceilings, or tapestry hangings, the staircases erected in our own country during the reigns of Elizabeth and James I. It is almost unnecessary to add that all colored decoration must be subordinated to the architecture of the staircase, and that it appeals to our good taste by possessing chasteness, simplicity and harmony.

CONCLUSION.

The staircase is an essential component part of nearly every domestic structure. It is the central and principal feature. Presenting many complex problems, and occupying a conspicuous position, it affords full scope and is well worthy the display of ingenuity, of happy disposition, and of that combination of constructional strength and quiet, harmonious, artistic beauty, which here, if anywhere in a dwelling, indicate the ability of the designer. The axiomatic, pithy brevity of Wotton, whose admirable precepts Professor Cockerell says "are amongst the most precious in our language," we cannot do better than conclude with, as embodying in a quaint, condensed form the leading principles at least which all ought to bear in remembrance. "Staircases must have a very liberal light, against all casualty of slips and falls. The space above the head must be large and airy, which the Italians used to call *un bels-fogolo*, as it were good ventilation, because a man doth spend much breath in mounting. That the half paces be well distributed at competent distances for reposing on the way. That to avoid encounters, and, besides, to gratifie the beholder, the whole staircase have no nigard latitude."

A PLATE-GLASS INSURANCE DID NOT COVER THE LOSS.— A jeweller in Frankfort had his plate-glass window insured. In putting up an awning a small screw was put in the edge of the plate of glass; the screw became so expanded that it finally split the plate. The company refused to pay a claim for damages and two courts have given a verdict in its favor, the plaintiff having been guilty of culpable carelessness.— *The Spectator.*

[3] Captain Douglas Galton's "*Healthy Dwellings.*"
[4] Kerr's "*English Gentleman's House.*"

CIRCULAR OF THE TRUSTEES A. I. A., IN THE MATTER OF COMPETITIONS.

AMERICAN INSTITUTE OF ARCHITECTS,
SECRETARY'S OFFICE, 10 CATHERINE ST.,
NEWPORT, R. I., July 2, 1884.

Sir, — At a meeting of the Board of Trustees, A. I. A., held at the Institute Room, Bryant Building, New York, on Wednesday, June 18, 1884, I was instructed to call the attention of all Fellows and Associates to an "open letter to the profession," presented by the editors of the *American Architect and Building News,* in their issue of April 5, 1884. This "open letter" relates to the much-discussed subject of competition, and is hereto appended.

The Trustees request you to consider the points discussed in this letter from the standpoint of your own views and experiences in connection with competitions, both open and limited, and communicate the result of such consideration to the Secretary of the A. I. A.

This request is based upon intimations received from several Chapters of the Institute, that it seems to them advisable that some action in the premises be taken by the National body as represented by its Board of Trustees. Before taking such action the Board is desirous of becoming more fully informed upon individual opinions. You will therefore confer a favor and materially assist the Trustees in their investigation of the subject by sending any information that you may be willing to impart to the office of the Secretary, on or before September 15, 1884.

[*From American Architect and Building News, April 5, 1884.*]

COMPETITIONS: AN OPEN LETTER TO THE PROFESSION.

[THE *Builder* for March 15 contains a statement to the effect that the Committee on Competitions of the Royal Institute of British Architects has just issued a circular to the architects of the United Kingdom, inviting them to pledge themselves not to take part in a public competition unless the award is to be made with the aid of a professional adviser. This emboldens us to lay before the profession in this country a somewhat similar but broader proposition, which we drew up some months ago, but until now have hesitated to make it public. We now present it to the profession, and as, in spite of its crudity, it may be the starting-point of a much-desired reform, we beg our readers to give it their earnest consideration, and communicate to us the conclusion they arrive at. We here subjoin our proposition in the form of an open letter.—EDS. AMERICAN ARCHITECT.]

THE PROPOSITION.

MR. ——, *Architect:* —

Dear Sir, — Will you kindly read and consider the following suggestion for a coalition of the architects in this country in the matter of competitions, and notify us of your willingness to join in any such movement, or your objections to it if you cannot approve of such a coalition.

It is to be understood that this information is sought by the editors for their *private* information, and not *in any way for publication.* It is, rather, the preliminary step to some, at present undetermined, scheme for mutual protection in the matter of competitions.

Very truly yours, THE EDITORS.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — On the supposition that an alliance of the architects of the United States and Canada, for their mutual protection in the matter of competitions for architectural designs can be effected without giving rise to possible objectionable features of trades-unionism, I hereby inform the editors of the *American Architect* for their *private* information that, in the event of such a coalition being assented to by a majority of members of the profession, I would thereafter absolutely abstain from taking part in any public competition, or any limited competition for a public building, in which the building-committee or other responsible party issuing the invitation to compete did not pledge itself as follows: —

1. To issue a programme prepared with the help of an architect, such architect or his partners to be debarred from competing.

2. To have at least one architect as member of the jury of award, such architect to have the casting vote in event of a tie.

3. To assure to the architect securing the award of the jury the execution of his design (if the building is built) at the regular compensation of five per cent on the entire cost of the work.

4. To make no use whatsoever of rejected designs, but to return all such to their authors without loss of time.

5. To pay to the successful architect, in case it is found necessary to abandon the project, the commission regularly charged for so much of the usual professional work as has actually been performed by him, such charge being the usual percentage computed on the estimated cost of the design which it is now found inadvisable to carry into execution.

(SIGNED.)

The term "public building," as used in the "open letter," is understood by the Trustees to refer to all national, State, county and municipal edifices, but does not refer to buildings erected through the enterprise or munificence of individuals or associations.

Respectfully submitted for the Board of Trustees,

GEORGE C. MASON, JR.,
Secretary A. I. A.

[WE understand that the above circular has been addressed to all the architects of the country, irrespective of their membership in the Institute, and we trust, now that the proposition appears once more under a *cachet,* which seems to promise effective work, that the responses will be more cordial and numerous than before.—EDS. AMERICAN ARCHITECT.]

SHINGLING EYE-BROW DORMERS.

OMAHA, NEB., June 26, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Will you kindly state how the "eyebrow" dormers are shingled-up with the roof to prevent leakage, and make a good permanent job. Truly yours, G.

[THE roof boarding is bent over the "eyebrow dormers," and the shingles or tiles carried over without any break. They are very tight.—EDS. AMERICAN ARCHITECT.]

THE *AMERICAN ARCHITECT* A "DUDES'" ORGAN.

TOPEKA, KAN., July 17, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Years ago I began to take the *American Architect,* first to see what would come of it, after the many failures in this direction. I continued my subscription because I thought that an honest effort was being made to give us an architectural paper that would be alike to all men; then came a period during which I was unable to assign a reason why I took the paper, except it might be that of habit. This period was followed by one during which it was the sole representative of the semi-idiotic vagaries and the dudeism in architecture, and I prized it as a curiosity; and now at the close of the fifteenth volume I find myself prizing it as the only paper ever published that can put forth page upon page of "midnight scenes in New Jersey," and make people believe that they are pictures.

I trust that you will be able to make them even more complete in your next issue by adding a touch of the realistic in the shape of a New Jersey mosquito. For the sake of the uninitiated, please label them, "This is the shadow of a Music Hall," or it might be mistaken for the man with a wart on his nose. *Vide* — that tower.

Truly yours, L. M. WOOD.

[WE always appreciate criticism even when it comes disguised in the shape of "Western humor." Whatever may be Mr. Wood's reason for continuing his subscription, our publishers will always send him a receipt for his money.— EDS. AMERICAN ARCHITECT.]

THE TRAP-VENT LAW.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — I am building a house in a city, in which special trap-ventilation is enforced by law. The owner is obliged to economize painfully in order to be able to build the house at all. We have "cut down" in every detail from foundation to roof, and omitted every luxury to bring the building within the required limits. We are considerably troubled by the trap-ventilation law, which puts us to a large expenditure without any gain that we can see.

It is necessary to have a flat sink in the attic connected with a studio; but there is no other fixture in or above this story; yet owing to the trap-vent law, we are obliged to spend a large amount in carrying vent-pipes to a point above the sink, though the traps are perfectly secure against siphonage without such ventilation. Some of the traps are necessarily at ends of the house opposite to the stack having the attic sink; but as their waste-pipes ultimately discharge into it, these traps must by the law have a separate stack of vent-pipes running up to the roof, or else very long and equally expensive lateral run on account of this sink. There is a water-closet in the second story, but it is of a kind which produces but very slight siphonic action on traps below, so slight in fact that an ordinary 4″ round trap would easily retain its seal indefinitely under its influence.

We protest against the law which we are certain does in a very great majority of cases much more harm than good. Few people understand enough about plumbing to know of the unnecessary expense they are put to by this law. The plumbers, though aware of the evil, are not so directly the losers by it as to induce them to make a strong effort towards its cure.

Will you not kindly insert this, and invite an expression of opinion upon the subject from your patrons. If I am wrong in supposing the trap-vent law is a mistake, I am quite anxious to know on what grounds. Yours respectfully, "A."

[WE do not see that "A" can do anything else than lament that his client was obliged to build while the present Procrustesian plumbing law was in force, the more that we believe the time is not far off when it will no longer be necessary to hew things to fit exactly the official pint-pot. — EDS. AMERICAN ARCHITECT.]

WOMEN AS ARCHITECTS. — Mr. Charles F. Wingate, former editor of the *Sanitary Engineer,* urges women to become architects because the profession "is not arduous, and is well suited to feminine tastes, habits and strength." On the evidence of this statement we take the liberty of questioning Mr. Wingate's knowledge of what constitutes the work of a practising architect, and also his capacity of gauging the strength of the ordinary woman, for we can hardly suppose he does not comprehend the meaning of the word "arduous." A certain portion of an architect's work is, however, well suited to a woman's capacity, and we wonder that more women do not fit themselves for the practice of some of its branches, but we hope few will be lead astray by such inconsiderate and mischievous advice as Mr. Wingate's.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

301,850. KNOB-ATTACHMENT.—Joseph Bardsley, Newark, N. J.
301,856. HANGING BELLS. — Gardiner Campbell, Milwaukee, Wis.
301,862. BURGLAR-ALARM. — John B. Chase, Aurora, Ill.
301,868. SUPPLY-APPARATUS FOR WATER-CLOSETS. — Henry Dawson, Worcester, Mass.
301,885. FIREPLACE. — Egbert Dewey Haven, Albany, Oreg.
301,893. ELEVATOR-HATCHWAY OPENING MECHANISM. — Martin W. Hoben, Cohoes, N. Y.
301,899. SHUTTER-WORKER. — William Kaufman and Abraham Kaufman, New York, N. Y.
301,904. CHIMNEY. — Chas. B. Loveless, Worthington, Minn.
301,923. FIRE-ESCAPE. — Joseph Reisdorff, Cottleville, Mo.
301,932. VALVE FOR WATER-CLOSETS. — William Smith, San Francisco, Cal.
301,970. KEY-HOLDER.—Robert Duerr and George F. Rohn, Milwaukee, Wis.
302,003. HYDRAULIC ELEVATOR.—Albert F. Knorp, San Francisco, Cal.
302,022. BASIN-FAUCET. — John M. Peck, New Haven, Conn.
302,030. FIREPLACE STOVE. — James D. Richards, Patriot, Ind.
302,058. HINGE-MORTISE MACHINE. — Joseph D. Thurston, South Union, Me.
302,059. FIRE-ESCAPE. — Joseph H. Townsend and Edward A. Dubey, Brooklyn, N. Y.
302,064. VENTILATION FOR BUILDINGS. — Henry Vollweiler, Brooklyn, N. Y.
302,067. SCREW-DRIVER.—Alfred D. Wallen, Mendham, N. J.
302,078. ELEVATOR. — Jacob Wimenour, Washington, Ind.
302,092. VENTILATOR-CAP.— Joseph M. Bing, Millville, N. J.
302,095. WEATHER-STRIP. — Gustav Burkhardt, Homer, Ill.
302,102. FOLDING SCAFFOLD. — Dennison P. Chesebro and William S. Whitman, New York, N. Y.
302,106. CLAMP. — Alva M. Colt, Batavia, N. Y.
302,110. WASTE-PIPE PROTECTOR.—Hirsch S. Danziger, Chicago, Ill.
302,140. OVERFLOW-TRAP FOR WASH-BASINS, BATH-TUBS, ETC. — William T. Jebb, Buffalo, N. Y.
302,149. BURNING BRICK, TILE, ETC. — John K. MacIver, Detroit, Mich.
302,151. FIRE-ESCAPE.—Christian E. Metzler, Philadelphia, Pa.
302,172. SELF-CLOSING HATCHWAY. — Richard D. Thackston, St. Louis, Mo.
302,180. CRANE. — Samuel T. Wellman, Cleveland, Ohio.
302,183. HANDLE FOR CROSSCUT-SAWS. — John Quincy Adams, Jr., Blanchard, Mich.
302,210. STEAM-BOILER FOR HEATING PURPOSES. — Frank H. Pulsifer, Auburn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

ADDITIONS AND ALTERATIONS. — Wm. F. Weber, architect, has prepared plans for additions and alterations to store, 58 and 60 Lexington St., to cost $9,400; Geo. Bunnecke, builder.

BUILDING PERMITS. — Since our last report twenty permits have been granted, the more important of which are the following: —

E. Brichard, three-st'y brick building, s s Chew St., s w cor. Chapel St.

Albert Mahone, 8 two-st'y brick buildings (square), w s Vincent Alley, between Townsend and Mosher Sts.

Mary H. Popp, three-st'y and mansard brick building, s e cor. Ensor and Mott Sts.

St. Michael's School, three-st'y brick building, w s Wolfe St., between Baltimore and Lombard Sts.

G. L. Hesenauer, three-st'y brick building, e s Exeter St., between Lombard and Watson Sts.

E. W. Gorman, 12 two-st'y brick buildings, e s Patterson Park Ave., commencing n e cor. Jefferson St.; 6 two-st'y brick buildings, s e Jefferson St., commencing s e cor. Castle St.; and 10 two-st'y brick buildings, e s Castle St., s of Jefferson St.

Louis Grebb, two-st'y brick building, 31' x 44', and one-st'y brick building, 33' x 120', s s Boston St., opposite Burke St.

J. J. Underhill, two-st'y brick building, 31' x 44', and one-st'y brick building, 33' x 120', s s Boston St., opposite Burke St.

Boston.

BUILDING PERMITS. — *Wood.* — *Auburn St., No.* 20, Ward 19, for Mrs. Mary E. Cowdrey, dwell., 12' x 15' and 24' x 42', two-st'y pitch; Henry C. Allen, builder.

Emerson St., near L St., Ward 14, for Wm. T. Eaton, dwell., 7' x 11' and 21' 6" x 42', two-st'y pitch; Wm. T. Eaton, builder.

East Fifth St., near L St., Ward 14, for Wm. T. Eaton, dwell., 7' x 11' and 21' 6" x 42', two-st'y pitch; Wm. T. Eaton, builder.

High St., near Ericsson St., Ward 24, for John E. Tuttle, dwell., 27' and 32' x 37', two-st'y mansard; Wm. T. Eaton, builder.

Webster St., Nos. 82 *and* 84, Ward 2, for Mr. Galligan, 2 dwells., 22' x 35', three-st'y flat; C. & J. Etridge, builders.

Winship St., e s, near Cambridge St., Ward 25, for Catherine Phelan, 2 dwells., 12' 6" and 15' 6" x 34', two-st'y pitch; James Keefe, builder.

Waumbeck St., near Winona St., Ward 21, for Nathan S. Wilbur, dwell., 19' 2" and 30' x 46' 4", two-st'y pitch; Nathan S. Wilbur, builder.

Sharon St., n s, near Brown Ave., Ward 23, for Henrietta Wilson, dwell., 26' 6" x 31' 6", two-st'y pitch; W. S. Mitchell, builder.

Nelson St., near Corbel St., Ward 24, for Hezekiel G. Ufford, dwell., 22' 3' x 28', two-st'y pitch; Miletus H. Jackson, builder.

Magnolia St., No. 34, Ward 20, for J. S. Wilson, dwell., 22' x 50', two-st'y pitch; C. E. Currier, builder.

Court Sq., off Rand Sq., Ward 20, for John C. Kelley, dwell., 20' x 42', three-st'y flat; Chas. A. Jefferson, builder.

Savin St., No. 3, Ward 21, for Lorenzo Vose, dwell., 14' x 19' and 21' x 30', two-st'y pitch; Lorenzo Vose, builder.

Brooklyn.

BUILDING PERMITS. — *Reid Ave.*, e s, 50' s Halsey St., two-st'y brick dwell., tin roof; cost, $3,500; owner, Mrs. J. Walter Stoops, Putnam Ave., near Reid Ave.; architects and builders, McKee Bros.

Newell St., e s, 195' n Norman Ave., 5 three-st'y frame tenements, gravel and tin roofs; cost, each, $4,000; owner and carpenter, R. B. Riker, 102 South Third St.; mason, G. F. Burns.

Palmetto St., n s, 125' e Central Ave., three-st'y frame dwell., tin roof; cost, $5,000; owner, Miss Kate Austin, 2212 Second Ave., New York; builder, B. Morgan.

Twenty-third St., s s, 125' w Fourth Ave., three-st'y frame tenement, tin roof; cost, $4,500; owner, L. A. Tooker, 249 East One Hundred and Seventeenth St., New York; builder, John Sorenson.

Greenpoint Ave., No. 165, n s, 275' e Manhattan Ave., four-st'y brick store and tenement, tin roof; cost, $8,000; owner, Susanna Reiss, 157 Greenpoint Ave.; architect, J. Mullhall; builders, J. Hatford and Post & Walker.

Graham Ave., n e cor. Powers St., two-st'y brick bakery, gravel roof, brick and stone cornice; cost, $20,000; owner, A. B. Herstmann, on premises; architect, Th. Engelhardt.

Powers St., Nos. 175 *and* 177, n s, 100' e Graham Ave., three-st'y brick stable, gravel roof, brick and stone cornice; cost, $10,000; owner and architect, same as last.

Monroe St., s s, 175' e Throop Ave., 3 two-st'y brown-stone dwells., tin roof; cost, each, $4,000; owner, etc., W. J. C. Miller, 299 Sumner Ave.

Flushing Ave., s s, 80' 4" w Garden St., 3 three-st'y frame tenements, tin roofs; total cost, $11,400; owner, Sigmund Jacobi, 732 Flushing Ave.; architect, Frank Holmberg; builder, Wm. Hellmann.

St. James Pl., w s, 120' s De Kalb Ave., 3 three-st'y brick dwells., tin roofs; cost, each, $5,000; owner, Jas. Callihan, 321 Washington Ave.; builder, Joseph I. Kirvy.

Graham Ave., Nos. 359 *and* 361, n w cor. Conselyea St., 2 three-st'y frame stores and tenements, tin roofs; cost for both, $9,500; owner, Louisa Haupert, 209 Frost St.; architect, Th. Engelhardt; builder, Jacob Schoch.

Grand St., n e cor. Catherine St., three-st'y frame store and tenement, tin roof; cost, $4,900; owner, James Follmer, cor. Grand St. and Bushwick Ave.; architect, Th. Engelhardt; builders, Young & Lamb.

Central Ave., No. 130, w s, 125' n Myrtle St., three-st'y frame store and tenement, tin roof; cost, $4,000; owner, Barbara Winkler, 91 Evergreen Ave.; architect, Th. Engelhardt; builders, Frank Blatz and John Rueger.

Chicago.

STORES. — Adler & Sullivan are architects of the six-st'y store-building, 68' x 171', to be built on Randolph St., near Wabash Ave., for Martin Ryerson; Lake Superior brown-stone, iron, and plate glass; cost, about $125,000.

Adler & Sullivan have just completed plans for a six-st'y business-building on Market St., between Madison and Monroe Sts., 80 feet square, Lake Superior brown-stone, Anderson pressed-brick, iron and glass; probable cost, $90,000; owner, A. F. Troescher, of New York.

BUILDING PERMITS. — Soper Lumber Co., two-st'y office and dwell., 733 Laflin St.; cost, $4,500.

Belden Ave. Presbyterian Church, church, 195 Belden Ave.; cost, $4,500.

H. D. Warner, three-st'y dwell., Prairie Ave.; cost, $3,000; architects, Burnham & Root.

P. Buehrle, three-st'y store and flats, 274 Division St.; cost, $5,000; architect, N. Gerten.

J. Schipper, two-st'y store and dwell., California Ave.; cost, $4,000.

G. Kreig, two-st'y dwell., 815 Twelfth St.; cost, $2,500.

P. McMahon, three-st'y barn, 46 and 48 Fourth Ave.; cost, $13,000.

C. Zuber, three-st'y store and flats, 755 Halsted St.; cost, $6,000; architect, F. Beiln.

M. A. Delaney, two-st'y dwell., 537 Hurlbut St.; cost, $5,000; architect, J. Otter.

P. Schoenhofen, three-st'y store and dwell., Milwaukee Ave., cor. Ashland Ave.; cost, $50,000; architect, H. Kley; builder, F. Hanson.

N. Hurlbut, two-st'y dwell., 476 and 478 Belden Ave.; cost, $10,000; architect, H. L. Gay; builder, J. Pedgrift.

C. L. Lowe, two-st'y dwell., 720 Chicago Ave.; cost, $2,600.

D. H. Bacon, 2 two-st'y dwells., 3201 and 3203 Rhodes Ave.; cost, $8,500; architect, Brauch.

A. Lendgreen, two-st'y flats, Sedgwick St.; cost, $4,000.

C. Thiet, three-st'y dwell., Wells St.; cost, $5,000; architect, A. F. Boos.

J. W. Maynard, 2 three-st'y dwells., 889 and 891 Adams St.; cost, $12,000; architects, J. M. Van Osdel & Co.

F. Paus, two-st'y dwell., 3039 Bonfield St.; cost, $2,500.

Brown Bros. M'f'g Co., three-st'y factory, 69 and 71 West Jackson St.; cost, $24,000; architect, C. M. Palmer.

H. Sheeler, two-st'y dwell., 237 Third Ave.; cost, $4,000.

A. Hanson, three-st'y flats, 558 Wells St.; cost, $6,500; architect, P. W. Anderson; builder, G. Brown.

R. Degrazzio, addition, 206 Sangamon St.; cost, $3,100.

M. A. Waters, two-st'y flats, 2943 South Park Ave.; cost, $5,000; architect, M. L. Beers.

J. Hlavacek, three-st'y store and dwell., 446 Twelfth St.; cost, $6,000.

P. Stanek, two-st'y dwell., 667 Centre Ave.; cost, $3,500.

Kokes & Smreka, 2 two-st'y stores and dwells., 811 and 813 Ashland Ave.; cost, $11,000.

D. Cameron, two-st'y dwell., 902 Monroe St.; cost, $5,000.

M. Gross, two-st'y flats, 342 Rush St.; cost, $5,000.

C. Hulvan, three-st'y flats, 681 Madison St.; cost, $10,000.

C. Obery, three-st'y flats, 200 May St.; cost, $4,500; architect, L. Berge.

J. H. Ramsfeld, three-st'y flat, 125 Townsend St.; cost, $5,400; architect, J. Otter.

J. Johnson, 6 cottages, Hirsch St., cor. Leavitt and Shober Sts.; cost, $7,000.

Gottfried Brewing Co., five-st'y brewery, 2231–2235 Stewart Ave.; cost, $100,000.

A. F. Troescher, six-st'y warehouse, 117–123 Market St.; cost, $70,000.

E. B. Case, two-st'y dwell., 546 Jackson St.; cost, $6,500.

F. Hoenmichel, 2 three-st'y stores and dwells., 636 and 638 Blue Island Ave.; cost, $14,500; architect, P. V. Ruehl.

J. Bartel, two-st'y dwell., 173 and 175 Rumsey St.; cost, $3,000.

M. Kussmann, two-st'y dwell., 995 Blue Island Ave.; cost, $3,000.

H. Byrne, 2 three-st'y dwells., 2628 and 2630 Wabash Ave.; cost, $18,000; architect, C. Chapman.

J. L. Stagg, 3 two-st'y dwells., 152–158 Leavitt St.; cost, $10,000; builder, J. C. Anderson.

C. Unmach, two-st'y dwell., 278 North May St.; cost, $6,000; architects, Fromann & Jebson.

A. Syvesson, three-st'y dwell., 340 West Erie St.; cost, $5,000.

M. & J. Dillon, two-st'y dwell., 3133 Wentworth Ave.; cost, $3,500.

Chicago City Railway Co., addition to barn, 2900–2916 Pitney St.; cost, $6,500; builder, A. B. Cook.

H. Teil, three-st'y store and flats, Archer Ave.; cost, $16,000; architect, J. F. Debr.

City of Chicago, three-st'y engine-house; cost, $11,000.

C. Lange, two st'y dwell., 158 West Division St.; cost, $4,500.

M. Ryerson, six-st'y warehouse, 45 to 49 Randolph St.; cost, $50,000; architects, Adler & Sullivan; builders, Barney & Rodatz.

Cincinnati.

STORE.— H. W. Derby, Esq., is to build a new store and office building, south-east corner of Fourth and Elm Sts.; the lot is 79' on Fourth St. by 140' on Elm; the building will be seven stories high, will cost about $100,000, and is in charge of Samuel Hannaford, architect.

BUILDING PERMITS.—A. Kessel, one-st'y brick dwell., 431 Vine St.; cost, $3,500.

Mike Joker, one-and-one-half brick dwell., Mickens Ave.; cost, $10,000.

Lev. Baumgarten, three-and-one-half-st'y brick dwell., 107 East Second St.; cost, $3,000.

J. B. Washburn, three-st'y brick dwell., cor. Blue Rock and Terrel Sts.; cost; $9,000.

J. H. Thowar, three-st'y brick dwell., 472 George St.; cost, $5,000.

A. B. Ritterman, two-and-one-half-st'y brick dwell., cor. Ohio Ave. and Calhoun St.: cost, $6,000.

J. H. Hulvershorn, two-and-one-half-st'y brick dwell., 141 Loth St.; cost, $4,000.

H. Wrigman, three-st'y brick dwell., Dandridge St.; cost, $5,500.

John Dorscher, three-st'y brick dwell., cor. Twelfth and Jackson Sts.; cost, $2,500.

T. F. Moore, two-st'y frame dwell., Gilbert Ave.; cost, $3,500.

H. W. Derby, seven-st'y brick dwell., cor. Fourth and Elm Sts.; cost, $40,000.

Baptist Church Congregation, cor. Kemper Lane and McMillian St.; cost, $15,000.

Mrs. Stauder, three-st'y brick dwell. cor. Liberty and Elm Sts.; cost, $4,000.

A. H. Hosenmeyer, three-and-one-half story brick dwell., Mulberry St.; cost, $5,400.

Anchor White Lead Co., two-st'y brick building, Culvert St., bet. Fourth and Fifth Sts.; cost, $3,500.

Paul Brungman, two-st'y frame dwell., cor. Spring and Locust Sts.; cost, $3,000.

Morris White, four-st'y brick dwell., cor. Court and Vine Sts.; cost, $18,000.

E. B. Guinn, two-and-one-half-st'y brick dwell., cor. Corry and Jefferson Sts.; cost, $3,000.

James Loner, two-st'y brick dwell., cor. Cutter and Lime Sts.; cost, $5,000.

Louis Glenn, two-st'y frame dwell., 480 Easter Ave.; cost, $2,000.

Jas. Oker, four st'y brick dwell., 735 Central Ave.; cost, $8,000.

John Goror, four-st'y brick dwell., 365 State Ave.; cost, $2,500.

Thos. Burke, two-st'y brick dwell., cor. Lane and Locust Sts.; cost, $3,200.

John Kilgour, three-st'y brick dwell., cor. Hatch St. and Observatory Road; cost, $6,000.

L. Haggerson, two-and-one-half-st'y frame dwell., Camp Washington; cost, $2,800.
Total amount to date, $190,000.
Total number of permits to date, 506.
Repairs, $11,500.

New York.

STORES. — For Dr. Aaron Wright a three-st'y and basement store, 20' x 50', stone and iron front, is to be built at No. 9 Bleecker St., from designs of Mr. Frederick C. Withers.

For Mr. S. Morris a six-st'y and basement warehouse, 18' 9" x 100', is to be erected at No. 127 Broadway, with brick, stone and iron front, from designs of Mr. Alfred Tucker.

STRIKE. — The building business, which has been very quiet, is likely to be still more retarded by the bricklayers' and laborers' strike which was started on Monday.

BUILDING PERMITS. — *First Ave.*, s w cor. Seventy-first St , 5 four-st'y brick stores and tenements, tin roofs; cost, each, $15,000; owner, Jacob Wick, Jr., 508 East Eighty-seventh St.; architect, J. Brandt.

West Eighteenth St., No. 429, five-st'y brown-stone tenement, tin roof; cost, $16,500; owner, Elizabeth Seitz, 18 Beekman Pl.; builder, J. Brandt.

Eighty-seventh St., n s, 275' w Ninth Ave., 7 three-st'y brick and brown-stone dwells., tin and slate roofs; cost, each, from $10,000 to $12,000; owner, C. L. Guilleaume, 56 East Seventy-sixth St.

East Seventy-seventh St., No. 247, five-st'y brick and brown-stone tenement, tin roof; cost, $18,000; owner, John McCahey, on premises; architects, A. B. Ogden & Son.

West Eighteenth St., No. 8, four-st'y brick and brown-stone dwell., mansard tin roof; cost, $30,000, owner, Mrs. Margaret K. Parker, 4 East Twelfth St.; architect, E. D. Lindsey; builder, J. J. Tucker.

West St., foot Hubert St., on bulkhead and pier, one and two st'y corrugated-iron freight-shed, tin roof; cost, $40,000: owner and architect, Pennsylvania R. R. Co., by E. F. Brooks, Engineer, Jersey City.

West Twenty-seventh St., No. 9, four-st'y brick store warehouse, tin roof; cost, $55,000; owner, W. Y. Mortimer, 31 West Thirty-fourth St.; architects, Babcock & McAvoy; builder, Lewis Adams.

Bowery, Nos. 39-43, 3 five-st'y brick stores, tin roofs; cost, each, about $12,000; owners, Gertrude W. Dodd and Annie C. Ward, Dr. B. L. Ward, att'y, West Orange, N. J.; architect, J. P. Leo; builders, P. Tostevin's Sons.

East Eighty-fourth St., No. 126, five-st'y brown-stone tenement, tin roof; cost, $15,000; owner, John Spiess, Jr., 164 East Eighty-sixth St.; architect, J. Brandt.

West Eighty-fourth St., Nos. 366-370, 3 four-st'y Connecticut brown-stone dwells., tin roofs; cost, each, $15,000; owner. Terence Kiernan, 317 East Eighty-third St.; architect, F. F. Ward.

One Hundred and Fifth St., s s, 275' e Grand Boulevard, 5 three-st'y brown-stone dwells., tin roofs; cost, each, $10,000; owner, architect and builder, John F. Moore, 427 West Fiftieth St.

Attorney St., No. 127, four-st'y brick cigar-box factory, gravel roof; cost, $4,500; owner, Mrs. Catharine Livingston, 61 West Thirty-ninth St.; architects, D. & J. Jardine.

Twelfth Ave., s w cor. One Hundred and Thirty-first St., one-st'y brick store, tin roof; cost, about $5,000; lessee, Henry N. Vedder, One Hundred and Thirty-eighth St. and Hudson River; architect, A. Spence.

Eightieth St., s s, 95' w Madison Ave., 3 four-st'y brick and brown-stone dwells., mansard tin roofs: cost, each, $33,000; owner, Anthony Mowbray, 104 East Eighty-fifth St.: architects, J. B. McElfatrick, Sons & De Baud; builder, Wm. Mercer.

Second Ave., n w cor. One Hundred and Fourth St., 4 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, David Stevenson; architects, Thom & Wilson.

Courtland Ave., s w cor. One Hundred and Fifty-second St., three-st'y brick tenement, tin roof; cost, $10,400; owner, Laura A. Peter, 311 Eighteenth St., Brooklyn; architect, A. Pfeiffer.

One Hundred and Thirty-first St., s s, 90' w Sixth Ave., 4 three-st'y brown-stone front dwells., tin roofs; cost, each, $10,000; owner, Samuel P. Wright, 150 West One Hundred and Thirtieth St.; architect, W. S. Jennings.

One Hundred and Thirty-first St., s s, 157' 6" w Sixth Ave., 4 three-st'y brown-stone front dwells., tin roofs; cost, each, $10,000; owner, Stephen J. Wright, 201 West One Hundred and Thirtieth St.; architect, W. S. Jennings.

Rivington St., No. 189, five-st'y brick tenement, tin roof; cost, $18,000; owner, Adolph Pawel, 335 East Seventy-ninth St.; architect, Wm. Graul.

Madison Ave., No. 600, six-st'y brown-stone dwell., tile and tin roof; cost, $50,000; owner, Dr. Theodore G. Thomas, 294 Fifth Ave.; architect, Bruce Price.

Concord Ave., e s, 279' s One Hundred and Sixty-fourth St., 2 three-st'y frame dwells., tin roofs; cost, $2,800 and $3,700; owner, Joseph Schaub, Gerard Ave., cor. One Hundred and Fifty-sixth St.; architect, Wm. Kusche.

Second Ave., e s, 100' 11" n One Hundred and Eighteenth St., five st'y brick tenement, tin roof; cost, $25,000; owner and builder, James Wood, 341 East One Hundred and Sixteenth St.; architect, M. V. B. Ferdon.

ALTERATIONS. — *Sixteenth St.*, n s, 160' e Eighth Ave., two-st'y brick extension, tin roof, iron columns in basement; cost, about $11,000; owner, Sixteenth Baptist Church, C. J. Day, President, etc., 23 West Twelfth St.; architect, J. Rogers.

Essex St., n w cor. Essex Market Pl., internal alterations, enlarging court-room, etc.; cost, $10,000; owner, City of New York, H. O. Thompson, Commissioner Public Works; architect, Douglas Smith.

William St., No. 158, raise two stories and a six-st'y extension, tin roof; cost, $10,000; agent for owner, E. R. Robinson, 159 Broadway; architect, Geo. B. Post; builder, not selected.

Eighth Ave., No. 131, raise one-st'y and a five-st'y brick extension, tin roof; cost, $6,000; owner, Matilda Alexander, 309 West Fifty-first St.; architect, M. C. Merritt.

St. Louis.

BUILDING PERMITS. — Sixty-four permits have been issued since our last report. Those worth $2,500 and over are as follows:—

Hampeter & Eckhoff, three-st'y furniture factory; cost, $7,000; Aug. Beinke, architect and contractor.

Dennis Connelly, 2 adjacent brick dwells.; cost, $4,000; O'Malley Bros., contractors.

Mr. Eberle, 2 adjoining two-st'y brick dwells; cost, $4,500; J. Seidhoff, contractor.

Church of the Unity, one-st'y brick chapel; cost, $4,000; Mortimer, architect; Bonsak, contractor.

Adeline M. Loehr, two-st'y brick dwell.; cost, $2,700; S. V. Mayors, contractor.

Jno. Mertz, 2 adjoining two-st'y brick dwells.; cost, $5,500; Herman & Schumacher, contractors.

J. Hermann, two-st'y brick dwell.; cost, $4,500; J. Hermann, contractor.

A Bollinger, two-st'y brick dwell.; cost, $3,000; A. Bollinger, contractor.

Geo. Kohmann, three-st'y mansard boarding-house; cost, $5,800; Johnsen, architect; V. Beckerle, contractor.

M. Berker, two-st'y brick dwell.; cost, $3,000; H. E. Peipers, architect; J. Keefe, contractor.

Wilson & McNary, 2 adjacent brick dwells.; cost, $6,700; J. V. Mayors, contractor.

Ella C. A. K. & Mary Lackland, 3 adjacent two-st'y tenements; cost, $4,000; S. Robbins, architect; J. C. Brockmier, contractor.

C. S. Grandjean, one-st'y mansard dwell.; cost, $3,000; C. Jupier, architect; Louis Yaeger, contractor.

Arnold Steinhugen, 2 adjacent one-st'y dwells.; cost, $3,000; C. F. May, architect; Louis Yaeger, contractor.

St. Louis Stamping Co., storage-house; cost, $2,500; A. Beinke, architect and contractor.

C. E. Cappelle, two-st'y stores and dwell.; cost, $4,900; G. I. Barnett & Son, architects; sublet.

H. Hemplemann, 2 adjacent dwells.; cost, $7,500; B. J. Goesse, architect; H. Heitmann, contractor.

C. Bergman, two-st'y dwell.; cost, $3,600; O. Koenig, architect; A. Fenner, contractor.

Jno. Droyer, two-st'y brick dwell.; cost, $1,000; Gaines, architect; Jno. Droyer, contractor.

G. M. Verno, 2 adjacent two-st'y dwells.; cost, $4,600; G. M. Verno, contractor.

Henry Staatz, two-st'y dwell.; cost, $3,600; Jos. Schuster, contractor.

Toledo.

ASYLUM CONTRACTS. — The long-talked-of asylum contract was finally awarded to M. J. Malone & Co. for a trifle less than $400,000. The price falling far below the appropriation, an addition of cellars and basements to the various buildings has been made at a cost of about $46,000. This, however, includes some changes in the heating, drainage, etc. Ground is being broken, and the time given for completing the work is about two and one-half years.

Mr. James Winans, a most competent civil engineer and superintendent, has been retained to take general charge of the entire work, and will give it his valuable service most of the time. Messrs. Malone & Co. rank as one of the oldest and most successful firms in this part of the country.

OFFICE BUILDING. — One-st'y brick office building, corner Superior and Madison Sts.; cost about $3,000; Miles & Horn, owners, architects and builders.

HOUSES. — Brick dwell., two-st'y and cellar, Nineteenth St., for S. Spear; cost about $6,000; S. Spear, builder.

Block of 5 brick dwells., two-st'y and cellar, 105' front, cor. Eleventh and Lafayette Sts.; Rayneer & Seagrave, owners; J. V. Saufleet, builder; cost, about $14,000.

Block of two-st'y brick and frame tenements, Superior St., for Mr. Hubbard; cost, about $7,000; Gibbs & Co., architects.

Two-st'y frame house for J. D. Ford, Esq., cor. Twelfth and Madison Sts.; cost, about $5,000; N. B. Bacon, architect; J. Hales, builder.

Two-st'y brick dwell., Madison St., for Mr. Mack; cost, about $6,000; A. Liebold, architect; Carl Schmul, builder.

Two-st'y brick dwell., cor. Twenty-third and Madison Sts., for S. C. Schenck; cost, about $16,000; N. B. Bacon, architect; A. Bently, builder.

Two-st'y frame house, Eleventh St., for John Winfield; cost, about $2,700; N. B. Bacon, architect; R. Hattersley, builder.

Two-st'y and basement brick dwell., Twelfth St., for Mr. Wober; cost, about $5,000; L. Welker, architect; R. Hattersley, builder.

Two-st'y frame dwell., Huron St., for R. Geysel; cost, about $2,500; N. B. Bacon, architect; A. Lombard, builder.

Two-st'y brick double dwell., Madison St., for Mr. P. H. Berdau; cost, about $11,000; N. B. Bacon, architect; J. B. Hassett, builder.

Two two-st'y brick dwells., Twenty-third St., for Jno. R. & Fred Boice; cost, about $8,000; N. B. Bacon, architect; John Valentine, builder.

General Notes.

ALBANY, N. Y. — Chapel at Albany Cemetery, stone; cost, $10,000; R. W. Gibson, architect; S. W. Eaton, contractor.

State Normal School on Willett St., stone and brick; cost, $145,000; Ogden & Wright, architects and contractors; Jas. Shattock, mason; Frederick McCann, carpenter; Sullivan & Ely, iron-work; Wasson & Martain, roofers; Lawrence & Stuart, painters and glaziers.

Henry Russel, Englewood Pl., additions and improvements; cost, $30,000; Ogden & Wright, architects; Pottier & Stymus, decorators; Jno. N. Parker, carpenter; Carr & Burdick, masons.

It is announced that the force of six hundred laborers on the new Capitol have been discharged, because of the exhaustion of the legislative appropriation.

BUFFALO, N. Y. — The Executive Committee of the Young Men's Association of this city, which some time ago offered prizes for the best plans for a new fire-proof building for their library, have awarded the first prize, $500, to C. L. W. Eidlitz, of New York; the second, $300, to H. H. Richardson, of Brookline, Mass., and the third, $200, to H. H. Wilcox, of Minneapolis, Minn. Mr. Eidlitz's plan is for a building of stone and brick, to cost $223,000, with a library-room with capacity for 283,000 volumes. It is expected that the foundation for the new building will be laid this coming fall. The site is the old Court-House property.

CAMBRIDGE, MASS. — A house for Mr. E. J. Mitten is being constructed on Lee Street, Cambridge, which will cost about $6,000; Mr. Daniel Appleton, of Boston, is the architect.

CUTHBERT, GA. — Mr. J. J. Flood, of Atlanta, is building the court-house. It will necessitate an outlay of $25,000.

LANCASTER, PA. — The board of directors of the Lancaster Cremation and Funeral Reform Association have awarded the contract for the building of their cremation furnace. It is to be of brick, 32' x 48', and will be located in the centre of a tract of three acres of land, in the southern part of the city.

MAMARONECK, N. Y. — The Mamaroneck people are to have a new Episcopal church, built of brown-stone, on the site of the present edifice.

MT. CLEMENS, MICH. — But little building is being done here this season.

Mr. E. J. Olde is building a $5,000 brick house.

A block of four stores is being built on Walnut Street, one owned by Mr. Wm. Bollensen, the other three by Bruno Van Landeghem & Son.

Mr. Geo. Murdock is building a brick cottage, from plans prepared by N. J. Gibbs, architect.

OWOSSO, MICH. — The committee for the building of a city-hall and engine-house have accepted plans prepared by N. J. Gibbs, architect, Mt. Clemens, Mich.; cost, $8,000.

PT. HURON, MICH. — The three-st'y brick block cor. Military and Water Sts. is being remodelled from plans by N. J. Gibbs, architect, Mt. Clemens, Mich.

REVERE, MASS. — Messrs. Rand & Taylor, architects, of Boston, have finished the plans for the alterations and additions to the church. The additions when completed will cost about $7,000.

SAG HARBOR, L. I. — The corner-stone of the new Christ Episcopal Church was laid on the 23d inst.

SLEEPY-EYE, MINN. — Griffith & Smith, proprietors of the Merchants' Bank, will build, on the cor. of Main and Fifth Sts., a two-st'y brick banking-house.

Fritz Koehne will build a business-building on Main Street the coming spring; as will J. P. Bertrand.

The Baptist Society will build a large church on Sixth St. this fall.

ST. PAUL, MINN. — George E. Schnell, two-st'y frame dwell., on the e s of Dayton Ave., between Kent and Mackubin Sts.; cost, $2,700.

Theodore Schurmeier, two-st'y frame dwell., on the n s of Tenth St., between Canada and Broadway Sts.; cost, $5,500.

Mrs. M. A. Hastie, two-st'y frame dwell., on the n s of Selby Ave., between Arundel and Mackubin Sts.; cost, $2,450.

O. E. Holman, two-st'y frame dwell., on the n s of Dayton Ave., between Kent and Dale Sts.; cost, $3,600.

Wm. Schornstein, two-st'y brick store-building and dwell.; also frame store-building on the n s of Hudson Ave., between Bates and Maria Aves.; cost, $5,000.

George Rochat, two-st'y brick and double store and dwell., on the w s of Seventh St., between Walnut and Sherman Sts.; cost, $12,000.

W. J. Gronewald, 4 one-st'y frame dwells., on the e s of Webster St., between James and Randolph Sts.; cost, $3,060.

Henry Justus, two-st'y frame double dwell., on the e s of Oak St., between Fifth and Sixth Sts.; cost, $3,640.

E. M. Hallowell, three-st'y brick carriage-manufactory, on the w s of Minnesota St., between Ninth and Tenth Sts.; cost, $14,000.

TRENTON, N. J. — The corner-stone of the Masonic Temple was laid July 15.

PROPOSALS.

RESERVOIR.
[At Danville, Ill.]
Sealed proposals for building a reservoir for the Danville Water Company, addressed to the undersigned, will be received at the office of the Company, in Danville, Ill., **until 5 o'clock, P. M., on Friday, August 1, 1884.**

Plans and specifications for the work can be seen at the office of said Company, or at the office of A. J. Guilford, Room 32, No. 171 Lasalle St., Chicago, Ill.
SAMUEL A. MILLER,
448 President The Danville Water Co.

SCHOOL-HOUSE.
[At Cheviot, O.]
Sealed proposals will be received at the office of Edward C. Reemelin, No. 49 West Third St., Cincinnati, O., **until 12 o'clock, M., of the 4th day of August, 1884,** for the erection and entire completion of a one-st'y addition to the school-house of Special School District, No 1, at Cheviot, O., according to the plans and specifications on file at said office. All bids to conform to the requirements of Section 3988 of the Revised Statues of Ohio. The Board reserves the right to reject any or all bids.
448 EDWARD C. REEMELIN, Clerk.

IRON BRIDGE.
[At Salem, N. J.]
Sealed proposals will be received by the Board of Chosen Freeholders of the County of Salem, **until the 13th day of August next, at noon,** for the building of an iron bridge over Salem Creek, at the city of Salem, in the County of Salem, State of New Jersey.

Specifications can be had by addressing the undersigned, and plans seen by calling on I. O. Acton, Geo. R. Morrison, or John P. Flynn, at Salem, N. J.

The Board reserves the right to accept or reject any or all bids. Address, JOHN P. FLYNN,
Clerk of the Board of Chosen Freeholders
449 of Salem County, N. J.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XVI. | No. 449.

AUGUST 2, 1884.

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CONTENTS.

THE letter of Mr. Wood published in our last issue perhaps deserves some notice at our hands. The insinuation that the *American Architect* is not "alike to all men" we suppose refers to the old accusation that it is published in the interest of members of the American Institute of Architects. As to this, we will only say that we find that up to the close of 1883 we had published designs contributed by four hundred and twenty architectural *firms*, while the membership of the Institute amounted at that time to one hundred and sixty-five *individuals*, — the total membership from the foundation only amounting to three hundred and seventy. Mr. Wood's special grievance, however, is our publication of "photo-caustic" prints from nature. These we freely admit are not satisfactory in every respect, and our attempt to use negatives furnished by amateurs or professional photographers in other cities unfamiliar with the requirements of the process, has reduced the average of excellence in a very undesirable degree. Still with all its deficiencies the process gives the grouping, mass, proportion and general effect of existing buildings in a way that cannot be shown better, except by photographs or gelatine prints, and we believe that as the process is perfected, as all processes are, less and less of the detail will be lost. Our belief has been that the publication of a single photo-caustic page with each issue might be a welcome relief from the monotony of pen-drawings. Still, we are open to correction.

WE are often asked why we do not publish more gelatine prints, such as the view of the North Easton Town-Hall, and not infrequently we hear laments that the "*Sketch Books*" were discontinued. We are ready and able at any time to print our illustrations from gelatine, the presses and men are ready, and there is an infinity of subjects. Why do we not do it, then? Simply because of our unbelief that our subscribers would be willing to pay for such illustrations. The "*Sketch Books*" contained forty-eight gelatine prints each year, and the subscription price was $6.00. The *American Architect* contains at present more than five times as many illustrations, to say nothing of the text, for the same price. Now it is not supposable that our subscribers would pay five times the present subscription for the sake of having gelatine prints, nor yet two-and-one-half times, at which price we might be willing to make the experiment. But as we may be quite in error, we will ask our subscribers in all seriousness how many of them would be willing to pay, say, one dollar more for the sake of having one gelatine print from nature added to our illustrations once each month? This question is worthy of an answer, as it might be possible to print a special edition for those who were willing to pay the extra charge, always supposing that a satisfactory number of subscribers are willing to incur the extra expense.

MR. SAMUEL SLOAN of Philadelphia, one of the best known architects in the country, died in Raleigh, North Carolina, July 19, at an advanced age. Although belonging, like other architects who began business fifty years ago, to a school which has ceased to excite commotion, in the artistic world, Mr. Sloan was one of the most distinguished of that school, and his career, in activity and usefulness, was one which the ablest of the younger generation might be glad to emulate. Indeed, many of the younger architects throughout the country owe something of their knowledge to the excellent books in which he sought to convey to others the results of his experience, and he deserves the credit of having been one of the first persons in the country to perceive the deficiency in technical literature which he afterwards endeavored to supply by the publication of his *Architectural Review and Builder's Journal*. Among the professional works which he executed were the old Masonic Temple and the Tradesmen's National Bank, in Philadelphia, the State Exposition Building and the Governor's Mansion in North Carolina, many private houses, and, particularly, a great number of hospitals and asylums in various parts of the country.

THE *Hydraulic and Sanitary Engineer* contains an excellent report of the Convention of the National Association of Master-Plumbers, held recently in Chicago, in which we find several things of considerable interest to architects. In the first place, we take satisfaction in saying that the business of the Convention seems to have been conducted with remarkable skill and good sense, and all those who attended it, or who read the reports of it, must feel that the interests of the trade which the Association represents were perceptibly advanced by the meeting. In the selection of the principal officer of the Association for the next year the Convention appears also to have been remarkably fortunate, Mr. Andrew Young, of Chicago, the new President, having already distinguished himself by his patriotic and sensible suggestion that the members of the great trade at the head of which he stands should be called upon in case of need to serve as auxiliary sanitary officers for the benefit of the community to which they belong. No one knows better than an architect how well qualified good plumbers are for rendering such service; and if a pestilence should drive the people of our great cities, under fear of death, to undertake at last the long neglected task of purifying their material existence, we could hardly urge too strongly the adoption of President Young's idea, and the placing of the details of domestic sanitation mainly in the hands of a commission of such plumbers as those who are fortunately already numerous in this country.

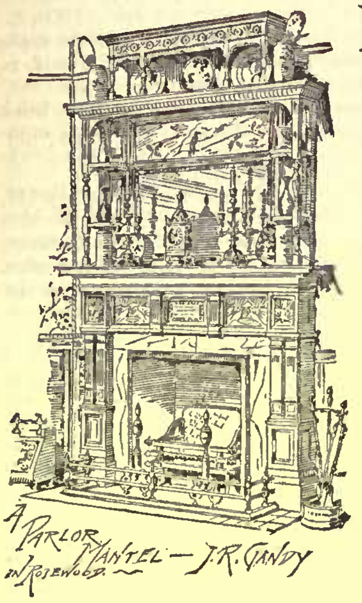
HAVING done this justice to the evident desire of the master-plumbers to advance their art as well as their own interests, we feel ourselves obliged to criticise some of the means by which, as we understand them, they hope to forward the latter. We have before spoken of the opportunities for fraud which were afforded by the enormous differences between the printed list-price of some kinds of plumber's goods and the actual cost, which was generally concealed, by collusion between the manufacturers of such goods and the plumbers, from those who paid for them. Unlike mercantile business, a great deal of the best plumbing-work is carried on under a confidential and honorable relation between the plumber and the man who employs him, and who willingly pays him, as compensation for his skill and time, a percentage on the cost of the material and labor. This percentage is generally intended to be a liberal one, and the obvious duty of the plumber who works under such an agreement is to take from his employer a fair profit on the materials and nothing more. Many plumbers, as we know, scorn to take advantage of the opportunity which the dealers, by concealing the real cost of their goods, intend to afford them for obtaining, unknown to him, an exorbitant profit from their confiding employer; but others, by presenting the list-prices as the basis of their bills, succeed, until they are found out, in paying themselves much more liberally than they deserve. Sooner or later, however, they get found out. The persons whom they have fleeced meet with others more experienced in the ways of the world, or perhaps have their own eyes opened by the offer, which we have known made, of a rival plumber to do certain work for less than the price-list cost of the materials alone, and a revelation of this kind, whatever the Master-Plumbers' Association may think of it, excites in the mind of the individual who experiences it a lively feeling of having been robbed, and is apt to leave, moreover, a decidedly unfavorable impression regarding the honesty of plumbers as a class.

IN the Convention of the National Association of Master-Plumbers, held last year, a good deal of indignation was expressed against certain dealers in plumbers' materials who sold their goods to other persons at the same rate as to plumbers, and the opinion of the Convention seemed to be that such dealers should be compelled to "protect" plumbers by selling to them at a lower rate than to any one else, under penalty of losing the custom of the whole plumbing trade. One house, in particular, which, as we recollect, made a virtue of selling certain classes of its goods to private individuals in preference to plumbers, on the ground that by dealing directly with owners the latter were sure of not having an inferior article substituted for what they or their architect desired, while the firm was more certain of getting its pay from the owners than from the plumbers, seems to have been the object of special animosity in the trade, and the Executive Committee of the Association was deputed to coerce all the refractory dealers. We regret to say that the Committee seems to have been completely successful, and at the convention held in June, it reported that an agreement had been made by which certain of the largest manufacturers and dealers in plumbing material bound themselves "not to sell to others than plumbers regularly engaged in the business, public institutions, corporations, and parties employing their own plumbers, except at a reasonable advance on the wholesale price to plumbers." The paper was signed by the representatives of the J. L. Mott Iron Works, Mr. Fred Adee, Messrs. Abendroth Brothers, Mr. Henry Steeger, Messrs. Mayer & Lane, Mr. Henry Huber, and the Meyer-Sniffen Company, and those interested will take notice that the goods manufactured by these gentlemen can be had by private parties only at a "reasonable advance" on the price which the plumbers pay for them, and as a consequence of this they will probably discover, as we have, that the plumbers' idea of a "reasonable advance" being more elastic than that of the dealers, they can buy these goods to much better advantage by competition among local plumbers than by ordering them directly from the producers. In some places, as it seems from the discussion in the convention, the plumbers sell gas-fixtures in addition to their other wares, and as the difference between the "long price" and real price of these is enormous, and house-owners naturally like to save one-third, or so, of the cost of their fixtures by getting them of some one else than the plumbers, the latter are demanding "protection" in this as well as in their more appropriate business. One of them, indeed, won the applause of the convention by saying that in his own city none of the plumbers connected with the local association would put up gas-fixtures bought of anybody except a plumber. It is not very surprising to find, on reading farther, that this gentleman's gas-fixture business has fallen off "fifty to seventy-five per cent" since he and his brethren took this resolution, and we venture to predict that, while no reasonable man will object to allowing plumbers a fair profit on goods which they furnish, to pay for handling them, the attempts which we have known made, to charge unsuspecting employers three times the cost of goods which were simply ordered sent from the manufactory to the job, cannot long be made successful by any combinations, agreements or threats; and those plumbers who do not wish to see "fifty or seventy-five per cent" of their business leave them will do well to treat their customers as they wish to have their customers treat them, seeking the protection of their interests in a well-earned reputation for fair and honorable dealing, rather than in occasional opportunities for betraying the confidence of men who do not know the real value of the goods they buy of them.

LE Génie Civil gives an interesting account of the recent expedition of the steamer *Talisman* for the determination of the depth of certain parts of the sea, and the investigation of the objects, living or inanimate, which are to be found there. Until within a few years, very little has been known about any of these matters. Arguing from the laws of hydrostatic pressure, some persons maintained that the water of the ocean in its greatest depths must be solid, while others, better informed, were disposed to admit that although the character of the water could not be changed, its weight, acting in all directions upon bodies submerged in it, would preclude the existence of living beings more than a few hundred feet from the surface. As the hydrostatic pressure of a column of water a mile high would be more than a ton to the square inch, and at the bottom of the deepest part of the ocean would be five or six times that, the theory that no creature with organs and muscles could live, compressed by such a strain, seemed reasonable, and it was not until extensive soundings were made along the "telegraphic plateau," before the laying of the first electric cable between Ireland and Newfoundland, that evidence was found of the presence in the deep sea of tiny mollusks, whose shells covered the submarine plateau with a soft and thick bed. Even this indication was not, however, regarded as conclusive, some maintaining that the little shell-fish had lived and died in the surface-water, their shells only sinking to the bottom after their owners had ceased to inhabit them.

AN additional reason for doubting the possibility of animal existence below a certain depth was afterwards found in the discovery that light penetrates only to a short distance, even in the clearest water. In the Lake of Geneva, perhaps the purest large body of water in the world, fresh chloride of silver is no longer affected by light at a distance of about one hundred and sixty-five feet below the surface, and recent experiments have shown that an Edison electric lamp, plunged to a depth of eighty feet into the sea, is invisible from the surface. The expeditions of the last ten or twelve years have, however, proved beyond a doubt that even the conditions of total darkness and immense pressure do not interfere with the development of animal life in varied forms in the greatest depths which have yet been explored. Not only the lower organisms, such as crustaceans and mollusks, but fishes so highly developed as sharks, are found miles below the surface, and in some places the number of creatures, as shown by the quantity of them brought up together in the dredge, is almost incredible. Much interest is added to the investigation by the fact that the deep-water animals differ in almost every respect from those found nearer the surface. Many of them are found to present forms known hitherto only in certain fossil species, while others are entirely new; and it has been discovered that some of the creatures common in the surface waters of the North Atlantic reappear again, but only at a considerable depth, in the warm equatorial seas, the distance from the surface at which they live increasing as the distance from the equator diminishes. As if to compensate for the darkness of the deep sea, a very large proportion of the animals which inhabit it are phosphorescent. Certain sharks are found to have their skins covered with a mucus so luminous that one can see to read by the light which shines from them, and the phosphorescence of many animals is not only very bright, but colored, some large crustaceans, like lobsters, shining with a red light, while the star-fishes show a rose-color, and the great sea-worms a brilliant purple. One kind of fish, we are told, has the brightness of his presence enhanced by phosphorescent lanterns, furnished with convex lenses in front, which he carries under his eyes. It is not very plain why a fish should need this kind of locomotive head-light, since the total illumination which he would diffuse would be quite as great without the convex lenses as with them; but those who try earnestly to believe the story will probably be rewarded in time by finding out the purpose of the apparatus. Aside from the discoveries made, the apparatus used for making them is interesting. It is hardly necessary to say that the old-fashioned hemp line is useless for deep soundings, and the modern investigations are made with the help of a very fine steel wire, weighing less than thirty pounds to the mile. The wire is kept coiled in a strongly alkaline liquid, to prevent corrosion, and when used is attached, by means of a short length of hemp cord, to a sinker weighing from fifty to one hundred pounds, according to the presumed depth of the water. The sinker is so arranged that the weights with which it is loaded are detached when it strikes the bottom, and as they fall off they serve to shut the valve of a small cylinder which forms part of the sinker, enclosing in this way a little of the sand or silt of the bottom, which is drawn back with the wire to the deck of the ship. The dredge, with which specimens are raised from the bottom, consists of a net, or, rather, of two nets of different sizes of mesh, drawn up by a small steel-wire cable. The mouth of the dredge, which has the capacity of a large hogshead, is held open by a light iron framework, and bunches of rags and thread are hung about the interior, which serve to collect animals too small to be retained in the nets.

THE HISTORY OF BRICKMAKING.



BRICKS have been employed from the earliest times in the execution of many undertakings of grandeur and magnitude. A complete history of brickmaking would be analogous to that of civilization with its advances and declines, for the authentic record of this branch of pottery is older than that of any other ceramic production, extending through forty-one centuries; the descendants of the sons of Noah, who journeyed from the East and located on the plains of Shinar, being the first potters of whom we have positive attestation.

In our own times structures of great altitudes have been projected; but the Washington Monument and similar undertakings appear insignificant when compared to the stupendous conceptions of those bold men, who, in 2247 B. C., said: "Go to, let us make bricks, and burn them thoroughly." And they said: "Go to, let us build us a city and a tower, whose top may reach unto heaven."[1]

The story of the manner in which this proposed monopoly of that portion of space between earth and heaven was defeated by confusion of the tongues of the builders is too familiar for repetition here. But that something was accomplished will appear from the speech of Moses to the Israelites, delivered seven hundred and ninety-six years later, in which cities in the land of Canaan are referred to as being great and walled up to heaven.[2]

In tracing development in the art of brickmaking we find that progress has often been slow and uncertain; it has flourished in ages of prosperity with other arts, and like them it has been lost in ages of darkness; but as with them it awoke with the Renaissance, and is steadily improving with the progress of time and the spread of knowledge.

Machinery is doing much to lighten labor, but in all ages the work required to make bricks has been of the hardest kind, and many have been faint with toil in their production, in modern as well as in ancient times.

The children of Israel, as early as 1706 B. C., were made to serve the Egyptians with rigor, and their lives were made bitter with hard bondage in mortar and in brick; and Pharaoh, in 1491 B. C., in order to increase the burdens and labor of the Israelites, commanded the task-masters, saying, "Ye shall no more give the people straw to make brick, as heretofore; let them go and gather straw for themselves, and the tale of the bricks, which they did make heretofore, ye shall lay upon them."[3]

Pictures illustrating the above passages are still preserved on tombs in Thebes, in which some of the laborers are represented carrying water in large pots to temper the clay; others carry on their shoulders large masses of clay to the moulder, while others, still, are bearing off the bricks, and laying them out on the ground to dry, the dried bricks being carried in yokes suspended from the shoulders of bowed and weary laborers. Task-masters, who were personally responsible for the labor of their gangs, are plentifully represented, observing that there was no shirking of the labor or slighting of the work.

The mud of the Nile is the only material in Egypt suitable for brickmaking; the modern plan is the same as the old; a bed is made into which are thrown large quantities of cut straw, mud and water, and this is tramped into pug, removed in lumps, and shaped in moulds, or by the hands. The moulded clay is sun-dried, not burned, the bricks of Egypt, both ancient and modern, being adobes.

Herodotus testifies that the walls of Babylon were built of bricks made from the clay thrown from the trenches surrounding the place. Accounts of the extraordinary mounds of bricks at Birs Nimrod, the supposed site of Babylon, and the remains of other ancient cities of the stoneless plains of the Euphrates and Tigris have been given by noted Eastern travellers. The buried palaces of Nebuchadnezzar have for a long series of years provided bricks for all the buildings in the neighborhood; there is scarcely a house in Hillar, a city of over 8,000 inhabitants, built close to the ruins of ancient Babylon, which is not almost entirely built with them. "To this day," says Layard, "there are men who have no other trade than that of gathering bricks from this vast heap, and taking them for sale to neighboring towns and villages, and even to Bagdad." Many bricks found in this ruin are coated with a thick enamel or glaze. The colors have resisted the effects of time, and present their original brightness.

On every brick that was made during the reign of Nebuchadnezzar it was his custom to have his name stamped, and Sir Henry Rawlinson, the Oriental scholar, in examining the bricks in the walls of the modern city of Bagdad, on the borders of the Tigris, discovered on each brick the clear traces of that royal signature.

The Babylonish bricks were usually of three colors: red, pale yellow, and blue, and also in all ancient Egyptian decoration the primary colors, red, yellow, and blue, were principally employed; green was the only secondary, to which were added black and white. The profuse employment of colored decoration is the distinctive feature of Babylonish architecture, the bricks being stamped out of a mould, and impressed with cuneiform inscriptions, which is a certain form of writing, the component parts of which may be said to resemble either a wedge, the barb of an arrow or a nail, the inscription being placed in a sunken rectangular panel. The sizes of the Babylonish bricks vary, the burned ones being thirteen inches square and three inches thick; the adobes or sun-dried bricks measuring from six to sixteen inches square, and from two to seven inches thick. The adobes were laid in clay, the work being striped horizontally every four or five feet in height, with thick layers of reed matting steeped in bitumen to form the bond; the burned bricks were laid while warm in hot bitumen, the bond being formed in the laying. In addition to the above kinds there were triangular bricks for corners of walls, and wedge-shaped bricks for arches, which were sometimes concave below and convex on top.

It is thought that the business of brickmaking was a royal monopoly in Egypt, as a very large number of bricks are found in that country with the stamp of Thothmes III, who is believed to be the prince who reigned at the time of the Exodus of the Hebrews. The bricks of this prince are impressed with his cartouche, which is an oval, on which the hieroglyphic characters used for his name were stamped, and the adobes made by him were 12 inches long, 9 inches wide and 6⅝ inches thick, and one in the British Museum weighed 37 pounds and 10 ounces.

Recent excavations have been made on the site of the Pithom, the treasure city built by King Rameses II with the bondage labor of the children of Israel. The buildings prove to have consisted almost entirely of tremendous storehouses built of adobes: some of these sun-dried bricks were made with straw and some without it. And explorations have been commenced on the site of the ancient city of Tanis, the capital of the Hyksos, or Shepherd Kings, one of whom, it is supposed, was the Pharaoh who ruled Egypt when Joseph was carried there. Some of the mysteries surrounding that period it is hoped will be solved, and very interesting developments are looked for when these researches are begun.

The great perfection to which the ancients carried the art of brickmaking is probably due to the abundance of labor, plenty of time to devote to each stage of the work, their great patience and painstaking, and the natural drying and preserving climate of the East. The dry, warm atmosphere of Egypt, Assyria and Babylonia, which countries were the nurseries of the ceramic arts, has kept in a good state of preservation for more than three thousand years the sun-dried bricks so common in those countries; many well-preserved adobes are also found in town and walls of ancient India.

Bricks, burned and unburned, were employed in the construction of the Great Wall of China, which is the most remarkable fortification ever erected by human hands; millions of men were employed for the space of ten years in its construction, and it was completed in 211 B. C. The length was about 1250 miles, the height averaging about 22 feet; each face of the wall was built of hewn stone or brick, and filled in between with earth; it was wider at the bottom than at the top, which was sufficiently wide for six horsemen to ride abreast; it was built by the great emperor of China, Shee-Hoang-Ti, who is the national hero.

It is probable that burned clay did not find great favor with the ancient Greeks, as they possessed an abundance of stone.

The walls of Athens, on the side toward Mount Hymettus, were built of bricks, and this is probably the largest undertaking in which they were employed by the Greeks.

The use of bricks for architectural construction was never, at any period, extensive in Greece, but in some few cases they were employed in minor public edifices. Their first application has been attributed to Hyperbius, of Crete, and Euryalus or Ayrolas. The bricks were made with a mould, and were named after the number of palm's lengths.

In the first century of the Christian era while the bricks made by the Romans were of a superior quality those made by the Greeks were very inferior.

But little is known of the material used in the early buildings of the Latin cities; yet judging from the great extent and destructiveness of the fires in Rome, it is inferred that wood entered largely into the construction of buildings to the time of Nero. During his reign in A. D. 64, two-thirds of the city was destroyed by fire. Augustus, who devoted so much time and thought to the beautification of Rome, had restricted the height of buildings to seventy feet, but this height was still further curtailed by Nero after the great conflagration, and in the rebuilding a certain part of the houses were constructed of a fire-proof stone from Gabii and Alba.

With the conquest of Carthage, Greece and Egypt, the Romans became acquainted with the arts of those subjugated countries, and tried to improve upon and use them for the embellishment of the imperial city, and it was most likely their innate desire for improvement that led to the burning of bricks in kilns.

Although burned bricks were used in the tower of Babel, and to

[1] *Genesis* xi: 3, 4.
[2] *Deut.* 1: 28.
[3] *Exodus* v: 7, 8.

face the adobes used in the building of the walls and palaces of Babylon, it is probable that the credit of first burning bricks in kilns belongs to the Romans, but it is hard to fix the time when this improvement took place.

Layers of thin brick, separating the tufa surface into panels, called *opus reticulatum*, were used in the time of Augustus. In the time of Nero the walls were faced entirely with excellent brickwork called *opus lateritium*.

Pliny says that the bricks made in Greece at this time were very inferior, and not fit to be used in the construction of a Roman dwelling, and that no party-wall was allowed to be more than eighteen inches in thickness, and that the material would not support one story.

The bricks must have been of a very poor quality, or else Pliny greatly misjudged their strength, for at the present time many buildings are being constructed, four and five stories in height, with the party-walls for most of the way only nine inches in thickness, of the poorest kind of "salmon" brick, from which the water has barely been driven out by the action of the heat; and if Pliny could see some of the bricks now used he would quake for the safety of the occupants of some modern hotels, apartment-houses, office-buildings and dwellings that have recently been erected for speculative purposes in London and some portions of this country.

In the first century of the Christian era the bricks were better than at other periods; they were large, flat, and thin, generally two feet square and one inch thick, and were what we call Roman tiles, but were used for building walls, and not merely for roofing or pavements; the facing bricks were triangular, the broad side being outwards. But bricks gradually became thicker and shorter, until in the fourth century they were very often as many as four to a foot on the face of the wall, which is about the same as in modern structures.

The Romans did not build their walls entirely of bricks; they were used only as a facing or veneering, the same as we use front or pressed bricks, the remainder or backing of a wall being of concrete, and thus we find that a large number of the great Roman buildings are constructed of concrete, faced with brick.

The brickwork of the first two centuries of the Christian era, the crowning period of art in Rome, was superior to any other. In the third century there was barely a perceptible change, but in the fourth there was a most decided deterioration, and brickwork went back with the times, old material being re-used extensively, as in the arch of Constantine.

Knowledge of the art of brickmaking has probably at no time become entirely extinct in the East, but after the fourth century, in sympathy with the decline of all other arts, and the dying Roman civilization, the knowledge of this art gradually expired, and was lost in Western Europe.

The Romans made bricks extensively in Germany and England, and though it might seem strange that such an art, when once acquired, should have been lost, nevertheless the remains of buildings between the Roman times and the thirteenth century show no evidence of bricks having been made in England. In a few instances only were they re-used as old material from buildings left by the Romans, as at Colchester and St. Alban's Abbey, the old Roman town of Verulamium, near which the latter is situated, supplying material for it.

The buildings of the Anglo-Saxons were usually of wood, rarely of stone, until the eleventh century, and it is not improbable that the primitive English churches may be among the earliest stone buildings of Western Europe, after the time of the Romans. In these buildings the arches are generally plain, but sometimes they are worked with rude but massive mouldings. Some arches are constructed of bricks, all of them taken from some Roman building, as at Brixworth, or sometimes stones are employed, and these usually have a course of bricks or thin stones laid upon the top of the arch, as at Britford Church, Wiltshire.

It has been thought that bricks were made in England, under the direction of Alfred the Great, as early as A. D. 886, and it is possible that, in rebuilding London and other cities which had been destroyed by the Danes, bricks were used; but this is not probable, as there are but few buildings in any part of Western Europe now in existence that are earlier than the eleventh century, and if bricks were made in the time of Alfred, in England, there are none at present in existence, and no authentic history of any building erected in his reign, in which they are said to have been used, and it is most probable that the earliest true modern or Flemish brick building existing in England is Little Wenham Hall, in Suffolk, which was erected in A. D. 1260.

In the reign of Henry VI, brick construction was not general, Hurtsmonceaux Castle, Sussex, built early in his reign, being one of the principal brick buildings of that period; but under Henry VIII and Elizabeth, the manufacture of bricks flourished, and they were used mostly for large buildings, the smaller ones being of timber construction, in which small panels of ornamental brickwork were sometimes formed and exposed between the upright studs.

Only a few instances of early fourteenth-century brickwork occur, and they are towards the close of the style; but in the fifteenth century brickwork became common, and we have in the Lollards' Tower, of Lambeth Palace, built in A. D. 1454, and the Manor House, or older portion of Hampton Court Palace, Middlesex, built in A. D. 1514, good examples of the English brick architecture in mediæval times. The ecclesiastical and palatial architecture of Italy of this period i rich in many beautiful specimens of brickwork, and in addition to the employment of colored decorative brickwork, the most elaborate mouldings and ornamentation in terra-cotta and brick are exhibited.

Until the first quarter of the seventeenth century, the bricks made in England were of many different sizes, but by Charles I, in A. D. 1625, their size was regulated and made nearly uniform.

After the great fire of London, in September, A. D. 1666, brick was the material universally used in the reconstruction, and ornaments carved with the chisel were introduced into some of the brickwork erected towards the last of that century in that city.

In A. D. 1784, bricks were subjected to taxation by George III, which burden was not repealed until A. D. 1850; the tax for this time, two-thirds of a century, averaging about 4*s.* 7*d.* per thousand for common bricks, and about 10*s.* per thousand for the finer grades.

The material of which a town is built depends generally upon the geology of the surrounding district; as in a mountainous country, like Scotland, cities of stone, such as Edinburgh, Glasgow, and Aberdeen naturally abound; but London and most of the great cities of England, being situated in alluvial valleys and plains, are built of bricks made from the alluvial clay beneath and around them. In Holland and the other provinces of the Netherlands, where no stone except a very soft and inferior sandstone is found, the use of brick as the chief building material became almost universal from earliest times, even the paving of the streets and other public works being done with bricks. There are buildings in some cities of the Netherlands in which stone has been largely used, but they are the exception rather than the rule.

Peter Mortier, in a small book published in A. D. 1782, gives a description of the city-hall of Amsterdam. He says that the old city-hall was erected earlier than A. D. 1400, that the front and sides rested on divers stone columns, and that on one side there was a four-square stone steeple, that the building was burned July 7, A. D. 1682, and the heat was so great that everything was consumed except a piece of brickwork in the steeple. The new building was constructed on the site of the old one, but was commenced in 1648, part of the old structure having been taken down to make room for the new. In order to obtain a foundation for the new building, 13,659 piles were driven, upon which were placed seven feet of brickwork to form the foundation.

It was under Wouter Van Twiller, of Amsterdam, a governor appointed by the Dutch West India Company, that the first brick buildings were erected in this country. In 1633, soon after his arrival on Manhattan Island, Governor Van Twiller erected for his own use a substantial brick house, which was the most elaborate private dwelling which had up to that time been attempted in America, and during the remainder of the Dutch dynasty this dwelling served for the residence of the successive chiefs of the colony. He also built several small brick dwellings for the officers, which with his own were erected within the walls of the fort. The bricks used in these buildings were brought from Amsterdam, and were of such a good quality that but few were broken in the long and rough voyage. The Dutch seem to have succeeded well in making a strong and very durable quality of brick, which bricks have been famous from an early period for soundness, and specimens of them brought over by the early settlers from Holland are yet to be met with in some of the old Dutch houses of New York.

Among the Puritan emigrants to New England money was very scarce, and, under Winthrop, carpenters and bricklayers, whose services were in great demand and had a monopoly price, were forbidden to accept over 12*d.*, and afterwards, in 1630, 2*s.* per day, the penalty being 10*s.* to giver and taker. The bricklayers were also the stone-masons; they ranked under the first head, but a much larger amount of building was done in wood and in stone than in brick in those times.

The earliest settlement in this country in which brick-makers are recorded as being part of the population was the colony of New Haven. In this industrious and inventive little company it is probable that the first bricks made in this country were burned in 1650. They had no rich backers willing to foot the bills for costly brick buildings, as the Dutch West India Company had done for Governor Van Twiller in his building operations at Manhattan, or New Amsterdam, as it was called at a later period. They had made several attempts to produce bricks at earlier times, but had failed, and it is not probable that the very few which they did succeed in burning were of a very superior quality. But like the building of their ship, which sailed from their ice-bound shore and was never again heard of, though faulty in many respects, their production was an evidence of great energy, and it is the inheritance of this same quality that has made all that section of country a great manufacturing and inventive district.

The Virginia colonists possessed clay of a far superior quality for brick-making; but they do not seem to have made any attempt to utilize it. A few bricks were brought from England and used in the furnaces of an iron-foundry and a glass-house, both of which were destroyed during the great massacre of March, 1622, and appear to have comprised the entire manufactures of the colony.

Brick has been a choice material for building purposes in the State of Pennsylvania from its primitive days. In a letter from William Penn to his agent, J. Harrison, at Pennsbury, written in 1685, in speaking of a lady who had purchased land and intended to emigrate, he said: "She wants a house of brick, like Hannah Psalter's, in Burlington, and she will give £40 sterling in money and as much more in goods. It must have four rooms below, about 18 x 36 feet large, the rooms 9 feet high, and two stories height." Some idea of the great purchasing power of money in those days, as well as the price and value of buildings, can be seen from the above.

In 1705 the price of bricklayer's labor in Philadelphia was 3*s*. 6*d*. per day, and the price of bricks 22*s*. per thousand. One of the oldest public buildings in this country constructed of brick was the old court-house in the city of Philadelphia, commenced in the fall of 1705, and to these Pilgrim fathers the erection of this building was a great undertaking and their largest endeavor. Gifts, fines, assessments and forfeitures were all combined to give it the amptitude of a "Great Towne House" or "Guild Hall," as it was sometimes called when first built. To modern ideas this building was small and ignoble; but in those days it was grand and imposing in the eyes of all the populace. The total expense of the structure was £616, the bricks costing 29*s*. 6*d*. per thousand, and the brick laying costing 14*s*. per thousand. This primitive building was erected in the middle of High, or as it is now called, Market Street, at the corner of Second, and after being used for various purposes for one hundred and thirty years, it was demolished in the spring of 1837. For about twenty-eight years it was used as a court-house; but its use for that purpose was superseded by the erection of "the new State-House," or "Independence Hall" as it is now called, which was built of brick in 1733. Another primitive brick building in that city was the "Great Meeting-house" of Friends, at the south of the "Great Towne House," on the corner of Second and High Streets. This building and the surrounding brick walls which inclosed it were erected in 1695, the ground being given for that purpose by George Fox, for "truth's and Friends' sake." Early in 1719 bricks came into use for foot pavements in Philadelphia, and the great demand for them made the material very expensive.

Bricks do not appear to have been much used in the early buildings of Boston, as wood seems to have been the favorite material for building purposes with the Puritan emigrants, stone being sometimes employed. The first "Towne House" erected in Boston was constructed of wood; it was built about 1657, and stood at the head of State Street, and was consumed in the great fire of 1711. Its successor was a brick edifice, erected in 1712, on the same spot, which in turn was destroyed in the fire of 1747. The "old State-House" was built the next year, 1748, and as late as 1791 it was described as "an elegant brick building, 110 feet in length and 38 in breadth." The first Episcopal church in Boston was erected in 1689, of wood, at a cost of £284, and was at the corner of Tremont and School Streets. The "Triangular Warehouse," which stood at the head of the "towne dock," was one of the earliest brick buildings erected in Boston; it was built by London merchants about 1700. Its foundation was of stone and its walls of brick, which were of a larger size than the bricks of the country in later times.

Brickwork became common in this country in the early part of the eighteenth century, and until the trouble between the colonies and the mother country, bricks were imported mostly from England. There was not much inducement to produce home-made bricks previous to this time, as vessels sailing with light cargoes for the colonies would finish out with bricks, which commanded ready sales at moderate prices, rather than with stone ballast, which would have to be thrown overboard before receiving their heavy return cargoes of tobacco and other exports of the colonies.

In this way a number of brick buildings were constructed on the tide waters of the Atlantic coast, in the times which preceded the troublesome period of the Revolution. At the period immediately following this war, there was but little done in the line of building; the generally distressed condition of the industries and the finances of the country was a bar to any improvements except such as were in the nature of repairs necessary to make buildings inhabitable.

The condition of things after the adoption of the Constitution gradually changed; churches and other buildings of a public character, which had remained in an unfinished state during the entire period of the war, were completed, and a few houses of a substantial character were erected in some portions of the country, home-made bricks being generally employed when they could be obtained, and the character of the buildings admitted, which was but seldom, as wood and stone entered largely into the construction of the great proportion of all buildings.

The inventive genius of the new nation was not much stimulated to improving on the manner of the mother country in the production of bricks. In fact, those which we then made were poorly moulded and burned, and compared unfavorably with the common building bricks of English and Dutch manufacture. But at the present time, both for quantity and quality, we have no equal in any nation of the world, and for this we are largely indebted to the American patent system, which greatly fosters and encourages development in this line, as in other and kindred arts.

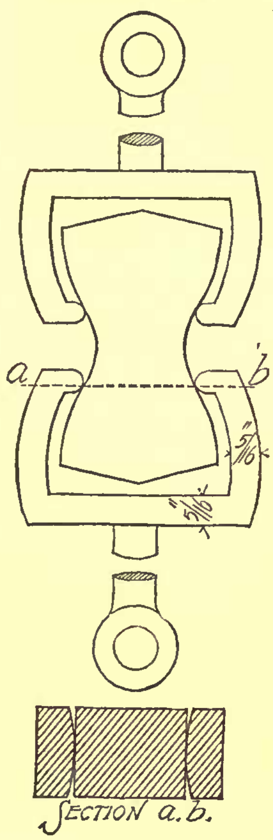
Improvements in modes or machines for manufacturing common bricks received but little attention until about 1840; previously they were more remarkable for being unique in some special point of but small importance than for any generally good achievements; that is, no attention was paid to the resulting brick after it came from the kiln; the whole idea seemed to be to shape or mould it in some manner. For instance, one machine was made like a box now used by plasterers to run off their lime; it was elevated slightly, and the mud, which was mixed in the box, allowed to pass through a grate into a large framework having sides about three inches high, and divided by wires stretched the length and across it, which laid upon the bottom, and when the clay in the shallow box was somewhat hardened, the wires were raised and the bricks thereby cut and formed into shape. The box, when emptied of the clay, could be easily moved on wheels running on a plank gangway to the next shallow mould-box, and so on. But the slush stock made in this way was very inferior; it would dry unequally, be full of cracks, and was subjected to no packing, as in the pug-mill, or pressure, as by machines of to-day, or a blow, as is done by the hand-moulder, who dashes the tempered and packed clay into the mould with great force, and again forces it down and closer together with the hands and plane. When the bricks came from the kiln they were light, very open or porous, therefore absorbed water readily, and were entirely unfit for building purposes.

But the brick-machines now in use have remedied these great objections in almost every particular, and have been brought to great perfection, so as to produce quickly large quantities of bricks from crude clay, in all conditions of plasticity, as well as in all stages of dryness.

Inventors are now turning their attention to improvements in methods for burning bricks, which is a good field, as the old open Dutch kilns so commonly employed is one of the most wasteful processes of manufacture that has endured for nearly two thousand years without improvement. CHARLES T. DAVIS.

PRELIMINARY REPORT ON A UNIFORM SYSTEM FOR TESTS OF CEMENT.[1]

TO THE AMERICAN SOCIETY OF CIVIL ENGINEERS: —



Standard Form for Briquette and Clips.

YOUR committee appointed to devise a uniform system for tests of cement respectfully submits the following preliminary report: —

In response to the request of the Secretary of the Society, made last year, samples of mortar-sand have been received by the Chairman of said Committee, kindly sent by members from localities indicated in an appendix to this report.

It will be observed that no samples have been received from the Pacific slope or from Canada.

The purpose of the Committee in making this collection is that a standard sand may be found in deposits somewhat widely distributed over this continent, that will give uniform results in mortar tests; therefore, it is quite desirable to secure typical sands from regions not covered by the samples received, before commencing any mortar tests of the sands at present collected.

Bearing in mind the labor and time necessary to make such collection and examination, we feel that it is due the Society that a mode of testing should be formulated and recommended for adoption, without further delay, as follows: —

I. In selecting samples of cement for experimental purposes, take the same from the interior of original packages at sufficient depth to insure a fair exponent of quality, and store the same in tightly-closed receptacles impervious to light or dampness until required for manipulation, when each sample of cement should be thoroughly mixed by sifting or otherwise, that it may be uniform in character throughout its mass.

II. Ascertain the per cent by weight of each sample that is rejected by sieves of 2,500, 5,476 and 10,000 meshes to the square inch respectively, the first-mentioned sieve being of No. 35, the second of No. 37, and the third of No. 40 wire gauge.

III. For tests of mortar composed in part of sand, the sand should be sharp, well washed and dried, rejecting all that will not pass the sieve of 400 meshes to the square inch, and that will pass a sieve of 900 meshes to the square inch; the wire gauge of the former sieve to be No. 24, and of the latter No. 28.

IV. The proportion of sand for mortar of each briquette should be carefully determined by weight, and thoroughly and intimately mixed with the cement in a dry state before water is added, and, so far as possible, all the water of mixture should be added at once that is necessary to produce the desired consistency of the resulting mortar, and thereafter the manipulation by the spatula or trowel should be rapid and thorough, and care should be taken to introduce the mass into the mould and complete the moulding process before incipient setting begins.

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[1] This paper was presented by the Committee at the Annual Meeting of the American Society of Civil Engineers, January 16, 1884, as a preliminary report, and was accepted as such by vote of the meeting, the Committee being continued The committee was as follows: Messrs. D. J. Whittemore, J. Herbert Shedd, Q. A. Gillmore, Alfred Noble, F. O. Norton, W. W. Maclay, Eliot C. Clarke. Republished from the *Transactions* of the American Society of Civil Engineers.

V. Ordinary fresh and clean water having a temperature acquired when exposed in open vessels in an atmosphere ranging between 60° and 70° Fah. should be used for water of mixture and immersion of moulded samples.

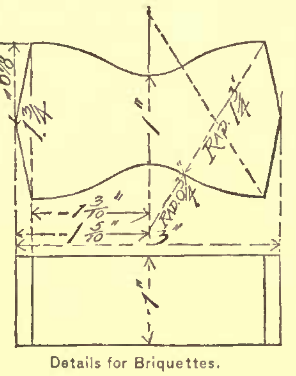
VI. For determination of strength, tensile tests are recommended; and the form and size of briquettes and clips to be used, shown by the cuts, are thought proper for this purpose.

VII. It is desirable that the bulk of given weights of cements be ascertained, and the following method is recommended for that purpose: Procure a cylinder six inches long, having an interior section equal to an area of two square inches. Sifting the cement to be measured so that it may not be compact, weigh carefully five ounces if of Portland cement, and four ounces if of American hydraulic cement, and pour the same into the cylinder, which should stand upright with its lower end resting upon a close-fitting and suitable base; then, without shock or sudden impact lower a closely-fitting piston, moving without friction, slowly down the cylinder on to the cement, said piston and its attachments to weigh exactly fifty pounds. After resting thereon for one minute, remove the same and ascertain the bulk of cement thus compressed. When sand is used in the fabrication of mortars ascertain the weight of an equal bulk of sand to that of the cement used in connection therewith, said sand to be shaken until its bulk remains unchanged before weighing.

VIII. In applying stress on briquettes do not allow in the commencement a strain to exceed one-half the estimated breaking strength of the best piece, and thereafter increase the same regularly at the rate of about two hundred pounds per minute until rupture takes place. If it is desired to compare the strengths of cement broken by different testing-machines, it is recommended to compare the machines themselves by breaking similar lots of briquettes on each, in order to determine their peculiar differences.

IX. For Portland-cement tests, the following method is recommended: Take enough cement to make five briquettes, one part cement, three parts sand, by weight; ten briquettes of neat cement and two cakes of neat cement two or three inches in diameter, about one-half inch thick, with thin edges.

X. Note the time in minutes that these cakes, when mixed with water to the consistency of a stiff plastic mortar, take to set hard enough to stand the wire test recommended by General Gillmore, viz.: one-twelfth-inch diameter wire loaded with one-fourth of a pound, and one-twenty-fourth-inch diameter wire loaded with one pound. One of these cakes, when hard enough, should be put in water and examined from day to day to see if it becomes contorted or if cracks show themselves at the edges. This is the test to show if the cement remains constant in volume, and is very important. The remaining cake should be kept in the air and its color observed, which for a good cement should be a uniform bluish-gray throughout, yellowish blotches indicating poor cement. The color of the cement when left in the air indicates the quality much better than when the cement is put in water.


Details for Briquettes.

XI. Make five briquettes composed of one part of cement and three parts of sand (by weight). Also make ten briquettes of neat cement; the moulds in each instance, while being charged and manipulated, to be laid directly on glass or slate, or some other non-absorbent material.

XII. The proportion of water, by weight, for the neat cement should be from 20 to 25 per cent or more, according to the fineness, age or other condition of the cement and the temperature of the air.

XIII. The desired mixture is a stiff plastic mortar, and when reached under certain conditions a very slight addition of water will sensibly diminish the tensile strength, especially for the seven-day test. As the age of the briquettes increases the injurious effect of too much water in gauging is less marked. When gauged, one part cement to three parts sand, by weight, the water required should not vary much from ten per cent of the combined weight of the cement and sand.

XIV. The moulds, when filled, should be pressed down firmly and struck off level; uniformity in this operation can only be obtained by practice. A damp cloth should be kept over the briquettes until they are hard enough to immerse in water.

XV. The moulds should be removed when the briquettes are hard enough to stand it; and for the sake of uniformity, the briquettes, both of neat cement and mixed with sand, should be immersed in water at the end of twenty-four hours.

XVI. The briquettes should always be put in the testing-machine and broken immediately after being taken out of the water, and the temperature of the briquettes and of the testing-room should be constant between 60° and 70° Fah.

XVII. Half the neat cement briquettes should be broken at the end of seven days and twenty-eight days respectively, and all the briquettes gauged, one part cement and three parts sand, should be broken at the end of twenty-eight days, in order to determine the tensile strength of each from the average of five breakings.

XVIII. For making tests of American hydraulic cements the following method is advised — using the standard mould and clutch advised for Portland-cement tests: —

Take enough cement to make ten briquettes of neat cement, five briquettes one part of neat cement and one part of sand, by weight, and two cakes of neat cement, two or three inches in diameter, about one-half inch thick, with thin edges.

XIX. Treat and observe the two cakes the same as for Portland cement; the cake kept in the air will be of a uniform color for a good cement, light or dark, according to the character of the rock from which the cement is made.

XX. Make five briquettes composed of equal parts, by weight, of cement and sand, the moulds being laid directly on glass, slate or some other non-absorbent material during moulding.

Also make ten briquettes of neat cement, using only sufficient water to make a stiff plastic mortar (the moulds being laid on glass or slate as before stated), and when filled to be pressed down forcibly and struck off level, and otherwise treated as specified for Portland cement until immersed in water, which immersion should take place as soon as removed from the moulds.

XXI. The briquettes should always be put in the testing-machine and broken immediately after removal from the water, and the temperature of the briquettes and of the testing-room should not exceed 70° nor be below 60° Fah.

XXII. Half of the neat cement briquettes should be broken at the end of twenty-four hours, and the remainder at the end of twenty-eight days, and all the briquettes composed of equal parts of sand and cement at the end of twenty-eight days, and from these results the average strength to be determined in each series of tests.

XXIII. Admitting the desirability and value of the twenty-four-hour tests of neat cement briquettes, we esteem of still more value the twenty-eight-day tests of similar briquettes in connection therewith, as showing continued activity, and as affording an index of ultimate energy.

THE ILLUSTRATIONS.

THE "SANITARIUM" BATH HOUSE, HOT SPRINGS, ARKANSAS, MESSRS. J. L. SMITHMEYER & PAUL J. PELZ, ARCHITECTS, WASHINGTON, D. C.

THE thermal waters of Hot Springs, Arkansas, have of late years become widely known on account of their great curative virtues, and it is easy to foretell that this watering place, at present with a visiting population of nearly four thousand and a permanent population of seven thousand, will in time become one of the most famous of the world. The seventy springs debouch from the easterly side of a narrow valley, running nearly due southward at altitudes averaging from ten to seventy-five feet above the level where the waters are used for bathing purposes, and yield about 500,000 gallons per day.

The United States Government has reserved the springs and the ground on which the springs and bath-houses are situated, and collects the seething waters (110° to 146° Fahrenheit) in reservoirs on the mountain side, and leads it in cast-iron conduit pipes to the bath-houses in the valley. The bath-houses have been put up by private parties under leases from the Government under certain conditions, and subject to the authority of the Department of the Interior. The lessees furnish baths to patients at a certain limited cost per bath. Most of the present bath-houses are built of wood.

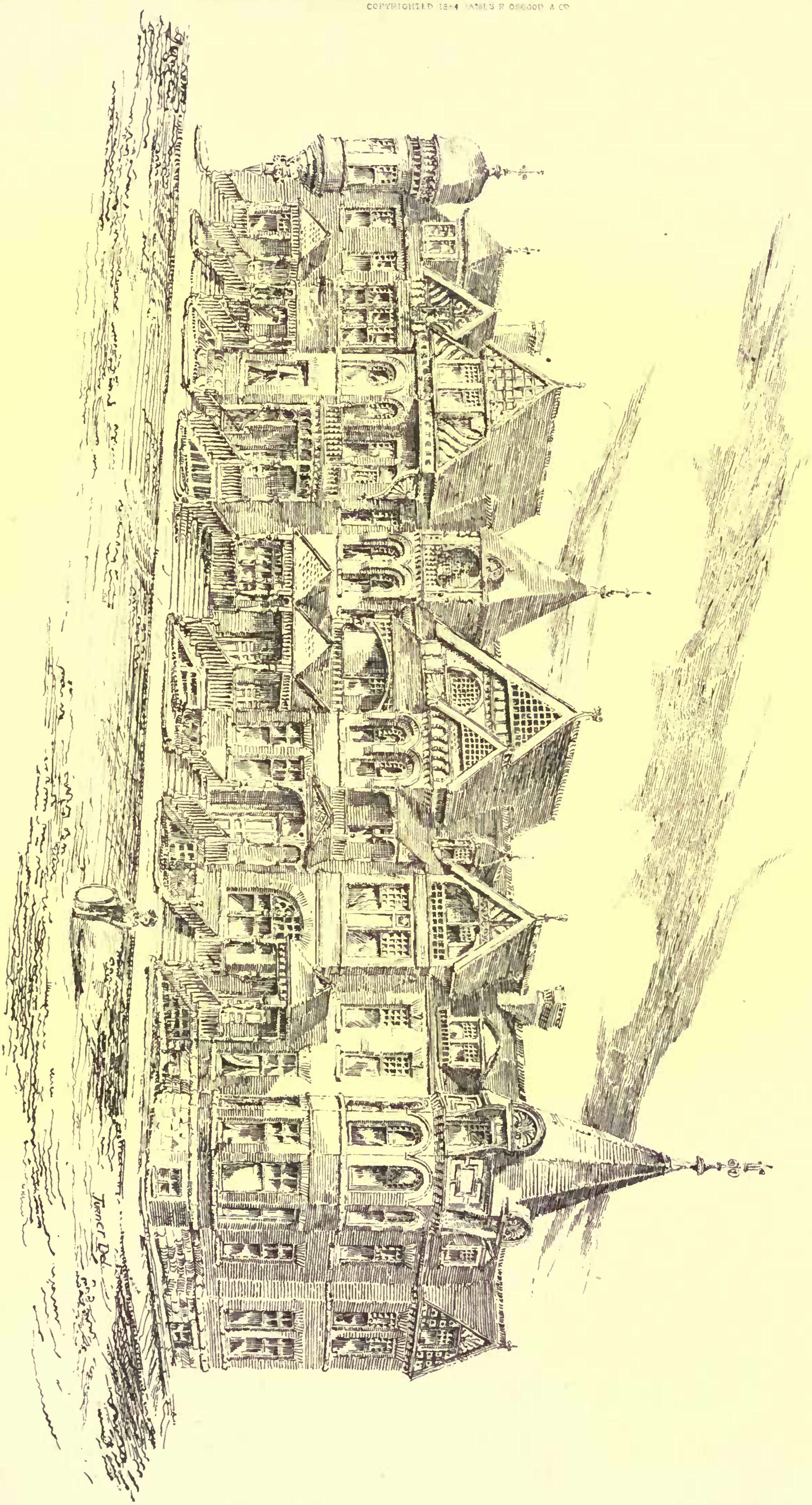
The structure shown on the illustration will be located between the "Old Hale" and the "Independent" bath-houses, nearly central in the row of houses of similar function; it has a frontage of sixty-seven feet by a depth of one hundred feet, partly extending into the hill-side. It will contain forty bath-tubs with the necessary vapor-boxes and plunge-baths. The tubs will be of white porcelain. The vapor-boxes are used for steaming patients, who assume a sitting posture and are wholly encased except the head. Each bath-room is furnished with a lounge for the patient to rest on after the bath.

The "Sanitarium" bath-house has been arranged for the separate accommodation of both sexes. The baths for men are on the ground floor, those for women on the second floor. The third floor of front building, on the easterly end of the second floor, contains apartments for taking sun-baths, which, following the suggestions of the highest medical authorities, will be used in conjunction with the hot-water baths. The roofs of these apartments contain large skylights. The disposition of the various rooms is apparent from the ground plans. The office has been located so that the clerk can attend to his duties for both departments, and the elevator will be arranged for the independent transport of patients of either sex to the upper stories. There is also a staircase from the first floor to the sun-baths on the third story.

The hot water, after being tempered in tanks on the mountain terrace, is led directly to the tubs, etc., in the ordinary manner. The waste is taken into the creek, which is now converted into a sewer by the Government; it is arched over, and its top will hereafter form part of the main street.

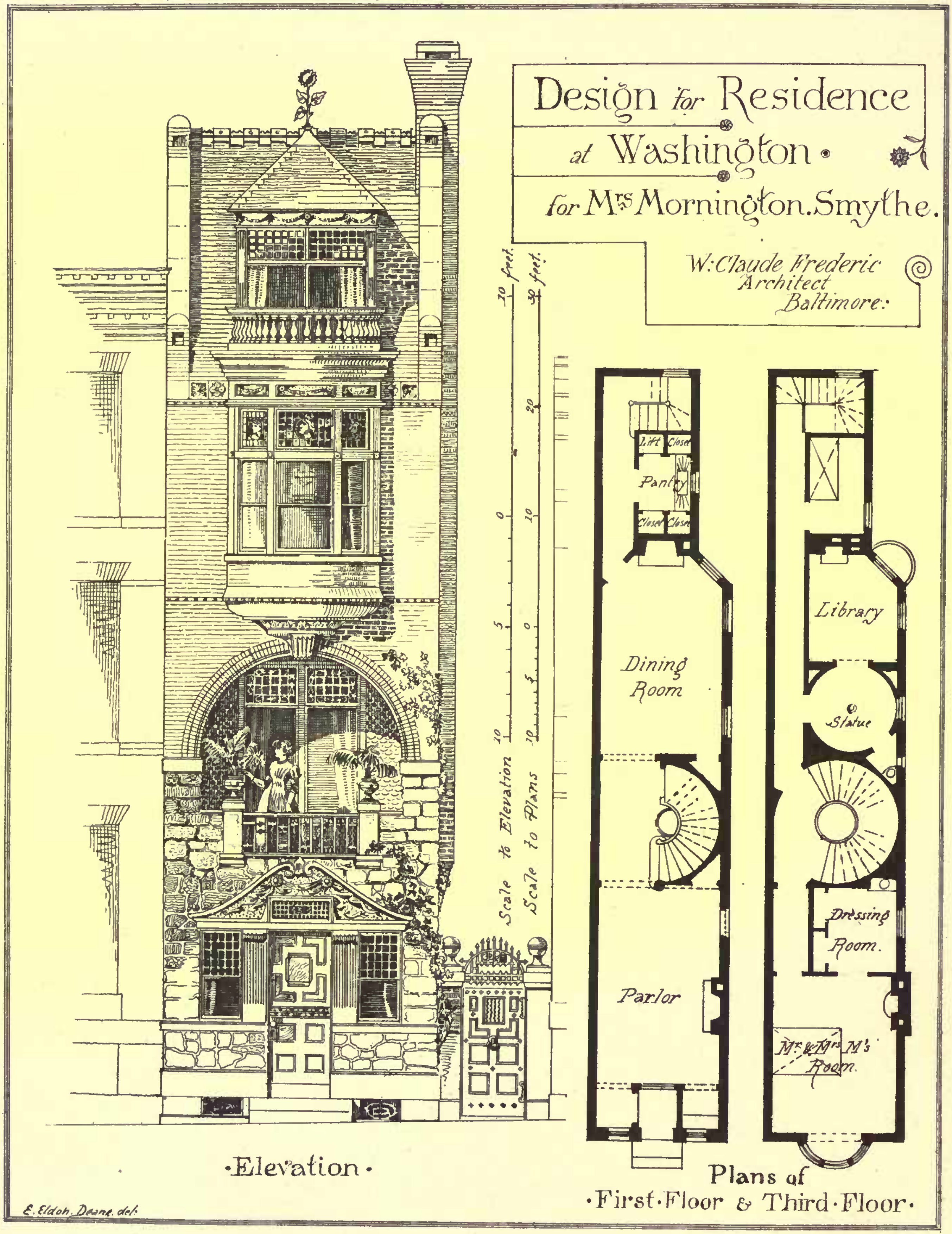
The "Sanitarium" will be built of the bricks made at the place, with pressed-brick arches and belts, stone sills, lintels and copings, and slate and tin roofs. It will be built during the next season, and will cost about $30,000.

HOUSE FOR MRS. MORNINGTON SMYTHE, WASHINGTON, D. C. MR. W. CLAUDE FREDERIC, ARCHITECT, BALTIMORE, MD.



BLOCK OF SEVEN HOUSES · ST PAUL, MINN.
George Wirth Architect

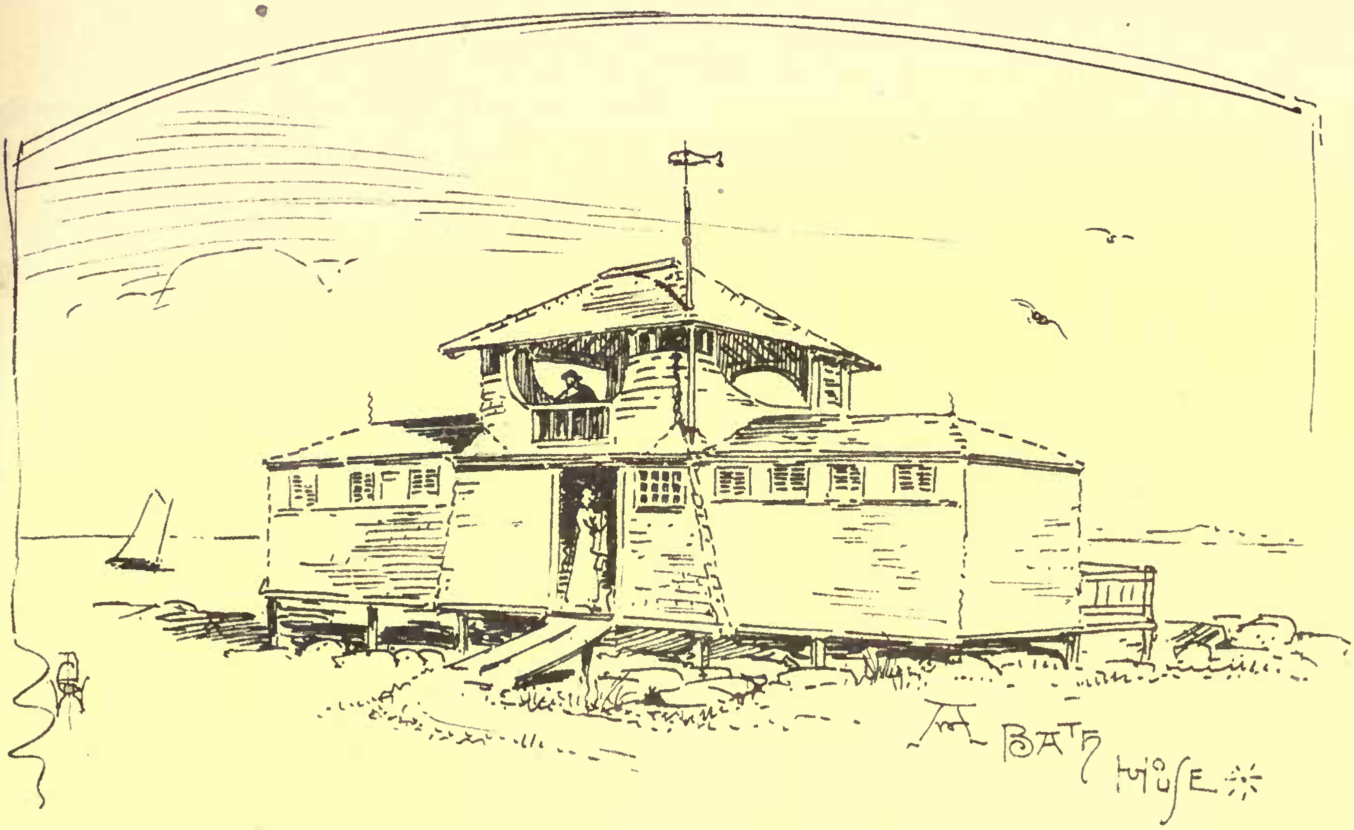
The Heliotype Printing Co Tremont St Boston.

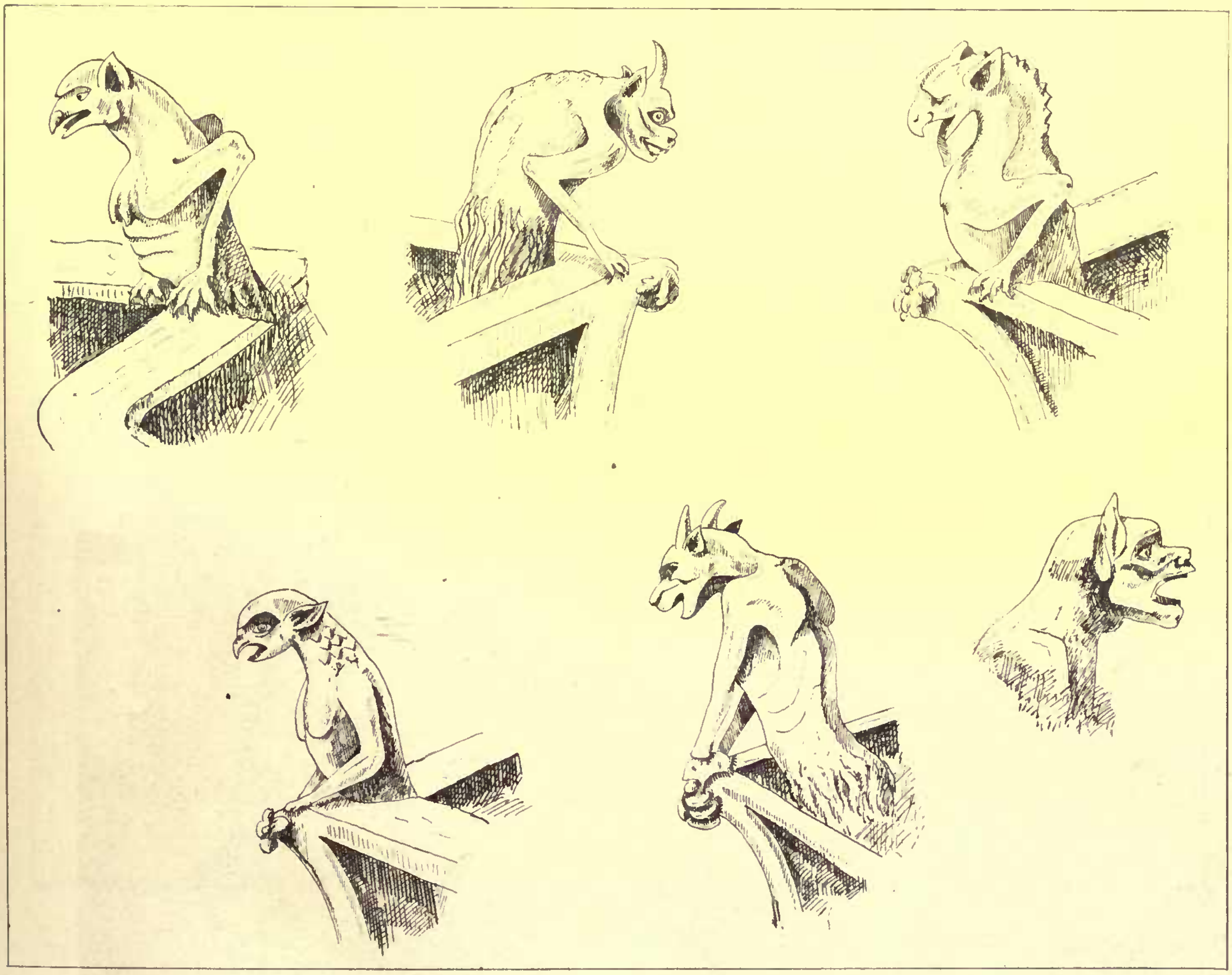


The Heliotype Printing Co. Tremont St. Boston.

Ch. of St. Paul · Issoire · (Auvergne) · France

PHOTO CAUSTIC, HELIOTYPE PRINTING CO., BOSTON.

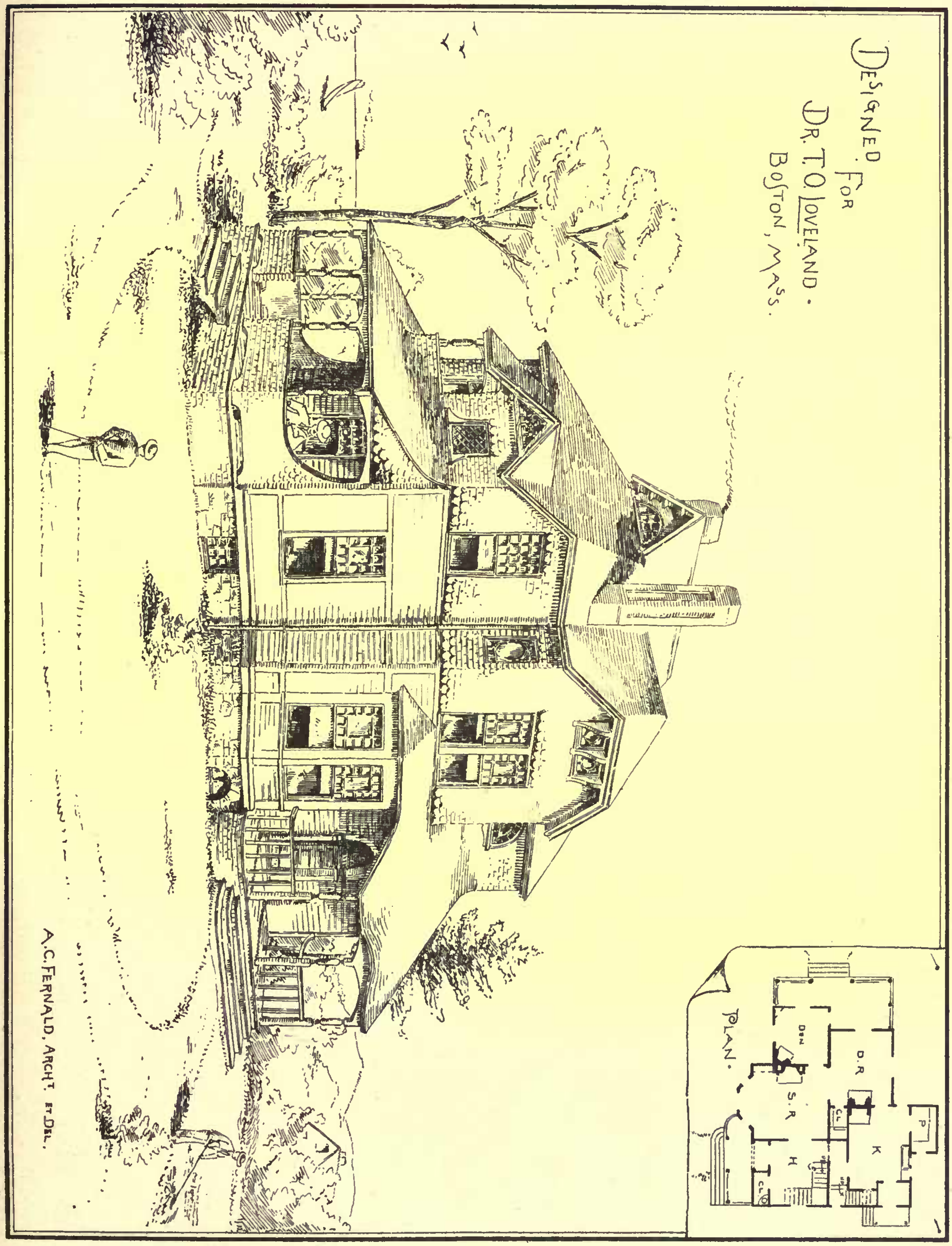




Some of the animals on the galleries of the towers of Notre-Dame in Paris.

M. K. Kress.

The Heliotype Printing Co. 211 Tremont St. Boston.



The Heliotype Printing Co. 211 Tremont St. Boston.

THE "SANITARIUM" BATH-HOUSE. HOT SPRINGS, ARK.

SMITHMEYER and PELZ ARCHITECTS. The Heliotype Printing Co Tremont St Boston. WASHINGTON D.C.

CHURCH OF ST. PAUL, ISSOIRE (AUVERGNE), FRANCE.

THIS is one of the celebrated Auvergnat churches whose distinguishing features are the semicircular apse, with chapels of the same form opening from it, a central tower — foundations for western towers exist in every case, but none were ever built,—and an exterior polychromatic decoration applied to the apse and apsidal chapels in the form of a mosaic-work of different colored lavas. This particular church, which is not large, and dates probably from the twelfth century, is further notable for the slight projection of its transepts—one bay, and for the insertion of a square-ended chapel in the axis of the apse.

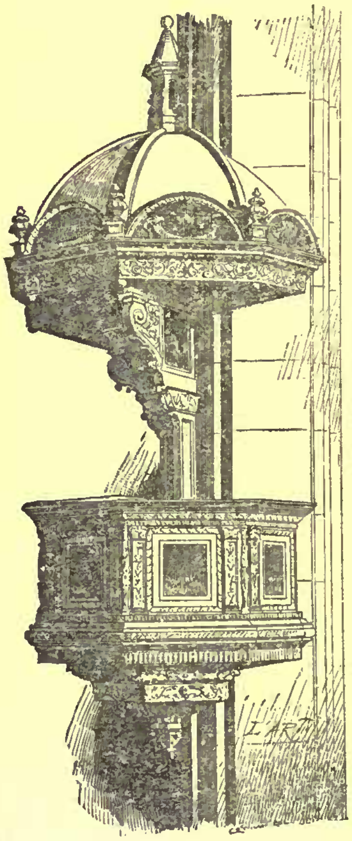
A BLOCK OF SEVEN HOUSES, ST. PAUL, MINN. MR. GEORGE WIRTH, ARCHITECT, ST. PAUL, MINN.

A BATH-HOUSE. MR. W. G. PRESTON, ARCHITECT, BOSTON, MASS.

HOUSE FOR DR. LOVELAND, BOSTON, MASS. MR. A. C. FERNALD, ARCHITECT, BOSTON, MASS.

SOME ANIMALS ON THE GALLERIES OF NOTRE DAME, PARIS, FRANCE. SKETCHED BY MR. M. K. KRESS.

THE REDWOODS OF CALIFORNIA.[1]



PULPIT: DESIGNED BY MATTEO CIVITALI. CATHEDRAL OF LUCCA, ITALY.

THE redwood, known to botanists as *Sequoia sempervirens*, is quite minutely described in "*Forest Trees of California*," a pamphlet issued in 1882 from the State Mining Bureau. The foliage "is like that of the yew — the same flat and final starry spray or twiglets of small leaves, say one-half to one inch long, distinctly in two rows, flat and line-like, with a sharp point; dark green above, soft grayish-green underside. The limbs are spreading or drooping; cones of an oblong shape, from one to one and a quarter inches long, and one-half to three-quarters of an inch thick, consisting of numerous trapezoidal-disked scales, with three to five flat, oval or obovate, dark reddish-brown seeds to each scale. The wood is red, with a faint coppery or metallic iridescent gloss, the hues deepening to richer, darker shades with age. Choice curl-grained wood is very ornamental for cabinet-finishing and similar work — takes a fine polish with a simple stain or varnish. Well-matured heartwood of the base of these trees is so solid and heavy as to sink in water. These will last for ages under the most trying circumstances, like cedars and yews. Insects seem never to trouble any of it. The bark, reduced to bast, has been utilized for upholstering — an excellent material." The bark of the redwood has a soft, fine fibre, and is of a spongy nature, the color being a rich reddish-brown, turning to a soft gray at exposed parts. It is usually deeply seamed, especially in old trees, and it is no uncommon thing to find it from twelve to eighteen inches in thickness.

"Redwoods abound chiefly, if not entirely, on sand-stone soil, and are always confined to the fog limits of the coast — say fifteen to thirty miles inland, and probably never exceeding forty or fifty miles even in the most favorable parts of the low Coast range, where the fog passes over low land or through open gaps. These mighty redwood wands possess a magic power over passing fogs, precipitating them in showers of rain at their feet. For this mainly, among other good reasons, living springs of the purest water ever bubble and babble at their bidding."

This is, perhaps, one of the secrets of the monstrous growth of these forests; for the dryest summer (and the summer months bring little or no rain in this region) has no appreciable effect upon the deep, rich soil in the shade of their protecting arms. The temperature is even, and high enough to convert the forest into a vast hot-house, in which all plant-life flourishes. The various fruit-bearing bushes — the blackberry, salmon-berry, thimbleberry, salalberry, and the like — attain remarkable proportions, while the sword and common ferns grow to monstrous size, often reaching a height of ten feet or more.

[1] Extracts from an illustrated pamphlet by W. G. Bonner, issued by the California Redwood Company, of San Francisco, Cal.

The redwoods extend along the northern coast of California from a little south of the Oregon boundary to the northern part of Monterey County, a distance of more than four hundred miles. The *Forestry Bulletin* (No. 13), published by the Government, gives a map showing the position of the belt, its dimensions and its variations as to density of growth and capabilities as to timber production. From this map and accompanying tables, it appears that the southern extremity of the belt is of no importance, and does not figure as a lumber-producing region. There is, however, a small body of timber in Santa Cruz County. With this exception there is no redwood for lumbering purposes south of Russian river, which empties into the Pacific perhaps one hundred miles north of San Francisco Bay. . .

The manufacture of redwood lumber has been going on in a quiet way for more than a quarter century; but men did not recognize its real value at first, and had but a vague idea of the vast supply in store. Besides, the demand heretofore has been easily met by mere trimmings, so to speak, from the edges of the forest. So the forest itself has remained — a legacy of untold value — for the use and profit of the present generation of hungry men. But its wealth is not limited to a gold valuo alone; for within its deep recesses the curious will find more to speculate on, and the lover of nature more to enjoy, than can be described in these pages. It is a perfect wonder-land — ever new, ever enchanting, and so wholly above and beyond any ordinary forest land in its attractive features as to pass the comprehension of the unacquainted. Rarely indeed does one find a listener who will accept the dimensions of the sylvan monarchs he has met with. The stranger may allow a ten-foot tree, say once or twice in a day's tramp; but when you tell him of measuring any number of trees of forty or fifty feet in circumference you are wasting time, and possibly losing confidence in your own veracity, so decidedly is it questioned. Yet larger trees than these are met with everywhere in the forests of Humboldt County, and may be seen and measured by any one who will take the trouble. There is a "fallen monarch" in the Freshwater forest, some twelve miles from Eureka, whose throne was undermined by the little brook at his feet. It lies across the stream, making a bridge, along the entire length of which any stage coach might drive with ease and safety. Twelve feet above the surface roots its girth is sixty-three feet; and two hundred feet above the circumference is thirty-six feet. The length of the log is about three hundred feet, the top having been destroyed by the falling of the tree many years ago. There was a few years ago — I am told it has been washed away by winter freshets — a fallen redwood in the northern part of the county that was turned to good account by the packers of that section. The tree had fallen across a deep gulch near the turbulent Klamath river, along the trail to Orleans Bar. It was utilized as a bridge, by means of which pack-trains and travellers regularly crossed the troublesome gulch for years. . .

Architects and builders, and wood-workers generally, have moved slowly in their experiments with redwood, as if they were not quite sure of their footing. But the ordeal has been passed, and it seems quite safe to say that no wood known to commerce is so well adapted to the general use of man. In its early history its use was carried no farther than house-building in a cheap way. Little by little it made its way into favor, its numerous good qualities gaining for it a preference among those who had believed only in pine and other woods known in their Eastern homes. The shingles and shakes made from redwood began to attract attention by reason of their lasting qualities, and in time they came to be rated A 1, and were finally accepted as the very best roof-covering to be had. Redwood shingles were recently taken from a roof here after twenty years' service and sent to San Francisco as a sample of their good qualities. They had neither decayed nor shrunk nor warped! In this country pine or other shingles are never met with, so completely does redwood answer all requirements. The manufacture of these shingles is carried on very extensively, almost every lumber mill having machinery for that purpose. Redwood was first introduced in the Eastern States in the shape of shingles. Now car-loads and cargoes of them go regularly to New York and other Eastern markets, where they have met with much favor. From this has sprung up a lively demand for all descriptions of redwood lumber. A great drawback has been the excessive freight rates across the continent; but even with this disadvantage the trade is rapidly developing in that direction. Woodworkers in the East, as well as here, seem to have decided that redwood is good enough for all purposes, and it is being used wherever a light, yet strong and durable, wood is wanted. Its deep, rich color, and its being susceptible of the highest finish, make it especially desirable for inside housework, as well as for car-trimmings and the like. Another important feature is the fact that when seasoned, redwood shrinks and swells less than any wood in use; in fact, it may be said not to shrink at all, if the experience of builders is worth anything. It may also be set down as a fact that insects and vermin will not abide within the walls of a redwood building. This, at least, is the testimony of householders; and I am sure that I have never met with nor seen evidence of any of those midnight raiders so plentiful in the country taverns and fine hotels in the East. In Peru and Chili there are ants and other insects which destroy the native woods, as well as pine and other kinds of wood from this country; but redwood is never molested — a fact which is thoroughly appreciated in those countries, and which has helped to build up a large trade there. The wood has little or no pitch, and is not combustible like pine. Neither has it any odor. . .

The government estimate of (board measure) timber standing in the redwood belt in the census year 1880 was 25,825,000,000 feet. This was made up from estimates furnished by a few lumbermen, whose opportunities for making a fair estimate cannot be questioned. But it is also true that many others, including millmen and lumbermen, estimate from fifty to one hundred per cent higher, and taking the estimated area of the belt from Russian river to the Oregon line with the estimate of timber standing, we shall find even their figures largely increased. The two hundred and seventy-five miles covered by this portion of the belt multiplied by the least estimated width (fifteen miles) gives 4,125 square miles. A square mile contains 640 acres, and the average yield per acre (according to government estimate) is 50,000 feet, which would give 32,000,000 feet to the square mile. This would give as a total for the 4,125 square miles 132,000,000,000 feet of standing timber, instead of the published estimate of 25,825,000,000. It may be that the estimated yield is too great, or that the extent of the belt has been overstated; but it is a matter of common experience that estimates fall short of the actual yield of claims when they are "worked," and there are those who believe "the half has not been told." During the past year two Canadian gentlemen went into the forest here, and, after careful estimates, concluded that 350,000 feet per acre would be a fair average. These gentlemen had long been accustomed to such work in the pine forests of Canada; one, I believe, was a government estimator. . . The estimated cut of all descriptions of redwood lumber for the census year 1880, as published in the government statistics for that year, was 186,000,000 feet, including shingles, shakes, and the various productions of the mills. According to statements published in the local papers here during that year, about one-half that amount was manufactured by the mills on Humboldt Bay, exclusive of shingles and other small work. For the year ending May, 1884, the cut of these mills will probably be twenty-five per cent greater, by reason of the increased demand, the additional capital invested, and the improved methods of logging and lumber-making which are constantly being adopted. . .

An observant person soon discovers that nearly all the lumber piled upon the docks — in fact nearly all that is made — is what is known to the trade as "clear" lumber, — that is, without knots or defects of any kind; and upon inquiry he will find that about seventy per cent of manufactured redwood is of this description; whereas not more than twenty or twenty-five per cent of eastern lumber is clear, the other seventy-five or eighty per cent being merchantable or refuse — that is to say, of second and third grades, as understood by lumber dealers the world over. Here is one great advantage of the redwood over other lumber-producing woods. The trees grow almost without limbs, and, as a result, make clear lumber. Much of this beautiful clear stuff we have seen on the wharf is rough (undressed), and is destined for foreign markets — Australia, Sandwich Islands and South American and Mexican ports. A few cargoes have gone to Europe also; but Europe has not yet seen enough of the redwood to become acquainted with its real merits, and it may be said that no market exists there. However, a number of Scotch capitalists, together with some of our enterprising lumbermen, have just now united to operate in this direction, and it is safe to infer that the markets of northern Europe will soon be opened. These gentlemen have secured about 75,000 acres of the choicest timber in the whole belt — that portion lying in Humboldt County, and tributary to Humboldt Bay. This is the land estimated by the government to contain 200,000 feet per acre — or rather, their land lies within this tract. They have, besides, purchased nearly all the mill property on Humboldt bay, and all of that at Trinidad, together with vessels, privileges, etc. — one of the largest business transactions, by the way, which has been consummated in California for many a year, and which gives to the purchasers the best of opportunities for extending the redwood traffic in all directions. They have, under the modest title of The California Redwood Company, established themselves at San Francisco, from which central point they can reach the four corners of the earth with the greatest facility. With millions of capital, an abundance of brain-force, and an unlimited supply of material to work with, it will be strange if this most excellent of all building materials, redwood lumber, does not soon acquire that universal popularity to which it is justly entitled. . .

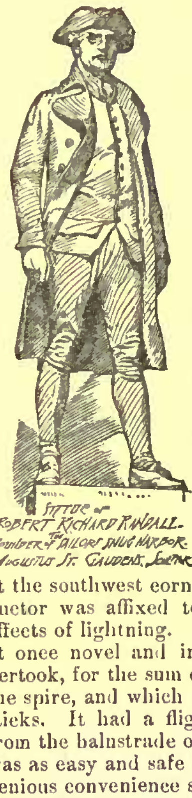
Redwood is used quite extensively as a veneer. The best part of the tree for this purpose is that at the base — just where the trunk joins the root. For years it was the custom in felling timber here to leave a stump of ten or twelve feet; it is still done in many cases. I cannot explain why — I only know it is so. But this stump, so long ignored, is, for many reasons, the best part of the tree; it is more compact and solid, is darker in color and more durable — it is, in fact, indestructible, as it will neither burn nor decay — a fact fully appreciated by those who have attempted to clear off redwood land for tillage. Among these stumps of the old worked-out logging claims there is a rich harvest for future reaping. From them can be obtained the very best of material for veneering, while many, perhaps a large proportion of them, are well worth working for the choice lumber they contain. This harvest will not be reaped to-day; the greater harvest of the forest demands the energy and enterprise of man. But the future will take care of it — it will not go to waste. Much of the timber which is now neglected — the smaller growth of two to three feet diameter — will be utilized, and some pains may be taken to preserve and protect the younger growth of the forest. This is problematical, however, as the history of all lumber-producing forests has been the same — they are made to yield to present needs, regardless of the future.

"The continual timber-supply capacity of a redwood forest under judicious care is so prodigious," says "*Forest Trees of California*," "as to be simply incalculable; none but a suicidal and utterly abandoned infanticidal policy, wantonly and untiringly practised, can ever blot them out." And one would think, from the nature of these forests, the conditions under which they grow and attain such proportions and such extreme age, that their existence might be prolonged indefinitely. But it is just this "abandoned policy," at work in the redwoods, which has sealed their doom. An effort was made some years since to induce the government to make two or more reserves in the heaviest-timbered portion of the belt; but the effort failed, and the whole forest has either passed into private hands or is open to pre-emption and destruction. Not only is every available appliance used for getting out timber in the quickest and easiest manner, but the brand is frequently applied for the purpose of clearing away the rubbish and dense tangled undergrowth which would render logging well nigh impossible. While these brush fires do not affect the timber (for it is practically fire-proof), they must retard the growth of the seedlings and injure, if not kill outright, the tender shoots just putting up from the ground. Little or no effort is made to preserve the trees too small for present use — trees of one, two or three feet diameter. If they stand in the way, clear them out; if they happen to be crushed under a fallen tree, no matter — there are enough and to spare for present needs. Why should they not make way for man's insatiate lust for gold?

And so I ask, How long will the redwoods last? A few years at most. But in that brief time men will build their castles and their thrones of power upon the ruins of this mighty race of giants, with the one regret that there are no more to conquer!

A WICKERWORK SCAFFOLD.

THE following letter, by Mr. H. Hems, appeared recently in the *Herts Advertiser:* —



Statue of Robert Richard Randall. Founder of The Sailors Snug Harbor. Augustus St. Gaudens, Sculptor.

Under this heading, in your current issue, is a paragraph referring to an odd scaffolding of wickerwork, with which, towards the end of the last century, one Birch, a basket-maker, of St. Albans, covered the graceful spire of St. Mary's Church, Islington. I happen to possess in my collection an engraving of this quaint and rare example of architectural construction. The spire is shown covered entirely by basket-work, looking very like a monster strawberry-pottle, or one of those cruel cages of the same material into which, says tradition, our Druidical forefathers used to pile unfortunate victims prior to burning. The basket began on the top of the tower — *i. e.*, 87 feet from the ground — and went up right beyond the apex of the steeple, which in itself stands 164 feet. This is no small altitude, being 20 feet or so higher than St. Alban's Abbey tower. A few more particulars relative to the work of this enterprising basket-worker of Verulam may possibly be interesting to your readers; so here they are, as from Nelson's third "Islington" (A.D. 1829): — "In 1789 a flagstaff, 42 feet high, which stood at the southwest corner of the tower, was removed, and an iron conductor was affixed to the spire, to preserve the building from the effects of lightning. The means used to effect these alterations were at once novel and ingenious. Thomas Birch, a basket-maker, undertook, for the sum of £20, to erect a scaffold of wickerwork round the spire, and which he formed entirely of willow, hazel, and other sticks. It had a flight of stairs within, ascending in a spiral line from the balustrade of the tower to the vane, by which the ascent was as easy and safe as the stairs of any dwelling-house. This ingenious convenience superseded the use of a scaffold, and was found to be of less expense. The spire on this occasion presented a very curious appearance, being enveloped, as it were, in a high basket, within which the workmen were performing their operations in perfect safety. The emolument received by the basket-maker on this occasion was very considerable, from the donations not only of the inhabitants, but of others, whose curiosity daily led them from London and the adjacent villages to view this surprising piece of workmanship. The exhibition was advertised in the newspapers, and the price of admission to the wicker staircase was sixpence each person. It is stated in Mr. Biggerstaff's MS. that Birch collected upwards of £50 by this exhibition. The late Alderman Sir William Staines is said to have been the first person who contrived this kind of scaffolding when repairing the spire of St. Bride's Church in London, which was damaged by lightning in the year 1764. It was afterwards improved upon by Birch in repairing the steeple at St. Albans, and he brought it to the greatest perfection in Islington on the occasion above mentioned. A print of the church, with the spire enveloped in the wickerwork, about seven inches square, was engraved and published in February, 1788, by Matthew Skinner, of Camden street, Islington, who was a skilful architect, much attached to archæological inquiries. There is also a copperplate engraving from this drawing by J. Roffe, and the Rev. John Swertner, a

Moravian minister, published a panoramic view in aquatint taken from the tower at the time of the wickerwork." Whilst on the topic of St. Mary's Church, Islington, those who are interested in bells may like to know the inscriptions upon seven out of the eight of them. They run as follows: —

1. — Altho' I am but light and small,
I will be heard above you all.
2. — At proper times our voices we will raise,
In sounding to our Benefactor's praise.
3. — If you have a judicious ear,
You'll own our voices sweet and dear.
4. — To honor both our God and King,
Our concert shall in concert ring.
5. — Whilst thus we join in cheerful sound,
May love and loyalty abound.
6. — In wedlock's bands all ye who join,
With hand your heart unite,
So shall our tuneful tongues combine
To laud the nuptial rite.
7. — Ye ringers all, that prize your health and happiness,
Be sober, merry, wise, and you'll the same possess.

SOUND-PROOF CONSTRUCTION.

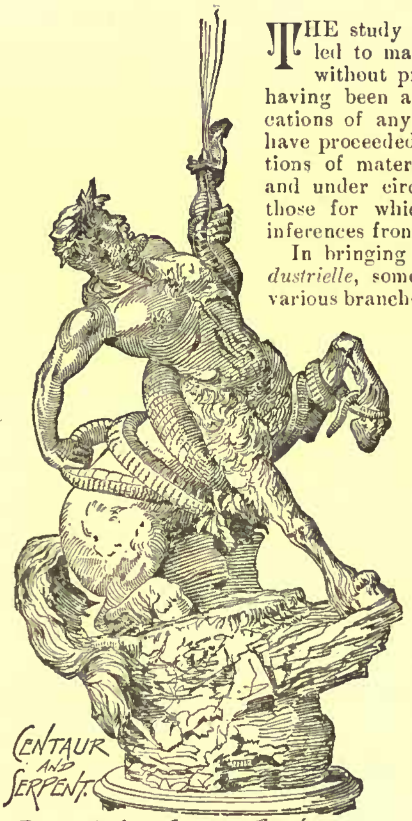
CAPITAL FROM THE TEMPLE OF PHILAE.

THE qualities which contribute towards making a fire-proof building are usually those which are best to prevent the passage of sound. A hollow floor of wood, for instance, is a very combustible as well as sound-making structure. If we ceil it, we make it impervious to both to a certain degree; hence the value of plastering of some thickness if it can be executed without risk of cracking. For lodging-houses the absolute importance of both fire-proof and sound-proof floors and partitions need hardly be asserted, though it is unfortunate to admit that the class of property, which is let in this way is the worst built and the most vulnerable, both as to the passage of fire and sound. Fire-proof floors are necessarily costly unless constructed in the way we lately pointed out, namely the complete immersion of iron-bars of small section in concrete, the bars forming a kind of netting for the latter, which is laid upon a centring of boards at the ceiling level. It is not so generally known that solid-wood floors have strong recommendations in their favor; they are comparatively fire-resisting, and quite sound-proof. In this form of flooring the joists are placed close together, the floor-boards are tongued, and the ceiling filleted, lathed, and plastered in the usual manner. Or the joists are in some cases brought into close contact by spikes at intervals, or by screw-bolts. The spikes or screw-bolts are placed eighteen inches apart, and fixed alternately. Angular grooves run along the bottom edges of each joist, forming, when they are put together, a series of dovetail grooves, which provide a key to the plaster ceiling. Specimens of these floors may be seen at the Health Exhibition (Messrs. Evans & Swain's exhibit). Staircases are made in the same manner; the joists are of course cut to the triangular section of the steps, and are in contact. These are spiked or screwed together, and as each joist is cut square at the bottom and grooved, a good key is given to the plaster. This firm make a solid wood staircase at about 3*s.* 6*d.* per foot lineal of step. They are fixed into walls in the same manner as stone staircases. For laborers' dwellings and hospitals, a solid wood floor would combine all the necessary qualities of health and safety. There being no hollow spaces between the joists, into which all kinds of dust and filth often fall, one of the fruitful causes of infection would be removed. The occupants in lower rooms would not be disturbed by noisy tenants over them; while, if an infectious disease breaks out in one of the lower apartments, it would not be carried so easily to the dwellers above. Fire also would be arrested materially in its progress upwards, if not entirely subdued by the solid floor. Here we have, therefore, (1) greater cleanliness; (2) freedom from noise; (3) less risk of infection spreading; (4) less risk of fire — four direct advantages of the solid floor, which we do not obtain in the ordinary hollow construction.

But architects have another and, in some cases, simpler method of rendering floors and partitions fire and sound-proof. The application of silicate-cotton or slag-wool is less general than its merits deserve. Silicate-cotton is a pure mineral fibre manufactured from the slag of blast-furnaces, and it can be made into sheets or packed into the spaces between the timbers, thus deadening sound, and rendering floors and partitions fire and sound proof. Asbestos felt is also prepared for the purpose of fire-proofing, and in checking the conduction of heat and cold. The felt can be laid between the flooring boards or studs, or on the ceiling or walls before they are plastered. Bell's asbestos-flooring and wall-felt is manufactured for these purposes.

Of still more recent modes of deadening sound we may mention the use of reeds for ceilings instead of laths. The reeds are secured to strong wires in the shape of webbing, which is fixed to the underside of the joists. The reeds are close, or nearly so, just sufficient space between them being allowed to form a key for the plaster. The plaster is then put on in the usual coats. These ceilings are said not to crack as in the case of shrinkage of laths; they are easily and rapidly fixed, and are recommended for floors subject to vibration. Then we have felt and the excellent "Willesden" paper, both admirable layers for floors and partitions serving to deaden sound, and both non-conductors of heat and cold. We have here touched upon methods and materials which serve to arrest the passage of sound; but there are other modes of accomplishing the purpose by the judicious laying of timbers, their embedding in the walls, and the prepation of mortar with non-conducting substances like slag-wool or sawdust. — *Building News.*

THE EFFECTS OF FROST ON BUILDING-STONE.



CENTAUR AND SERPENT.
FROM THE FOUNTAIN GROUP IN BRONZE BY AUGUST SOMMER.

THE study of the above question has led to many detailed investigations, without precise and definite results having been arrived at. The only indications of any exactness are those which have proceeded from lengthened observations of materials employed in climates and under circumstances analogous with those for which it is proposed to draw inferences from practical experience.

In bringing forward, in the *Revue Industrielle*, some connected details upon various branches of this subject, M. Braun remarks that nothing definite is proved by the statements made at a certain period respecting sulphate of soda. It has often happened that stones which have resisted expansive force have later on given way under the influence of frost, while the contrary has sometimes been remarked. It must not, however, be concluded if stone has for a length of time resisted the effects of frost, that it will do so for an indefinite period. The case of the stone bridge at Borrege, cited by Vicat, is a striking proof bearing on this point.

After calling attention to the fact that the effects of frost are often confounded with other causes of deterioration to which stone is liable, M. Braun endeavors to define in an exact manner the question under discussion, asserting that a stone is affected by frost when its resistance to longitudinal traction is less than the force of expansion of the water contained in its pores at the moment of its transformation into ice.

The *Journal du Céramiste et du Chaufournier* remarks that this theory requires certain modifications in practice. It is, however, admitted that, supposing this definition to be exact, it furnishes a provisional solution of the problem, and would allow of the resistance of a stone to frost being ascertained without exposing it to a practical test. According to mechanical theories, a kilogramme ($2\frac{1}{5}$ pounds) of water in freezing develops an amount of mechanical labor equalling 33.681 kilogramme-metres (243.51 foot-pounds). This knowledge of the force developed by water at the moment of its changing its condition would enable the resistance of a stone to frost to be estimated if there were also known: 1, its density; 2, its porosity; 3, its resistance to longitudinal traction. Thus, if the quantity of water contained in a cubic centimetre (.061 cubic inch) of a stone does not produce in congealing a force superior to its resistance to traction per square centimetre (.15 square inch), the stone would not be affected.

Unfortunately, however, matters are not so simple in practice. The principal elements of perturbation are (1) the want of homogeneousness in stones; (2) the state of superfusion of water, which is often produced in the interior of stones; (3) the chemical action of the waters of the quarry. The first point is too well known to call for detailed reference. The capacity for absorption of water which is possessed by stones from the same quarry (or even from the same part of it) varies to such an extent as to render it difficult to fix *à priori* what is the quantity of water the expansive force of which in congelation has to be estimated.

The circumstances under which the longitudinal traction takes place must not be lost sight of. M. Braun, relying upon Hodgkinson's experiments, considers that the figures arrived at in the tests of traction should be reduced by one-third. As the complete rupture is always preceded by a disaggregation which is indicated by fissures, and as these fissures are generally produced under a burden which varies between one-third and one-half of that necessary for the total rupture, it would be necessary, in view of these facts, to introduce a new co-efficient of reduction, comprised within the limits indicated. This *co-efficient of broken equilibrium*, as M. Braun designates it, must be always attended by uncertainty in its determination, according to the opinion expressed by the journal already mentioned. As a summary of his investigations, M. Braun gives this formula: —

$$(C + C_1)\,R \mathrel{\substack{>\\=\\<}} 33.681\,A.$$

C = The co-efficient of reduction as deduced from Hodgkinson's experiments.
C_1 = The co-efficient of broken equilibrium.
R = The average burden per square centimetre, which determines the rupture under the action of longitudinal traction.
A = The quantity of water contained in a cubic centimetre of stone and expressed in grammes.

When the first number of the above is superior to the second, the stone is fit for building purposes. When the contrary is the case, the stone should only be used in situations where it is not exposed to frost.

It is admitted, in conclusion, that M. Braun's ideas are both new and original, displaying, at the same time, such an amount of probability as to render it possible for them to mark a new point of departure in experiments bearing upon the subject under discussion, notwithstanding the speculative nature of some of the principles enunciated. — *The Builder.*

ONE FORM OF TRUSSED JOIST.

Los Angeles, Cal., June 14, 1884.

To the Editors of the American Architect: —

Dear Sirs,— There is an idea current among builders, that nailing strips to the sides of joists of, say, 1″ x 4″, or 1″ x 6″, in truss form, making the bottom fibres of joist serve as tie-rod, strengthens the joist. Please let us know, to settle the question, if it does answer that purpose more than merely giving strength by keeping joists from splitting. Constant Readers.

[Trussing of this kind stiffens the beam very slightly, probably less than the same amount of material would if added to the thickness of the beam. — Eds. American Architect.]

NOTES AND CLIPPINGS.

The Uncertain Success of Artesian-Well Boring.— The experience of the Winchester Arms Company, of New Haven, Conn., in the matter of artesian-well boring is somewhat peculiar, and from present accounts seems of a sufficiently discouraging nature to make farther prosecution of the work doubtful. The company use a large quantity of water daily, and, in order to effect a saving in water bills, commenced sinking an artesian well on their premises some two years ago. All the necessary preparations were made, and the work of putting down a 6-inch hole was begun by a contractor of long experience in the Pennsylvania oil regions. In a month the hole reached a depth at which ordinarily plenty of water is found, but in this case the bore remained perfectly dry. A fresh contract was made, and then another and another, but still no water was reached. At length sandstone was struck, and this made progress more than ever slow. Up to the present time the total cost of the operations is estimated at $18,500, and the company now find themselves with a hole within a few feet of half a mile deep on their hands, with no water in it. To make matters still worse, it is found that a chunk of iron has fallen to the bottom of the shaft, thus effectually crippling the work of the drill. It is thought that it will take about three months to bore through it, and the contractor is now in search of suitable apparatus with which to fish out the obstruction. If it fails, the well will probably be given up.— *The Metal Worker.*

Taking down a Chimney. — From a paper entitled "Chimney Construction," by Messrs. R. M. and J. F. Bancroft, we take the following interesting account of an ingenious arrangement employed for taking down a chimney-shaft in Middlesboro', England, the method followed being necessary, as the chimney stood in a crowded position, and therefore could not be thrown down. The bricks had to be lowered with as little damage as possible, so that they might be used again for building purposes. Owing to the position of the chimney the bricks could not be thrown down outside, and if thrown down inside they would have been smashed, or if lowered by mechanical means the process would have been very tedious, and was impracticable. Under these circumstances it was considered whether the bricks could not be allowed to fall by their own gravity, and at the same time be cushioned sufficiently to break their fall and prevent damage. In order to do this an air-tight iron box was placed at the bottom of the chimney: this box was fitted with an air-tight door mounted on hinges, and closing on an India-rubber face, against which it was tightened by a wedge. A wooden spout was then fixed to the top of the box and carried up the chimney; it was 3½″ x 5″ inside, and was made of planks 1⅛″ thick, well nailed together, with a little white lead on the edges, thus making it air-tight. The spout was made in about twelve-foot lengths, and these were joined together by cast-iron sockets or shoes, and corked round with tarred yarn, the whole apparatus costing about $30. A few stays were put inside the chimney to keep the spout steady, and steps were nailed upon it, by which the men ascended. It will be seen that the whole of the spouting being air-tight, if a brick filled the spout it would not descend; but as the section of a brick is 3″ x 4½″, and the spout was 3½″ x 5″, there was a quarter-inch space each way through which the air could pass the brick freely, the space further allowing for any irregularity in the sizes of the bricks. The result was that the bricks, being cushioned in their fall, arrived at the bottom without any damage. As soon as the box was full the man at the bottom rapped on the spout as a signal to stop, and then opened the air-tight door and removed the bricks inside. This being done he shut the door and signalled same to the man at the top. The man on the top lowered his own scaffold, and as the spout became too high he cut a piece off with a saw. If there was much mortar adhering to the bricks it was knocked off before putting the latter into the spout, and such mortar, etc., was allowed to fall inside the chimney, and was afterwards wheeled out.

Subterranean Water Supplies. — Some information of considerable interest has reached us from Adelaide with reference to the sinking of a very effective artesian-well in the far north of the extensive colony of South Australia. The well has been sunk at Tarkanina, sixty miles north of Farina, and good water was struck at a depth of 1220 feet. The water gushed up 20 feet above the surface. The investigation which led to this important discovery was commenced under the Surveyor-General of South Australia in 1881, that official having formed a favorable impression as to the probability of striking fresh water below the salt water known to exist. The first 800 feet was bored with hand tools, but in the course of last year steam-power was substituted, and progress was then made at the rate of 2 feet per day. The bore is the deepest in the Australian colonies, and the discovery is the more important as it is in the cretaceous formation which occupies a large extent of the northeastern corner of South Australia. The eastern part of the formation was accurately determined by the South Australian Government geologist, who reported generally as to the probability of striking artesian water; and the portion at the west of Peake and around the head of Lake Torrens was traced by the Conservator of Water, who was confident of the rich discovery to be made. The extent of the cretaceous formation has been ascertained to be fully 126,000 square miles. It is interesting to note that the South Australian Government geologist, in reporting upon the country in the course of last year, expressed his belief in the existence of a plentiful supply of artesian water in the neighborhood Referring to the evidences of extinct springs, he observed: "Between Mulligan and Blanchewater, at several points, in groups rising in small, roughly dome-shaped masses above the surface of the soft clay of the plains, are semi-concentric masses of iron ore (hematite), which are doubtless the remains of old spring deposits. In the same neighborhood similar-shaped circular protuberances of limestone come to the surface, which I take to be also the old outlets of extinct calcareous springs. The surface of the ground over a large extent of country here is covered with pieces of gravel of iron ore, in addition to nugget-like pieces of porcelainized rock, from which circumstance the water-course flowing through it is called Dreary Creek. In the sections shown in some of the creek banks bands of ferruginous clay-stone and iron-stone are found, as well as ferruginous conglomerate. As previously shown, water is rather plentiful in the older rock formations, although it cannot be determined before sinking whether it will be brackish or fresh. The numerous beds of limestone which are interstratified with the other rocks are favorable to the storage of water in caves, and hollows, and underground streams. The occurrence of calcareous conglomerate and tufa on the surface of the older rocks, and in gullies and creeks traversing them, points to the eruption of water charged with lime at some not very remote period. The Flinders and other ranges lying to the south of the plain and sandhill country act as a dam to prevent the subterranean water from reaching the sea; this gives rise to the natural artesian springs such as Mulligan, Blanchewater, etc. The actual artesian wells show that in those localities water will rise to the surface when the water-bearing strata have been pierced. Whether it will do so all over the area above mentioned depends on the level of the land, the depth of the formation, the undulations of the bed rock, etc. It is, however, certain enough that water will be found in sufficient quantities by sinking to a moderate depth."— *Engineering*

Fate of the Hotel de Chimay. — The Hôtel de Chimay is soon to pass away as a residential palatial dwelling, its acquisition having been found indispensable for the enlargement of the School of Fine Arts. The Budget Committee, it is expected, will vote the credit of nearly £4,250,000 required for the purchase. The property at present of a Belgian noble, the Hôtel de Chimay, is one of the most celebrated residences in Paris, having been occupied successively by historical characters, including Princes of the blood, financiers, noblemen, etc. It was built by Mansard, Lebrun embellishing the ceilings, and at one time served to shelter Henrietta of France, widow of Charles I. Marianne Mancini, the youngest niece of the great Cardinal Mazarin, made it the rendezvous of the shining lights of the art and literature of her period; La Fontaine, Chaulieu, Le Fare and Pradon being her habitual guests. In 1822 the hôtel, or rather the two buildings at Nos. 15 and 17, on the Quai Malaquais were sold as national property, Pellapra, the financier, being the purchaser. The property passed through his daughter into the family of the Caraman-Chimays, with which the Montesquiou-Fezensac and de Greffulhe families are connected. The Hôtel de Chimay proper consists of the main building and two wings, the left of these being occupied by Dr. Charcot and M. E. Pailleron; the right by the widow of M. Buloz. The gardens, which separate it from the Fine-Art School, were the scene of sundry summary shootings by the Communists in 1871; one of the pillars of the arcade still bears the marks of blood. Prince Caraman, who occupies the ground-floor is entitled, according to his sale agreement, to dispose of the magnificent chimney-pieces which adorn the rooms. — *Galignani's Messenger.*

A Breach in the Wall-Paper Ring.— The members of the American Wall-Paper Association have held together with remarkable unanimity and success until recently one of the large concerns, finding their mill too small for their trade tore it down and rebuilt. By the rules of the association they claimed and got $70,000 as their share of the season's profits in the Association, although they had not run a day. This caused dissatisfaction and kicking, and they left the pool, with one or two other manufacturies. This has been a big monopoly, holding the prices way up, and enabling them to divide handsome profits. But a few have left the fold, and the remaining ones claim that they will not go to pieces, and that they can meet the competition and still maintain prices — *Southern Trade Gazette.*

The Zinc Mines of Kansas.— The largest zinc producing locality in the world is the district around Galena, Kansas. Last year 70,000 tons were mined.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

302,232. FIRE-ESCAPE. — Charles Bloss, Bethlehem, Conn.
302,236. SASH-FASTENER. — David Hector Butler, Cane Valley, Ky.
302,240. SCAFFOLDING. — John L. Clevenger, Dayton, O.
302,247. ELLIPSOGRAPH. — John Harwood, Oshkosh, Wis.
302,253. APPARATUS FOR THE PREVENTION OF ESCAPE OF GASES FROM PIPES OF WASH-BASINS, ETC. — Paul Hoffman, New York, N. Y.
302,369. SINK-PIPE CAP. — Cornelius J. Lyons, Hartford, Conn.
302,278. FIRE-ESCAPE. — Cornelius J. O'Sullivan and Eugene J. O'Sullivan, Chicago, Ill.
302,286. CORRUGATED-IRON ROOFING. — L. Lewis Sagendorph, Cincinnati, O.
302,289. MANUFACTURE OF BRICKS MADE OF GLASS. — Francis H. Shaw, Newark, N. J.
302,308. SCREW-DRIVER. — Jotham S. Works, Abbot, Me.
302,318. SEWER-PIPE AND TRAP. — Joseph Brungard, St. Louis, Mo.
302,320. RATCHET-BRACE. — John Chantrell, Bridgeport, Conn.
302,325. ELEVATOR. — Henry M. and Robert F. Darling, Linwood, O.
302,334. BIDET. — James Hanse, Brooklyn, N. Y.
302,338. CONSTRUCTION OF BUILDINGS. — Peter H. Jackson, San Francisco, Cal.
302,339. STAIRS FOR BUILDINGS. — Peter H. Jackson, San Francisco, Cal.
302,343. PIPE-JOINT AND COUPLING. — John C. Kitton, San Francisco, Cal.
302,346. CLAMP. — William H. McAuley, New York, N. Y.
302,348. DEVICE FOR OPERATING DOORS AND GATES OF ELEVATOR-HATCHWAYS. — Thomas H. Melrose, San Francisco, Cal.
302,351. PORTABLE WATER-CLOSET. — Charles C. Nash, Providence, R. I.
302,353. CISTERN AND TANK CLEANER. — John E. Pattison, New Orleans, La.
302,358. EAVES-TROUGH HANGER. — Daniel B. Rock, Fairfield, Pa.
302,373. VENTILATING AND ADJUSTABLE RAIN-PROOF. — Samuel T. Atkin, Georgetown, Tex.
302,383. BRICK-MACHINE. — Charles A. Carpenter and Joseph Hill, Keokuk, Iowa.
302,384. SLIDING-DOOR LOCK. — James B. Cook, Yarmouth, Mass.
302,397. DOOR-LATCH. — James R. Gray, Ayer, Mass.
302,404. PROTECTOR FOR CHIMNEYS. — Henry W. Holly, Brooklyn, N. Y.
302,413. KILN FOR BURNING BRICKS, ETC. — Henry Knowles, Woodville, County of Leicester, England.
302,416. FLOOR-JACK. — Emmett J. Lobdell, Northville, N. Y.
302,429. ROOF-FENDER. — Frederick O. Rogers, Boston, Mass.
302,443. PROCESS OF ABSORBING HEAT FROM ROOFS OR MATERIAL BY USE OF A LIQUEFIED GAS. — Julius J. Suckert, Ridgewood, N. J.
302,459. FIRE-ESCAPE. — Charles Wood, Worcester, Mass.
302,463. TORNADO-PROOF BUILDING. — Francis K. Alexander, Sterling, Ill.
302,476. VENTILATING VAULT-COVER. — Chas. E. Furman, New York, N. Y.
302,489. RADIATOR FOR HOT-AIR FURNACES AND STOVES. — Cyrus S. Hood, Corning, N. Y.
302,490. ELEVATOR. — George C. Howard, Philadelphia, Pa.
302,530. REFRIGERATOR-BUILDING. — Chas. Vogel, Rochester, N. Y.
302,531. CHIMNEY-TOP OR COWL. — Jean Wüstner, Annecy, France.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report twenty-nine permits have been granted, the more important of which are the following: —

Robert Garrett, three-st'y brick building, Monument St., between Charles and Cathedral Sts.

John Hochschild, three-st'y brick building, e s Gay St., between Aisquith and Forrest Sts.

Bernard Link, 4 two-st'y brick buildings, e s Chapel St., s of Gough St.

Lawrence Turnbull, 36 two-st'y brick buildings, n and s s Pinckney St., between Greenmount Ave. and Carter Alley.

Hy. Bergman, 5 two-st'y brick buildings, w s Bradford Alley, s of Monument St.

Jas. H. Gablo, 4 three-st'y brick buildings (square), s s Tennant St., between Woodyear Alley and Carey St.

Conrad Ripple, 2 three-st'y brick buildings, e s Hanover St., between Fort Ave. and Clement St.

C. C. Fink, three-st'y brick building, e s Broadway, s of Chew St.

Seth A. Marchant, 8 two-st'y brick buildings, n s Jefferson St.; and 18 two-st'y brick buildings, w s Chester St., between Jefferson and McElderry Sts.

E. W. Haviland, 26 two-st'y brick buildings, e s Hanover St., between Winder and McComas Sts.

Geo. F. Seward, three-st'y brick building, e s Williams St., between Warren and Montgomery Sts.

The Labor Quotations remain unchanged.

Brooklyn.

BUILDING PERMITS. — *Nelson St.*, s s, 240′ e Clinton St., 2 three-st'y brick tenements, tin roofs, wooden cornices; cost for both, $9,000; owner, etc., Thos. Keogh, 149½ Nelson St.

Broadway, e s, 65′ s Flushing Ave., three-st'y brick store and dwell., tin roof; cost, $6,500; owner, Louisa Herle, Fifth Ave., cor. Fifteenth Sts.; architect, John Platte; builders, John Auer and F. Herte.

Broadway, e s, 37′ s Flushing Ave., three-st'y brick store and tenements, tin roofs; cost, $8,000; owner, architect and builders, same as last.

Broadway, s e cor. Flushing Ave., three-st'y stores and dwell., tin roof; cost, $8,500; owner, architect and builder, same as last.

Sullivan St., s w cor. Conover St., four-st'y brick store and tenements, tin roof; cost, $7,750; owner, Charles Plate, 149 Conover St.; architect and builder, C. M. Detlefsen.

Conover St., w s, 22′ s Sullivan St., 3 four-st'y brick stores and tenements, tin roofs, wooden cornices; cost for all, $22,000; owners, Platte & Co., 149 Conover St.; architect and builder, C. M. Detlefsen.

Hancock St., n s, 160′ w Nostrand Ave., 4 three-st'y brown-stone dwells., tin roofs, wooden cornices; cost, each, $6,000; owner and builder, S. E. C. Russell, Brooklyn; architect, I. D. Reynolds.

Flatbush Ave., s w cor. Pacific St., 2 two-st'y brick stores and dwells., gravel roofs; cost for both, $10,500; owner, Abraham Knox, Sixth Ave., cor. Lincoln Pl.; architect, M. J. Morrill; builders, J. M. Brown and Wm. V. Williamson.

Lorimer St., w s, 20′ n Calyer St., 6 two-st'y brick dwells., gravel roofs; owners, D. A. Manson, et al.; architect, G. H. Gerard; builder, J. B. Woodruff.

Stockton St., n w cor. Lewis Ave., three-st'y frame store and tenement, tin roof; cost, $5,000; owner, T. J. Moore, 72 Sumner Ave.; architect and builder, John Erickson.

Graham St., w s, 170′ s De Kalb Ave., three-st'y brick picture-frame factory, gravel roof; cost, about $7,500; owner, Hugo Tollner, 421 Franklin Ave.; architect, A. Hill; builders, Chas. Collins and T. Doris.

Leonard St., e s, 120′ s Norman Ave., one-st'y frame church, tin roof; cost, $5,000; owner, Reformed Episcopal Society, Leonard St.: architects and carpenters, Randall & Miller; mason, Israel Reed.

Ross St., *No.* 31, n s, about 87′ from Kent Ave., three-st'y dwell. and stable, gravel roof, brick cornice; cost, $3,500, owner, Mrs. A. S. Scholes, 145 Bedford Ave.; architect and carpenter, Wm. Seaman; mason, Henry McQuilkin.

Grand Ave., e s, 74′ 7″ s Lexington Ave., two-and-one-half-st'y brick dwell., tin roof, wooden cornice; cost, $3,000; owner and builder, Joseph I. Kirby, 73 Gates Ave.; architect, Amzi Hill.

Bartlett St., s s, 200′ w Throop Ave., three-st'y frame tenement, tin roof; cost, $4,300; owner, M. Gunkel, 51 Bartlett St.; architect, H. Voilweiler; builders, Henry Eich & Bro.

Degraw St., s s, 32′ w Smith St., four-st'y brick store and tenement, tin roof, wooden cornice; cost, $5,000; owner and carpenter, John Collins, Degraw St., cor. Smith St.; architect, R. Dixon; mason, J. H. O'Rourke.

Keap St., s s, 188′ e Marcy Ave., 2 three-st'y dwells. and one-st'y extensions, tin roofs, wooden cornices; cost, each, $5,500; owner and builder, Thomas B. Saddington, 246 Keap St.

George St., s s, 100′ e Central Ave., three-st'y frame tenement, tin roof; cost, $4,500; owner and architect, Adolph Pfaudler, Troutman St.; builders, C. Wahler and J. Rueger.

Scholes St., *No.* 201, n s, 100′ e Humboldt St., four-st'y frame tenement, tin roof; owner, V. Beitsch, on premises; architect, Th. Engelhardt; builder, Chas. Wishauer.

Myrtle Ave., *Nos.* 1126 *and* 1128, s s, 52′ w Broadway, 2 four-st'y brick stores and tenements, tin roofs; cost, each, $9,000; owner, A. Vigelius, 845 Broadway; architect, Th. Engelhardt; builders, Jacob Rauth and Jos. Fussi.

Richards St., n w cor. Sullivan St., two-st'y church and lecture-room, slate and tin roof; owner, Trustees of St. Paul's M. E. Church, on premises; architect, John Welch; builders, Algie & Son.

Sullivan St., w s, 90′ n Richards St., three-st'y stone and brick parsonage, slate and tin roof, brick cornice; owner, architect and builder, same as last.

Lafayette Ave., s s, 40′ e Lewis Ave., two-st'y brown-stone dwell., tin roof; cost, $5,500; owner and builder, M. J. McLaughlin, 100 Kosciusko St.; architect, F. D. Van Pelt.

Willow St., n w cor. Pineapple St., 3 three-st'y brown-stone dwells., tin roofs; cost, each, $8,000; owner, C. A. Silver, 20 Sidney Pl.; architect, C. Werner; builders, J. J. Bemjen and F. D. Norris.

Norman Ave., n e cor. Newell St., 2 three-st'y frame stores and tenements, tin roofs; cost for both, $9,000; owner, J. G. Koster, cor. Norman and Oakland Ave.; architect, Th. Engelhardt; builder, I. D. Reed.

Nelson St., *No.* 62, s s, 167′ e Hicks St., three-st'y brick tenement, tin roof, wooden cornice; cost, $4,500; owner, Dennis Wheeler, on premises; architect, J. F. Nelson.

Lafayette Ave., s s, 20′ e Lewis Ave., three-st'y brick store and flat, tin roof; cost, $6,50 ; owner and mason, M. J. McLaughlin, 100 Kosciusko St.; architect and carpenter, F. D. Van Pelt.

Nostrand Ave., w s, 75′ n Clifton Pl., three-st'y brick store and dwell., tin roof; cost, $4,500; owner and architect, Henry Van Stader, Nostrand Ave., cor. Clifton Pl.; masons, Van Pelt & Pearce; carpenters, Williams Bros.

ALTERATIONS. — *Sidney Pl.*, e s, 25′ s Livingston St., two-st'y brick extension, tin roof; cost, $6,100; owner, St. Charles Church, Sidney Pl.; architects and carpenters, M. Freeman's Sons.

Johnson Ave., n s, 100′ e Bushwick Ave.; raise one st'y, also one st'y frame extension; cost, $3,000; owner, Peter Frank, Ewen St., near Scholes St.; architect, J. Platte; builders, J. Rauth and Jos. Fresse.

Maujer St., *Nos.* 34 *and* 36, old brewery altered to theatre; cost, $10,000; owner, C. S. Gray, De Kalb Ave., cor. Fort Greene Pl.; architect, H. Kreitler.

Chicago.

SCHOOL-HOUSES. — The Board of Education is now building five first-class school-houses, the largest of which is the Haven, on Wabash Ave., four stories, 82′ x 138′; J. J. Flanders, architect. It is of Indiana pressed brick, with terra-cotta trimmings; cost, about $75,000.

BUILDING PERMITS. — E. Hentchel, three-st'y flats, 166 La Salle St.; cost, $8,500; architect, J. Zittel.

C. H. Briott, three-st'y flats, 113 North Clark St.; cost, $4,000.

H. Zoelck, three-st'y flats, 605 West Chicago Ave.; cost, $5,000; architect, D. Westphail.

W. Silhnek, three-st'y flats, 818 South Ashland Ave.; cost, $5,000; architects, Benes & Sayer.

W. Cuthbert, two-st'y dwell., Prairie Ave.; cost $7,500.

W. H. Borcherding, two-st'y dwell., 72 Nineteenth St.; cost, $2,500.

T. W. Christolph, two-st'y flats, 40 Belleview Place; cost, $3,500.

M. Manquette, two-st'y dwell., 222 West Division St; cost, $2,800.

Mrs. E. Bailey, two-st'y dwell., 81 McAllister Place; cost, $6,000.

W. J. Anderson, 7 cottages, 24 to 40 Homer St.; cost, $6,000.

B. Wadden, three-st'y store and dwell., 298 North Market St.; cost, $4,000; architect, Geo. Spear.

M. Dwyer, three-st'y dwell., 325 North Wells St.; cost, $7,000; architect, G. S. Sporb.

U. P. Smith, 6 two-st'y dwells., 3122 to 3144 Cottage Grove Ave.; cost, $30,000.

C. Weber, two-st'y dwells., 2734-6 South Park Ave.; cost, $4,500; architect, Arndt.

Mrs. M. F. Barrett, two-st'y dwell, 323 Burling St.; cost, $8,000; architect, J. Addison.

G. Slafter, two-st'y dwell., 3135 Forest Ave.; cost, $7,000; architect, L. B. Dixon.

G. Plamp, two-st'y dwell., 158 Bissell St.; cost, $2,800.

H. S. Newton, two-st'y dwell., 95 Warren Ave.; cost, $4,000.

J. Hart, four-st'y store and dwell., 136 Townsend St.; cost, $10,000; architect, J. Otter.

E. Luth, St. Jacob School, school-house, 79 Burling St.; cost, $5,000; architect, C. F. Berlin.

N. Manheimer, two-st'y dwell., 546 Hurlbut St.; cost, $4,000.

Mrs. P. Portman, 2 two-st'y dwells., 603-5 West Superior St.; cost, $6,400.

Mrs. R. G. Warner, two-st'y dwell., 503 Dearborn Ave.; cost, $5,500.

J. H. Smith, three st'y dwell., 42 Lincoln Place; cost, $10,000.

J. G. Shortall, two-st'y dwell., 1608 Prairie Ave.; cost, $12,000.

A. Anderson, two-st'y dwell., 393 West Erie St.; cost, $4,600.

P. Delph, two-st'y dwell., 716 California Ave.; cost, $4,000.

E. Heinze, two-st'y dwell., 151 Osgood St.: cost, $4,000.

J. Hokart, two-st'y dwell., 432 West Huron St.; cost, $3,300.

F. B. Little, two-st'y dwell., 1361 Jackson St., cost, $3,000.

G. W. Adams, two-st'y dwell., 3242 Indiana Ave.; cost, $6,000; architects, Treet & Foltz.

W. H. Thomas, two-st'y dwell., 1343 Jackson St.; cost, $2,500.

N. Fagen, three-st'y store and dwell., Halsted St.; cost, $8,000; architect, P. W. Ruehl.

Geo. Prince, 3 cottages, Erie St.; cost, $3,000.

M. Kleiner, two-st'y dwell., 3525 Vincennes Ave.; cost, $5,000.

D. Buchanan, two-st'y store and dwell., 313 West Twelfth St.; cost, $4,000.

J. Johnson, three-st'y flats, 68 Mohawk St.; cost, $3,000.

J. Conway, two-st'y dwell., 318 Webster Ave.; cost, $5,000; architects, Furst & Rudolph.

G. A. Engelhardt, two-st'y dwell., 13 Emma St.; cost, $3,500; architects, Shaub & Berlin.

Detroit.

BUILDING PERMITS. — The following permits, amounting to $5,000 or more, have been granted since last report:

W. E. Brown, roller-skating rink, East Larned St.; cost, $25,000.

Peter Hedricks, new St. Mary's Church, cor. Crogan and Antoine Sts.; cost, $65,000.

H. H. Humphreys, brick dwell., 38 Henry St.; cost, $6,000.

Hugh McMillan, new stores, 407-9 Woodward Ave.; cost, $5,000.

Thomas Payne, three-st'y brick dwell., 38 Willis Ave.; cost, $6,000.

Mason & Rice, brick dwell., Parsons St.; cost, $6,200.

C. L. Cole, three-st'y brick building, 63 Alexandrine Ave.; cost, $6,000.

W. H. Travis, three-st'y double brick building, 232 Fourth St.: cost. $6,000.

William Myll, three-st'y brick dwell., 83 Macomb St.; cost, $8,500.

William Scott & Co., three-st'y brick dwell., 619 Cass Ave.; cost, $6,600.

M. W. Scovel, three-st'y brick block, 92-94 Grand River Ave.; cost, $6,500.

Nuppenan & Clark, two-st'y brick dwell., 565 Jefferson Ave.; cost, $5,000.

Nuppenan & Clark, three-st'y block of eight dwells. on Second Ave.; cost, $24,000.

Charles Goodnow & Co., two-st'y double brick dwell., 254-256 Fourth St.; cost, $5,000.

George C. Codd, two-st'y brick dwell., 78 80 West Adams Ave.; cost, $5,400.

A. C. Varney, three-st'y brick dwell., 596 Cass Ave.; cost, $8,000.
Three two-st'y brick dwells., 529 to 539 Trumble Ave.; cost, $12,000.
Two-st'y brick dwell., Hendrie St.; cost, $5,200.
Four two-st'y frame dwells., Putnam St.; cost, $5,-500.
William Scott & Co., two-st'y brick dwell., Woodward Ave.; cost, $18,000.
Two-st'y brick and slate dwell. and frame barn, Holden St.; cost, $6,500.
S. W. Jackson, two-st'y brick block of six stores, 360 to 374 Grand River Ave.; cost, $19,600.

New York.

STRIKE. — The continuation of the bricklayers' strike has a very depressing influence on the market, and should the men gain their point, it will seriously curtail contemplated improvements.

STORE. — On the s e cor. of Broome and Mulberry Sts., a five-st'y 25'-front store is to be built from designs of Mr. J. B. Snook, for Mr. P. Skelly.

STABLE. — At No. 416 East Seventy-sixth St., a three-st'y brick stable is to be built by Mr. Hy. Wiessen.

CHURCH. — On the n s of One Hundred and Fifteenth St., 100' w of Pleasant Ave., a brick and stone church, 65' x 100', is to be built for Our Lady of Mt. Carmel Roman Catholic Church, from designs of Mr. L. J. O'Connor.

BUILDING PERMITS. — *One Hundred and Fiftieth St.*, s s, 175' w Courtland Ave., two-st'y frame dwell., gravel roof; cost, $3,000; owner, Agnes Walsh, 245 East One Hundred and Twelfth St.; architect, J. Walsh; builders, P. Sprague and S. Smith.

Eighty-fifth St., n s, 300' n Second Ave., five-st'y brown-stone tenement, tin roof; cost, $15,000; owner, Patrick Keyes, 352 East Seventy-eighth St.; architect, A. B. Ogden.

Second Ave., s e cor. Seventy-first St., 4 five-st'y brown-stone tenements, tin roofs; cost, each, $14,000; owner, F. A. Seitz, 315 East Forty-second St.; architect, F. A. Barus.

First Ave., n e cor. Seventy-second St., five-st'y brown-stone tenement, tin roof; cost, $18,000; owners, Ph. and Wm. Ehling, St. Ann's Ave., One Hundred and Fifty-sixth St.; architects, A. Pfund & Son.

First Ave., e s, 26' 7'' n Seventy-second St., five-st'y brown-stone tenement, tin roof; cost, $15,000; owners, etc., same as last.

First Ave., *No.* 1348, five-st'y brick and stone store and tenement; tin roof; cost, $17,000; owner, Jacob F. Wahrenberger, 130 Greenwich St.; architect, F. W. Klemt.

East One Hundred and Thirty-fourth St., *No.* 597, 2 three-st'y brown-stone front dwells., tin roofs; cost, each, $3,500; owner, James Maginn, 18 Broadway; architect and builder, Wm. P. Anderson.

East Fifty-first St., *Nos.* 347 *and* 349, 2 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, John W. Smith, 1574 Park Ave.; architect, Wm. R. Smith.

One Hundred and Forty-sixth St., s w cor. Railroad Ave., two-st'y brick factory, tin roof; cost, $4,000; owners, Edwards & Co., One Hundred and Forty-fourth St., near McComb's Dam; architect, Wm. J. Merritt.

One Hundred and Sixth St., n s, 125' w Ninth Ave., five-st'y brick flat, tin roof; cost, $15,000; owner, Henry Bornkamp, 306 West One Hundred and Twenty-seventh St.; architects, Maclay & Davies.

Bergen Ave., *Nos.* 610 *and* 612, two-st'y frame workshop and dwell., tin roof, cost, $3,400; owner, Theodore Von Gerichten, 722 Westchester Ave.; architect, S. Kramer.

Eighty-sixth St., s s, 70' w Fourth Ave., 2 four-st'y stone and brick dwells., tin and slate roofs; cost, $25,000 and $27,000; owner, Thomas Parson, 2 East Eighty-fifth St.; architect, Wm. Baker.

Bleecker St., *No.* 9, three-st'y brick store, tin roof; cost, $6,000; owner, Mary Wright, Brooklyn; architect, Fred. C. Withers; builder, E. H. Day.

Seventh St., *Nos.* 223 *and* 225, 2 five-st'y brick tenements, tin roofs; cost, $15,000 each; owner, Fred. Heerlein, 932 Second Ave.; architect, J. Kastner.

Sixty-first St., s s, 81' w Boulevard, 5 five-st'y brown-stone front flats, tin roofs; cost, each, $18,000; owner, Selig Steinhardt, 650 Madison Ave.; architects, A. B. Ogden & Son.

Third Ave., s e cor. One Hundred and Seventh St., 4 five-st'y brown-stone front flats and stores, tin roofs; cost, each, $18,000; owner and builder, Thos. McManus, 709 Lexington Ave.; architect, J. H. Valentine.

Tenth Ave., s w cor. Sixty-seventh St., 3 five-st'y brick tenements and stores, tin roofs; cost, two, each, $18,000, corner, $20,000; owner, Julius Johnson, 101 East One Hundred and Nineteenth St.; architect, J. H. Valentine.

ALTERATIONS. — *Pine St.*, *No.* 5½, iron skylights, iron stairs, hardwood and glass partitions, etc.; cost, about $15,000; owner, Wm. K. Aston, 22 West Fifty-sixth St.; architect and iron, —— McKinney; builders, Fauchere & Co. and Bogert & Bro.

Catharine St., *Nos.* 1, 3 *and* 5, repair damage by fire; cost, $4,539; owner, James E. Sandford, on premises; builder, Henry Wallace.

East Eighty-second St., *No.* 151, raise one st'y and build bay-window on rear; cost, $4,000; owner, A. Vanderbeck, on premises; architect, John McIntyre; builder, M. McGinty.

East Fortieth St., *No.* 119, raise one st'y; cost, $4,000; owner, Jane B. Eddy, on premises; architect, E. A. Sargent; builders, Wm. Haigh and McDowell & Robinson.

Philadelphia.

THEATRE. — The Bijou Theatre, situated on Eighth St., below Vine, is to undergo alterations, from plans by Wilson Bros. & Co., architects; also, two dwells. adjoining.

BUILDING PERMITS. — *N. Twenty-fifth St.*, *No.* 1512, two-st'y dwells., 15' x 50'; Frank Gilbert, contractor.

Market St., *Nos.* 1730 *and* 1732, 2 two-st'y stores and dwells., 14' x 84' 6''; C. L. Grubb, contractor.

Delhi St., n of Susquehanna Ave., 2 two-st'y dwells., 16' x 45'; B. F. Bryan, owner.

Bowman St., w of Thirty-fifth St., three-st'y dwell., 17' x 45'; C. Bartle, contractor.

Trinity Pl., between Twenty-second and Twenty-third Sts., fourth-st'y addition to 6 dwells.; B. Ketcham & Son, contractors.

Krail St., s of Queen St., three-st'y dwell., 18' x 46'; C. Bartle, contractor.

Main St., rear of, above Scott's Lane, two-st'y mill, 40' x 100'; I. & J. Dobson, owners.

Chestnut St., *No.* 2209, three-st'y dwell., 18' x 60'; D. J. Comber, owner.

Sepviva St., cor. York St., three-st'y dwell., 17' x 52'; W. D. Huston, contractor.

Thirteenth St., below Washington Ave., two-st'y shop, 20' x 82'; Jno. Russell, owner.

Twenty-seventh St., cor. Jefferson St., 8 two-st'y and 7 three-st'y dwells., two 13' x 38', and thirteen, 14' x 46'; P. H. Somerset, owner.

Forty-third St., cor. Silverton St., 4 three-st'y dwells., 16' x 48'; Jas. Bradley, contractor.

Fifty-sixth St., n of Haverford, two-st'y dwell., 18' x 45'; Chas. H. Young, contractor.

Broad St., cor. Wood St., addition to Industrial Art Hall, 60' x 63'; R. J. Dobbins, owner.

Lawrence St., *No.* 1436, three-st'y dwell., 15' x 40'; Geo. Kessler, contractor.

Bread St., n of Arch St., four-st'y factory, 50' x 90'; Thomas Leaming, contractor.

Second St., cor. Willow St., four-st'y store, 20' x 40'; A. B. Levis, contractor.

North Sixth St., *No.* 1815, two-st'y shop, 31' x 100'; Theo. Cornell, owner.

Neff St., w of Richmond St., two-st'y dwell., 16' x 42'; J. Ziegler, contractor.

Margaretta St., cor. Worth St., three-st'y dwell., 18' x 50'; Thos. Waters, contractor.

Richmond St., cor. Allegheny Ave., four-st'y warehouse, 39' 5'' x 100'; S. B. McDowell, contractor.

Sixty-third St., cor. Vine St., 2 three-st'y dwells., 18' x 53'; Dickey & Arrison.

Thirty-first St., cor. Girard Ave., one-st'y railroad-station, 14' x 60'; C. R. Kohl & Bro., contractors.

May St., between Westminster and Lancaster Aves., 3 two-st'y dwells., 14' x 30'; R. G. Black, contractor.

Saller's Lane, cor. Keystone St., 2 three-st'y dwells., 16' x 31'; Geo. Still, contractor.

Sixth St., n of Erie Ave., two-st'y dwell., 16' x 42'; Albert F. Raw, contractor.

Gillingham St., between Tackawana and Mulberry Sts., two st'y dwell., 14' x 40'; Wm. Worrell, contractor.

Wharton St., *No.* 524, two-st'y dwell., 16' x 45'; Geo. C. Jackson, contractor.

Reed St., c of Ninth St., dwell., 16' x 36'; J. P. McGonigal, contractor.

Twenty-third St., between Berks and Norris Sts., two-st'y dwell., 17' 9'' x 35'; W. E. Shaffer, owner.

Sprague Ave., w of Dury's Lane, two-st'y dwell., 16' x 32'; McLaughlin & McManus, contractors.

Seventy-first St., cor. Greenway Ave., three-st'y dwell., 22' x 54'; Jno. Welsh, contractor.

Forty-first St., below Warren St., 2 two-st'y dwells., 16' x 42'; F. S. Michaelson, contractor.

Warren St., above Forty-first St., 6 two-st'y dwells., 14' x 42'; F. S. Michaelson, contractor.

Susquehanna Ave., between Delhi St., 2 three-st'y dwells., 15' x 42'; H. M. Campbell, contractor.

Thirty-sixth St., cor. Pine St., two-st'y veterinary college, 22' x 65'; J. Bradin, contractor.

Chester Ave., between Forty-eighth and Forty-ninth Sts., 4 three-st'y dwells., 17' x 55'; Jas. D. Arthur.

Wyoming St., w of Second St., three-st'y dwell., 32' x 38'; Jno. Davis, Jr., owner.

Duval St., w of Adams St., three-st'y dwell., 18' x 41'; Bella F. Maxwell, owner.

Penn St., n of Harrison St., 2 two-st'y dwells, 16' x 50'; J. C. Haines, contractor.

Cumberland St., w of Fourth St., 6 three-st'y dwells., 14', 15' and 16' x 44'; Brockelhurst & Ewing, owners.

Columbia Ave., *No.* 1937, three-st'y store and dwell., 22' x 71'; Hugh Hazlett, contractor.

Palmer St., e of Frankford Road, 2 three-st'y dwells., 16' x 45'; J. Ziegler, contractor.

Smedley St., cor. Venango St., 3 two-st'y and 1 three-st'y dwells., 14' x 30' and 16' x 32'; Julius Keller, contractor.

Eighth St., cor. Somerset St., three-st'y mill, three-st'y picker-room, two-st'y boiler-house, 29' x 66', 42' x 66', 65' x 200'; G. F. Payne & Co., contractors.

Orkney St., *No.* 2257, two-st'y dwell., 18' x 28'; E. C. Sheppard, contractor.

Twenty-third St., cor. Berks St., three-st'y store and dwell. and two st'y stable, 17' x 45' and 18' x 75'; P. H. Somerset, contractor.

Lawton St., both sides, between Moore and Mifflin Sts., 38 two-st'y dwells., 14' x 32'; J. E. Conroy, owner.

Vienna St., between Belgrade and Thompson Sts., two-st'y dwell., 17' x 49'; A. T. Richards, contractor.

North Twenty-fourth St., *No.* 1343, three-st'y dwell., 18' x 30'; W. R. Davis, contractor.

North Third St., *No.* 833, three-st'y dwell., 20' x 40'; Pauline Lehman, owner.

Thirty-sixth St., between Lancaster Ave. and Warren St., 6 two-st'y dwells., 15' x 46'; S. L. Sherman, owner.

Sixty-third St., cor. Vine St., one-st'y chapel, 53' x 73'; Jas. Johnston, contractor.

General Notes.

ATLANTA, GA. — The Capitol Commission have rejected all bids for the erection of a new capitol-building, and will advertise for more to be opened on September 24.

BINGHAMTON, N. Y. — Messrs. Hartwell & Richardson, architects, of Boston, have completed plans for a large residence, which will cost over $25,000.

BIRD ISLAND, MINN. — The foundation for the Catholic church is completed, and work on the superstructure will be pushed. The building will be 32' x 60'.

BRIDGEPORT, CONN. — The Catholics are to build a $70,000 church here.

DAVENPORT, IO. — The Sisters of the Academy are building a four-st'y building, 42' x 150' in size, to cost between $25,000 and $30 000.

HOLYOKE, MASS. — The committee on city property received, August 1, bids for the erection of an eight-room two-st'y brick school-house, with basement and attic, to be built on the corner of Chestnut and Sargeant Sts. The plans have been drawn by T. W. Mann.

KANSAS CITY, MO. — Hoover, Rhodes & Co., a warehouse, 75' x 130' 6'', five stories high, at Kansas Ave., cor. Hickory St.; cost, $30,000.

LINCOLN, NEB. — The corner-stone of the new Capitol of Nebraska was laid on the 15th ult.

NORWICH, CONN. — The Free Academy is to be enriched by the addition of a new building, the gift of Mr. W. A. Slater.

SHADYSIDE, PITTSBURGH, PA. — A house for Robert Pitcairn, Esq., is being built from plans by Wilson Bros. & Co., architects.

Bids and Contracts.

CINCINNATI, O. — The following is a synopsis of bids for joiners' work and wood flooring for the custom-house and post-office: —

Joiners' work, white pine and mahogany: the Robert Mitchell Furn. Co., $29,499.31; Tomlinson & Carsley, $41,076.35; James Griffith & Sons, $42,587.65; Jos. Thomas & Son, $44,039.

White pine and white oak: Mitchell Furn. Co., $22,675.14; Tomlinson & Carsley, $34,926.99; Griffith, $37,058.40; Thomas, $37,254.

White pine and black walnut: Mitchell, $26,187.49; Tomlinson & Carsley, $37,451.30; Griffith, $39,382.70; Thomas, $42,500.

Wood flooring: Mitchell, $23,861.81; Griffith, $17,-089; Thomas, $17,250.

Additional 5-4 flooring per square: Mitchell, $21; Griffith, $14; Thomas, $13.85.

The bid of the Robert Mitchell Furniture Company, $29,499.31, for white-pine and mahogany, and of James Griffith, $17,089, for wood flooring, the lowest in each case, has been accepted.

JACKSON, MICH. — The following is a synopsis of bids of low-temperature hot-water heating-apparatus for the court-house: —

Bartlett, Hayward & Co., $6,464 (*accepted*).
Kelley & Jones Company, $7,262.
Walworth Manufacturing Company, $7,997.
Marshbank & Tippett, $8,350.
Samuel I. Pipe & Co., $8,970.

PLYMOUTH, MASS. — The contract for building the new house of correction has been awarded to J. H. Coon & Co., of Boston, and they have given the required bonds. The building is to be finished by January 1, and work will be begun at once.

PROPOSALS.

JAIL. [At Salem, Mass.]

The undersigned will receive bids for the entire work, to reconstruct and enlarge the county jail at Salem to accommodate 150 prisoners. The main building will be of granite, and the additions of brick; the whole to be under the supervision of Rufus Sargent, the architect, and according to his plans and specifications, which can be seen at our office, court-house, Salem, from 9 A. M. to 4 P. M., every day **from August 11 to August 18.** Proposals directed: John W. Raymond, Chairman of the Board. The Commissioners reserve the right to reject any or all bids, if, in their judgment, the interests of the county require it.

JOHN W. RAYMOND,
EDWARD B. BISHOP, } County Commissioners.
451 GEORGE J. L. COLBY.

STONE AND BRICK WORK. [At Hannibal, Mo.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., July 25, 1884.

Scaled proposals will be received at this office **until 2 o'clock, P. M., on the 16th day of August, 1884,** for furnishing all the labor and materials for building, complete, the basement and superstructure of the post-office, etc., at Hannibal, Mo., in accordance with drawings and specifications, copies of which may be seen and any additional information obtained on application at this office or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
450 Supervising Architect.

WHARFINGS. [At Three Rivers, Conn.]

HARBOR COMMISSIONERS' OFFICE, July 14, 1884.

Sealed tenders, addressed to the undersigned, and endorsed, "Tenders for Three Rivers Harbor Works," will be received **until Saturday, the 9th day of August, 1884,** for the construction of Deep Water Wharfing in the Harbor of Three Rivers, according to a plan and specification to be seen on application at the Harbor Commissioners' Office, Three Rivers, on and after Saturday, the 19th day of July, 1884, where printed forms of tender and other information can be obtained.

The works to be constructed are payable in Three Rivers Harbor Debentures.

Persons tendering are hereby notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank check for the sum of $1,000, payable to the Chairman of the Harbor Commission, which will be forfeited if the party tendering declines to enter into the contract for the work.

For the due fulfilment of the contract security will be required by the deposit of money to the amount of five per cent on the bulk sum of the contract, of which the sum sent in with the tender will be considered a part. All checks will be returned to persons whose tenders are not accepted.

The Commissioners do not, however, bind themselves to accept the lowest or any tender.

By order, GEORGE BALCER,
450 Secretary Harbor Com. Three Rivers.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

WE regret extremely to learn that Mr. Thomas Wisedell, of New York, one of the most distinguished among the younger architects of the country, died suddenly July 31. Mr. Wisedell was born in England in 1846, and trained in the office of Mr. R. J. Withers, of London. At the completion of his professional education he was induced to come to this country, and showed conspicuous ability in his work for Messrs. Vaux and Withers, and in connection with Mr. F. L. Olmsted. Some years ago he formed a partnership with Mr. Kimball, and the firm of Kimball and Wisedell rapidly gained a reputation in the profession surpassing even that which it acquired among the public. One of the first buildings executed by the new firm was the beautiful Madison Square Theatre, a structure as remarkable for its excellent plan and the unprecedented thoroughness of its ventilation as for the originality and interest of its detail. This brought deserved credit to the young architects, and among other smaller theatres the firm was employed to design the Casino, on Broadway, which, although hardly yet complete, presents perhaps the most remarkable series of designs of detail, in a very difficult style, that can be seen in this country. No New York building that we know is so full of interest to the architect or student, and the professional visitor, whether he sympathizes with the style selected or not, is sure to be greatly impressed with the fertility of imagination, and the pure taste which displays itself in endless ways at every turn. Of the smaller works of the firm we do not know enough to speak, but that one of the architects of the Casino and the Madison Square Theatre should have been taken from us at the very beginning of his career is a misfortune both for the public and the profession.

WE have often had occasion to say that if architects would work only for those who thought enough of their services to ask for them, and would let the condescending persons who merely "consent to receive designs" competitive or otherwise, carefully alone, they could be reasonably sure of getting their pay for their skill and trouble. Most members of the profession find, as they advance in years, that people in general have a high respect for the technical knowledge which good professional standing implies, and would never dream of trying to get the benefit of it without paying for it unless the meaner architects themselves put it into their heads; and juries, in accordance with the common feeling, seldom fail to give due consideration to the value of an architect's care and knowledge, and to see that he is paid for them if he does what is reasonably to be expected of him. One of the most recent cases in which an architect was obliged to collect his pay by legal process was decided in England last month. In this the plaintiff furnished plans and supervision for certain houses, but in the course of the work the builder abandoned his contract, and the architect was put to a good deal of trouble in seeing that the building operations were properly continued by a fresh set of men. For this extra duty he was promised additional compensation, but when everything was done his client kept back about eight hundred dollars of the commission and extra fees, and presented a claim of ten thousand dollars as damages for "negligence" on the part of the architect. The latter brought suit for the amount of his bill, and a referee was appointed to examine into the justice both of this and the counter-claim for negligence. His award, as is usual in such cases, was wholly in favor of the architect, the claim for negligence being dismissed as groundless, and the architect's bill for services and extra compensation being confirmed, with full costs.

THE great Washington Monument is rapidly approaching completion, and, according to the newspaper correspondents, the walls will be ready for the roof about the middle of August. The plan originally devised by Colonel Casey, of terminating the structure by a pyramidal roof of iron, seems to have been abandoned, and the stone-work will be carried to the very apex of the monument. To sustain the courses of marble which compose the roof, stone ribs have been constructed, springing from corbels in the interior angles of the walls, and meeting in the centre. These form a very strong skeleton, on which the overhanging blocks will rest quite securely. The height of the walls of the shaft above the ground is now five hundred and seven feet, and they will be built ten feet higher before the base of the "pyramidion," which is to be twenty-five feet high, is reached. The total height will thus be five hundred and forty-two feet from the ground to the copper point which serves as a lightning-rod at the top of the monument. The construction of the walls, since the work was put into Colonel Casey's hands, has been very strong, the whole upper portion being of cut stone in regular courses, in place of the miserable ashlar backed with rubble which our ancestors thought good enough for the lower portion, and it is perhaps to be regretted that ages are likely to elapse before the monument will fall down.

A CURIOUS method of excavating a deep railway cutting was recently adopted on a new road in France. According to *Le Génie Civil*, the contractor for the earth-work of the road, finding himself obliged to penetrate a hill of gravel, and not wishing to go to the expense of tunnelling, resolved to undertake a middle course, excavating the cutting from below instead of from above, and thus taking advantage of the force of gravitation to fill his gravel cars, instead of working against it to hoist the material out of the excavation. The first step was to drive a rough tunnel into the side of the hill, supporting the sides and top with timber, but leaving openings in the roof, temporarily closed with planks, which could be withdrawn at any time from below. As fast as the tunnel advanced, a track was laid into it, and another body of laborers at the same time occupied themselves in sinking pits from points on the surface of the hill vertically over the openings in the tunnel roof. The gravel was so firm that the sides of the shaft would keep themselves in place with little timbering for a few days, and it was only necessary, when the pit had reached the roof of the tunnel, to remove the planks, leaving a clear passage from the top to the bottom of the excavation. As soon as this was done one or more short trains of gravel cars were moved into the tunnel, and stationed under the shafts, and the workmen above them attacked the edges of pits, throwing the material down with crow-bars in large lumps, directly into the cars below. As soon as a car was full, a man who remained in the tunnel gave a signal, and moved the train forward so as to bring the next car under the shaft, when the work proceeded as before. The excavation around each shaft soon took the form of an inverted cone, and joined itself to the corresponding cone about the next shaft, leaving only a small intervening mass to be cleared away. After a short experience of the rapidity with which work could be carried on in this way, the contractor improved his system by fitting an iron door to the lower aperture of the shaft, which was closed by the men below during the shifting of the cars, without interrupting the work at the top of the shaft, the door retaining the material thrown down until the next car was ready to receive it. In this way, with gravel cars holding three and one-half cubic metres each, it was found practicable to move, through two shafts only, four hundred and fifty cubic metres per day. While this was going on, the tunnel was pushed forward by another set of men, and new pits sunk, the timbering being released by the completion of the excavation fast enough to serve in sustaining the advancing portion of the pioneer tunnel. The expense of tunnelling was a little less than two dollars a foot, and the shafts cost twenty dollars each, while timbering was consumed to the value of about sixty-five cents per foot of tunnel; but with the help of twelve hundred feet of tunnel and four shafts, costing about three thousand dollars, two hundred and six thousand cubic metres of gravel were moved in the easiest possible manner.

A COMPETITION is announced for the new Exchange building at Amsterdam, arranged in the manner now becoming common in public competitions abroad. The first competition closes on the first of next November, and is open to all architects. From the designs sent ten are to be selected, the authors of which will receive equal prizes of two hundred dollars each, and five of the ten architects so distinguished will be commissioned to prepare drawings for a second competition, in which all the contestants will receive prizes, varying in value from six hundred to two thousand dollars. A jury, containing a number of eminent architects from various countries has already been chosen, among the members being M. Paul Sédille of Paris, Professor Kerr of London, and Herr Cuypers of Amsterdam.

LE Génie Civil gives a brief comparative view of the populations of the principal cities in the world, which contains some interesting particulars, especially in regard to the European cities of the second rank. It is remarkable that the proportion between the population of Paris and that of London has remained nearly constant for a hundred years, although within that time each has nearly quadrupled. Thus, in 1789 Paris contained six hundred and fifty thousand souls, while London counted barely a million; in 1836, about fifty years later, Paris had reached something less than nine hundred thousand, and London something less than a million and a half; while in 1882 Paris had two millions two hundred and twenty-six thousand, in round numbers, and London three million eight hundred and thirty-two thousand. It thus appears that, as in the United States, the crowding of population in Europe from the country to the great cities is a matter of recent times, the percentage of accession of population in the first half of the past century having been, in London and Paris, little more than one-fourth that of the latter half of the century. What change in the moral nature of civilized men this movement may indicate we will not stop to inquire, but, whatever it may be, it is shared by a great part of the people of the world.

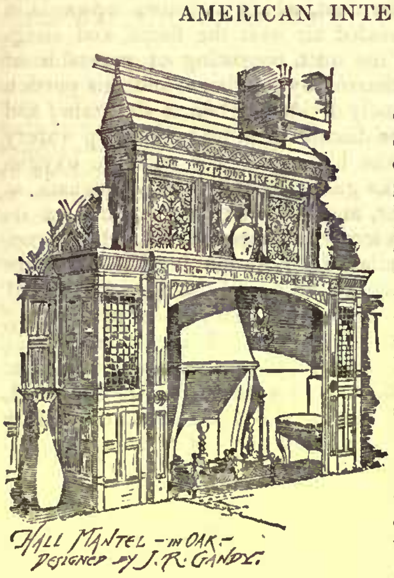
AMONG the smaller cities of Europe, Berlin shows the most remarkable growth, the population, which in 1836 was two hundred and forty thousand, being, now a million and a quarter, or something more than five times as great as it was forty-six years ago. A part of this increase is to be accounted for by the increased political importance of the city, but even Vienna, which has lost, rather than gained in this respect, contains nearly four times as many people now as in 1836. New York stands about half way between Berlin and Vienna in prosperity, having multiplied its population by something less than four and one-half in the fifty years from 1830 to 1880. Exceptions to the general rule are to found only in the countries most removed from the influence of modern ideas. Thus Constantinople has gained little or nothing in thirty years, and Naples very little. Moscow, Warsaw, Rome, Budapest, Amsterdam and St. Petersburg have about doubled in the same time. A few cities like Saint Etienne, Lille, and some English places, have, through the development of a special industry, increased in population within a few years at a rate surpassing the growth of our own Western towns.

MR. THOMAS FLETCHER, whose remarkable experiments on the flameless combustion of gas will be remembered by our readers, makes some practical suggestions about the so-called smoking of gas-flames which will interest architects, as well as the householders whose troubles they endeavor to anticipate. Every one has observed the black or brown stains on ceilings over chandeliers or bracket-burners, particularly on those which burn during the daytime as well as the night, and has probably ascribed them to the smoke from the burner, perhaps not without some wondering that a flame so clear, and apparently so smokeless, should be able to stain the white plaster four or five feet above it. According to Mr. Fletcher, the apparent absence of smoke from the ordinary gas-flame is real, and the stains which appear on plastered surfaces over it are not caused by smoke, but by dust, which is thrown upwards in the ascending current of heated air over the flame, and clings to the ceiling. A part of the dust, consisting of vegetable or animal fibres, is probably charred by the flame, and this portion gives the brown color of finely divided carbon to the stain; and the flame further assists the discoloration by sending up watery vapor, from the union of the hydrogen in it with the oxygen of the air, which, when the gas is first lighted, condenses as moisture on the cold plaster, and collects flying particles on its adherent surface. The reason why lamps do not, when properly burned, cause a similar discoloration is that they are moved frequently from place to place, and, being, generally of less power than a burner, have less tendency to set up a strong ascending current in the air above them. The best remedy for the staining is, as might be expected, the suspension of a hood or bell over the flame. By this the upward current is dispersed, and diffusing itself in the cooler air about it, reaches the ceiling only slowly, and over a large surface, instead of being concentrated in a small area.

WE mentioned not long ago that an attempt had just been made to distribute force by means of water under pressure. It seems that the experiment, which is being carried on under the control of the General Hydraulic Power Company, in London, has proceeded so far, and with such successful results, that a considerable district is now supplied with the water, and the company has many subscribers. According to the account in *Engineering*, the force so distributed is used for operating hydraulic presses, lifts and pumps. The water supplied to the subscribers is pumped from the Thames, but, as this is very turbid, it is filtered before distribution by forcing through layers of sponge. The sponges get too foul for use after a day's service, and are then cleaned by an ingenious device, a small quantity of clear water being drawn back through them, while they are vigorously kneaded by the movement of a perforated piston, to which they are attached. The pressure maintained in the pipe is seven hundred pounds to the square inch, which seems to us far too high, at least for the purposes to which hydrostatic force would be applied in this country. In hydraulic presses of a simple kind it may be possible to pack the joints so that they will not leak under such a pressure, but the hydraulic elevators so much in use here could not be operated at all with a pressure half as great as that in the London mains. To say nothing of the cylinders, which would burst long before the maximum strain could be applied, it would be impracticable to keep either the valves or the packings tight, and leakage of water under such pressure would be a much more serious loss than that of steam. Whether the small motors made for driving light machinery would work under this pressure we do not know, but it is safe to say that none of them could utilize the force economically. There are so many apparent advantages in the distribution of power by water, in the absence of heat or danger from explosion, and other points, that we should be glad to see the system tried here, and we think that a preliminary study of the results to be obtained, and the best mode of obtaining them, such as Mr. Emery has carried on so successfully for the New York Steam Company, might prove a very profitable undertaking for some young engineer.

OUR attention has been drawn to the near approach of the opening of the New Orleans Exhibition, and we are requested to suggest to architects the propriety of contributing drawings, models or other illustrations of their work. A special effort is to be made to exhibit educational appliances, including examples of school buildings and furniture in the utmost possible variety, and those architects who have been particularly successful in the design of school-houses will find their work, as shown by plans, understood and appreciated. Not the least of the attractions, especially to Northern visitors, will be the vast gardens, covering nearly seventeen acres of ground, which are to be filled with tropical and other plants from Mexico, Central America, California and Florida. Besides these gardens, a great conservatory, six hundred feet long and nearly two hundred feet wide, is to be devoted to plants too delicate to bear the winter climate even of New Orleans. It is announced that contracts have been made with the principal railroads throughout the country by which the cost of transportation to and from New Orleans will be reduced, during the time the Exhibition if open, to a maximum of one cent a mile, with excursion rates of one-half or three-quarters as much.

AMERICAN INTERIORS.[1]



One's first impulse on turning over these photographs is to exclaim, "How truly American! How characteristic of the American humor for living in the glare of the public eye — in the newspapers as it were; for these views are, in fact, 'interviews' with the inanimate *lares* and *penates* which most people prefer to keep retired in the *penetralia* of their homes. 'Homes,' that is the key-note. Are these places homes or are they show-places, bric-à-brac museums and old curiosity-shops?" But a second thought calls to mind the "show" houses of aristocratic England where, when the family is away, 'Arry is allowed to roam almost at will, and cheek by jowl with Brother Jonathan, stares half understandingly at the treasures of art that have been accumulating there for ages. Where the ladylike housekeeper, in her decent silk dress, or the butler in more comfortable undress is always ready to extend the itching palm for the half-crown that Jonathan, at least, half hesitates to offer to such superior creatures. Is it, by the way, a philanthropic interest in the art education of the masses that has instituted and fostered this custom abroad, or is it an ingenious stroke of economy by which the illustrious owners are able to spare their pockets by suspending the housekeeper's salary in vacation time, putting her on board wages, and allowing her to make what she can by running the place as a kind of side-show for foreign and domestic excursionists?

We have no sympathy with the assertion that is so often made, that the possessor of a fine or unique work of art is in duty bound to show it occasionally to the public, either at a public exhibition or by opening his house or gallery more or less freely to the *profanum vulgus*. Our feelings are more in harmony with the amateur who having a work of art wishes to keep it to himself, and goes and revels in its beauties in complete solitude, or with some absolutely sympathetic friend. We can even appreciate the feeling of the late Duke of Portland who was unwilling that even the outside of his dwelling should be profaned by the gaze of the professed or accidental sightseer. But we are so far human that we are not unwilling that other people should be less exclusive, and though the arrogant parading of valuable possessions may grate upon our sensibilities we need not feel debarred from going to the show for the sake of the beauty that is there to be spread before us.

If any persons might be expected to be willing to take the public broadly to their bosoms it would certainly be the unconventional and democratic Westerners, and it is not surprising that the views before us represent the interiors of Chicago dwellings, with all the flavor of domesticity that might be expected in a "show-house." Just as there is no more certain means of gauging a man's social position than by discovering what manner of womankind belongs to him, so there is no better way of measuring his degree of intellectual or artistic culture than by examining his library, or the furnishings and arrangements of his house, and these views furnish a capital index of their owner's character. Only in this case there is always the difficulty to discover whether the man himself is responsible for selection and combination, or whether they are due to the trained judgment and taste of the bookseller and the architect.

There is much internal evidence which makes us feel that in most cases the architect of the buildings had, at least, an advisory function to perform in the populating, so to speak, of the rooms they had built; but people have of late been educated so rapidly in the harmonies and proprieties that the lay mind alone may be responsible for the results. At all events, there is little in these views to remind one of the crude lack of taste that not many years ago you might expect to find in a Chicago or other Western house, and the majority of them prove that there is no lack of architectural skill and taste of a high grade in the great Western city.

In these days of rapid transportation, and the almost electric spread of ideas the fashions change almost simultaneously everywhere, so that the latest work in Chicago is not appreciably less advanced than the latest work in the East — always assuming that the germination of artistic ideas takes place in the eastern hemisphere, and travels thence westward. Still we seem to perceive that the Neo-Gothic and the "Eastlake" styles have not become so completely things of the past in the West as they have in the East, though as the dates are not given with each subject, the houses in which these styles are employed may have been built when these styles were at the zenith of their popularity. But aside from these few examples we find the interiors treated in the now familiar conglomerate — a little Renaissance, a little Jacobean, a trace of Neo-Grec and modern Gothic, and enough of the real Eastlake to leven the mixture. This skeleton is then clothed—sometimes bedizzened—in the plunder of all climes and people. Persian rugs, Turkish *portières*, Japanese screens, Chinese tables and vases all in a room together show the cosmopolitanism if not the catholicity of the owner's taste. But few moderns would care to confine their surroundings exclusively to the style of any past epoch, and even the purist would be liberal-minded enough to enjoy the reproduction of the Panhellenic Procession in spite of the Chinese *portière* suspended beneath it, and the Gothic colonnettes of the bookcases that abut against it: and stretched at ease in a Wakefield rattan chair with an elbow on a table, a very masterpiece of Chinese carving, could wonder vaguely why a white marble Renaissance fireplace of really excellent design should have been introduced in the midst of so much black walnut Gothic finish. But a man's house, which used to be his castle, is now his museum, and the purist understands that things are to be considered as unticketed specimens, the tokens of the collector's prowess or the souvenirs of his travels, and is ready to grant that as an intellectually cheap way of securing an effect the modern fashion of furnishing has its advantages over that followed by the acknowledged masters of interior decoration in past times, who depended more on the proportion and consistency of their main work than on the adventitious aid of bric-à-brac of doubtful authenticity.

As a social study these views are exceedingly interesting, and as a means of satisfying herself how people live who do not include her venerable name on their visiting-lists, they must be a perfect boon to Mrs. Grundy. But they have, too, a considerable value and a real significance to the architect, one of whose unspoken thoughts on seeing some of the really good work shown would probably be, "Hullo! What luck these fellows have had to have such a client. I wonder if I can't induce So-and-so to let me do something of the kind for him?" The force of example is contagious, and "So-and-so" can probably be induced to spend a little more money than he had intended, and so another step is gained in art progress, for each example becomes a centre of instruction and constant stimulus to further effort.

Several things impress the observer as he turns over the views. One is that it is seemingly impossible for an architect to design a piece of furniture that shall be comfortable to use, or that shall impart to a room any air of coziness or hospitality. Side-boards have been positively mastered, tables have at length been persuaded to have their legs where the ordinary biped does not naturally wish to put his own, but beds are too often understood to be merely ornamental head-boards by the architect, who seems never to remember that one's limbs at night are not protected by the ungraceful trouser's leg, and that in the dark sharp angles are extraordinarily successful in "getting in" their hits. Chairs, big and little, so-called "easy" chairs, dining-room chairs and chamber chairs are in open revolt. Indeed, our advice would be to have an architect design everything rather than the chairs.

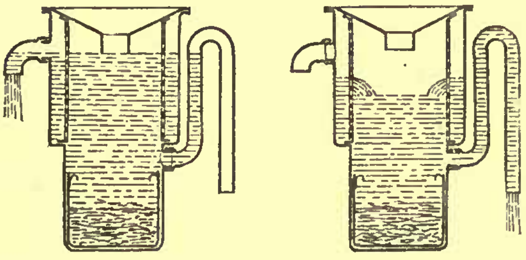
Another thing we remark is that Americans are certainly ingeniously inventive even if they are not always successful in their combinations and copyings. And a third thing we note is that the value of fine—in the sense of small and refined—members in interior mouldings is not yet fully appreciated, though a considerable advance has been made in this most effective means of securing an air of refinement in interior work. One other thing is to be noticed besides the general air of luxury which is so common to most of the subjects, — the advance that has been made in the arts of decoration, or rather the increase of the number of the minor arts whose products are now readily at the command of those who have money. A few years ago a stained-glass window in a private house was almost a nine-day's wonder, while here is abundant evidence that no house is considered truly "complete" without them. At that time it would have been almost impossible to find workmen who could produce the wood-carvings that are used so lavishly in the house of Mr. Wells; a ceiling of mosaic-work such as is shown in the library of Mr. Fields could not have been then made on this side of the Atlantic; the fireplaces would have lacked the Low-tile facings; the brass chandeliers would have been represented by monstrosities of imitation bronze, and the crumpled shades of opalescent glass by ground-glass globes with rudimentary designs cut on their surface; the walls would have been hung with the detestable flock or plush papers instead of the hangings now so charming in design and color; brussels carpets of sprawling pattern and glaring colors would have been tacked fast to pine floors, where now the foot of the unwary walker fails him as a small rug slips away over a polished marquetry floor. Time brings rapid change and advance, but we can hardly believe that the next decade will show the progress of that just past.

It is not our function to describe in a notice of this sort any of the individual examples, and still less to criticise the work of the architects here represented, but it may not be amiss to note some of the most successful of the work before us. For appropriate and ingenious design we think honors are easy between Mr. Jennison's dining-room for Mr. Spaulding, and Messrs. Wheelock & Clay's billiard-room for Mr. Wells, while the other views of rooms in the same house prove that no part of it has escaped the artists' careful attention. The fireplace by Messrs. Palmer & Spinning, which we publish elsewhere, tells its own story, while the dining-room for Mr. Libby, by Messrs. Treat & Foltz, shows some very carefully-designed fixed furniture.

[1] *Architectural Photographic Series*, Chicago Dwelling-House Interiors. Twenty-six Views in Portfolio. Price, $12.50. J. W. Taylor, Chicago.

The photographs themselves are very excellent specimens of interior views — almost the most difficult achievement of the photographer's art; but it would do no harm for the photographer to change his lens, and hereafter use one which will sharply define the whole field of the picture, for in many of these views the distortion and uncertainty on the confines of the print are very annoying. We do not know the extent of his possibilities, but the subjects he has selected are, as a rule, judicious, and if he can find other householders who do not shrink from publicity we advise him to go on as he has begun, with the certainty that enough architects will appreciate his efforts to make them reasonably remunerative to him.

AN INGENIOUS CATCH-BASIN.



IN 1882, M. Baclé published in *Le Génie Civil* a study of the sewer systems in some of the large foreign cities. There may be found there a description of the Liérnur system at Amsterdam, Leyden and Dordrecht, in Holland, and in certain cities of Germany and the United States.

This system consists in the employment of two distinct systems of ducts, one for the discharges from water-closets and the other for household wastes, rain-water, and the discharges from factories when sufficiently purified. This arrangement allows the employment of sewers of small section, provided that it shall be unnecessary to enter them for the purpose of cleansing them. It has been necessary, therefore, to provide inlets with a separating apparatus called "gully" or "catch-basin," which retains as completely as possible all solid matter, mud, excrement, and débris of every kind which may be floated in by street-washing or by rain-water, and which may be capable of causing stoppages in the sewers, the choking-up being followed by fermentation and the emanation of noxious vapors.

M. C. Pieper of Berlin suggests a device for a catch-basin, which appears to meet the requirements. It is in the form of a cylindrical metal box, enlarged in its upper section to receive a filtering cylinder of perforated sheet-iron which occupies almost the upper half of the device and rests upon the smaller lower part. The entire apparatus is covered by a movable funnel, through which enters water and any rubbish which it may carry with it. From one side a tube allows the liquid to be discharged, while a siphon placed on the opposite side serves the same purpose under certain circumstances, as will be explained.

Figure 1 represents the apparatus discharging under normal conditions. The heavy matter, sand, stones, etc., falls to the bottom into a receptacle which can be lifted out from time to time and emptied. The lighter buoyant matters, straw, vegetable débris, paper, etc., remain at the surface, and are retained by the filter; the water passing through the holes in the sheet-iron rushes in a filtered condition through the annular space which exists in the upper part between the two cylinders and escapes by the waste-pipe when the water reaches a proper level. If at a given moment the quantity of water flowing in is too much to be discharged through this waste-pipe, the level of the water mounts in the cylinder until it reaches the top of the siphon. Immediately the siphon comes into play and empties the upper part of the apparatus, and the filtered water contained in the annular space already mentioned quickly reënters the cylinder through the perforated sheet-iron, and in so doing cleans out the perforations with considerable energy. This second period is represented in the second figure.

The mouth of the siphon being placed above the movable basket, the heavy matters contained in the latter are not in the least disturbed, and the metallic screen placed over the mouth prevents the entrance of any floating matters. When siphonic action ceases, the water in the short arm of the siphon empties itself into the main receptacle, and by so doing cleanses this screen. During a rain or the washing of the streets, the siphon can work in concurrence with the ordinary discharge-pipe. It is evident of course that these two pipes can be placed on the same side of the apparatus, if this prove the most convenient arrangement.

We will add that this apparatus can be applied not only to the Liérnur system, but also can be used for preventing the entrance of obstructions into sewers of the ordinary type, where the grade is small or where the quantity of water is insufficient; and if we adopt the system of "everything to the sewer," can we not find in the employment of this apparatus an element for the realization of the famous formula, "Always in circulation, and never in stagnation." — *Le Génie Civil.*

The Baltic-North-Sea Canal. — Prince Bismarck has ordered the engineers to hasten the preparations of the plans for a canal from the Baltic to the North Sea. The necessary credits for the construction of the canal will be asked of the Reichstag at its coming session.

LEAD-LIGHT AND STAINED-GLASS GLAZING. — I.

IN the séries of papers of which this is the first, we propose to deal briefly but practically with the whole subject of stained glass as used by the glazier—a subject as yet, we believe, without its literature. First, we purpose to detail the routine of ordinary lead-light glazing, and then proceed to the use of stained glass for ecclesiastical and secular purposes, with notes on the classes and qualities of the different varieties of stained glass itself; and, lastly, conclude with a few succinct but simple hints on the art of glass painting. The last we shall endeavor to render useful and beneficial to the aspiring provincial glazier or ambitious apprentice, as showing them how to finish any small job intrusted to them with their own hands.

We are well aware that of late years (more is the pity!) the British workingman has not shown himself either artistic or æsthetic; but it is to be hoped that in these days of technical education and universal drawing-classes he will shake off his apathy and occupy a higher plane. We know that the English artisans — as masons and blacksmiths — of the Middle Ages were fully equal to the natives of any other land as art-workmen. Witness the glorious carvings in wood and stone which adorn some of our cathedrals, and the magnificent relics of ancient iron-work still preserved amongst us. It is difficult to conceive of any job which could give greater satisfaction to a small but ambitious tradesman who loves his craft than an order from some parish priest in the country to the local glazier for a small memorial window for the baptistery or nave. It would not alone be in the satisfaction that such an operative would feel when he received the design from the parson that he was able to order the correct and best material of his glass-cutter, to fix it in a workmanlike manner in a well-made fret-work, and even to paint the hands and faces, and shade the robes; but in the knowledge that his handiwork would adorn the house of God, and be pointed at by generations yet unborn with the comment, "Ah, that beautiful window was made by old Mr. Vitrail, who lived in Mile Street, long ago, and is much admired." It was in this spirit the mediæval artist worked, and we see how he succeeded.

We are not concerned here with any elaborate historical disquisition on the discovery and antiquity of window-glass. It is sufficient to mention that glass itself was probably known to the Egyptians as early as B. C. 1500; that it was certainly used by the Romans for glazing at the beginning of our era, as is proved by the discovery of a pane of glass in the ruins of Herculaneum, which city was destroyed by an eruption of Vesuvius in A. D. 79; and, lastly, that stained glass was probably first introduced into this country by St. Biscop Baducing, a monk, and that the parish church of St. Peter, at Monk Wearmouth, has the honor of being the first British church in which it was used. The exquisite charm of stained-glass windows has always been keenly appreciated by poet and painter, and indeed by all people of sensitive and æsthetic spirits. Even the stern Puritan mind of the youthful Milton has enshrined in "Il Penseroso" the glories of the Oxford glass, and the "storied windows, richly dight, casting a dim, religious light," which have passed into a proverb from Milton's song, still cast, in King's College chapel, the same "soft chequerings" upon their framework of stone, while Wordsworth watched through the pauses of the anthem the winter afternoon's departing glow,—

> "Martyr, or king, or sainted eremite,
> Whate'er ye be that thus, yourselves unseen,
> Imbue your prison bars with solemn sheen,
> Shine on, until ye fade with coming night."

It is, however, a strange fact that one effect of the witchery of stained glass is a matter of dispute. Few people who have read it will ever forget the striking night-scene in the "Lay of the Last Minstrel," where the rough moss-trooper, William of Deloraine, and the "Monk of St. Mary's Aisle," watch together in Melrose Abbey until the hour should come to open the tomb of the wizard, Michael Scott. We are told of the great chancel window —

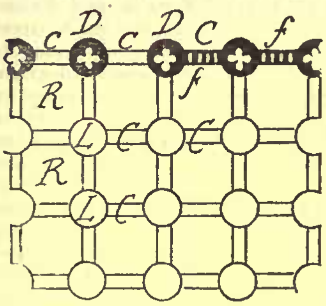
> "Full in the midst of his cross of red,
> Triumphant Michael brandished,
> And trampled the apostate's pride;
> The moonbeams kissed the holy pane,
> And threw on the pavement a bloody stain."

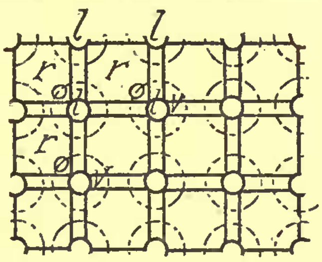
And at a certain hour the figure of the cross fell on the slab which covered the sorcerer's tomb. A perhaps still better known passage is that stanza from Keat's exquisite "Eve of St. Agnes": —

> "Full on the casement shone the wintry moon,
> And threw warm gules on Madeline's fair breast;
> As down she knelt for Heaven's grace and boon
> Rose bloom fell on her hands together prest,
> And on her silver cross fair amethyst,
> And on her hair a glory like a saint."

Now, the remarkable point in connection with these passages is that several modern authorities explicitly deny that the moonbeams cause any colored reflections from stained glass, and the point in question between them and the poets is not yet satisfactorily settled.

In all that relates to coloring, one very noteworthy thing is that the juxtaposition of the different hues is an important point in the general effect. In painting, the Venetians, the Flemings — in fact, all the great colorists — have been aware of this. That which is true of painting, as applied to canvas, panel or fresco, is of still greater importance when it affects a translucid picture, such as is presented by stained glass. Of course, in ecclesiastical glazing, where the glazier receives the design from the artist, he has no concern with the matter of the juxtaposition of colors, as the designer is responsible. But, as he may be often called upon to get out a simple window for secular glazing it is best that he have some general ideas to guide him as to the fitness of the glass which he should use. This is a matter well worthy of the study of the aspiring artisan, and he is recommended to make himself thoroughly familiar with its details by the careful perusal of some elementary work on color. In glass the colors participate in the light that passes through them, and have such an effect that the least piece of colored glass takes, at a distance, from its reflective nature, a prodigious importance. But this quality differs much with the different colors, thus to take the three fundamental colors, those of the prism. Blue is the color which sends out the most rays, and red the least, yellow occupying an intermediate position as a radiator. Thus suppose a design in stained glass resembling Figure 1. The heavy black lines indicate the leading. The compartments R are red, L blue, and the fillets C white. Now let us see the effect this disposition will produce on the eye of a spectator placed at a distance from the window of, say, a few yards. The circular blue compartments *l* (Fig. 2) will extend their rays or influence so far as the dotted circles, and the red spaces *r* will therefore remain unaffected only in the middle of each of their compartments. It results from this that all the surface *o* will be red, glazed with blue — that is to say, violet — and that the isolated fillets of white between them, not giving off any rays themselves, will be lightly tinged with blue at the spaces *v v*, as will the leads themselves, and that the general effect of this piece of glazing will be cold and violet-hued over the greater part of its surface, with the red spaces *r r* bad and unpleasant if the spectator stands near the window, and dull and sombre if he be far distant from it. But if we diminish the field of each blue piece by some black painting, as at D D (Fig. 1) we neutralize in part the effect of the rays issuing from these pieces. If, in place of the white fillets C, we put fillets of a yellowish-white or a greenish-white, and if we paint the fillets in black, with a pattern as at *f f* (Fig. 1), leaving the pearls as shown, then we obtain a much better effect. The blues, thus powerfully surrounded by black designs, and even having such designs on their own surface, have the raying faculty much diminished; the reds are rendered much less violet by their neighborhood. The yellowish tones on the greenish-whites of the fillets acquired fineness and depth by the proximity of the blue, which, affecting their extremities, leaves between them a warm portion which allies itself pleasantly with the red. These beneficial effects are strengthened if the leads have been made broader or if the fillets have been painted with the pearls as at *f f* (Fig. 1). Suppose now, on the contrary, that the quarries R R (Fig. 1) are blue and the discs L L are red. In that case the powerful influence of the blue, relative to the small patches of red, will be such that these patches will appear of a black or a sombre violet, and that the observer would not be able to suspect the presence of red. The white fillets would appear a dirty gray or green if they are yellow, or blue-green if they are of a greenish-white. The general effect would be unpleasant and bad. The influence of the large amount of blue would subdue and fade all the other lines, the coloration would be cold, and the tonality false, for in glass, much more than in painting, each tone only acquires its proper value by the due juxtaposition and opposition of other tones. A clear blue near to a green-yellow becomes turquoise color; the same blue near to a red is a brilliant azure. Red near to straw color takes an orange hue in the same manner that it becomes violet near blue. These elementary principles were well known to the glass-workers of the twelfth century, at which era the art reached its highest development. When what may be called the modern revival of ecclesiastical stained-glass came on (a revival which owed much to the efforts of Mr. Pugin), it was found that the earlier efforts were terribly crude and harsh. Now, the great characteristic of antique stained-glass is its charming quietness and harmony. Upon this subject we cannot do better than transcribe some remarks of the late Rev. G. A. Poole upon this quality, and the modern attempts to attain it: —





"As in the works of nature, which have been fed on sunshine and light and the air of heaven, so also in old glass; all colors harmonize, though they promise, according to the Newtonian theories, or M. Chevreul's canons, to be most discordant. Yet we do our forefathers more than justice if we attribute to them conscious science or skill in the harmonizing of colors. In decorative painting they neither had it, nor sought for it, nor cared for it. In their windows they neither sought for it nor cared for it; but they *had* it in perfection. An exact reproduction of any old window in modern glass (exact, I mean, so far as it could be in the recent material) would be as intolerable as any new one; the worst new cartoon, executed in glass equal to the old, would be in perfect harmony. Let it be, indeed, ever so bad in other respects — of which I am not speaking — in this an old window is always good — it never outstares you. You never feel its presence obtrusively. Your attention is not attracted, nor your eye pained by bright patches of glaring colors; but there is just that hazy, quiet light thrown around which best prepares the eye to appreciate form and color in everything else. This, then, is magic. And now, whence does it proceed? Be it confessed, without shame, from the imperfection, technically speaking, of the manufacture of the glass itself. The texture of ancient glass is much coarser than that of modern glass, and it is to this defect, if defect it can be called, that its tone is due. It is, as compared with modern glass, what the imperfect are as compared with perfect gems — less transparent, less luminous, because less homogeneous; it is an opal to a sapphire. But if the effect of opal is wanted, and that of the sapphire would be injurious, the opal, *pro hac vice*, is the better of the two. If one is asked to explain how it is that this imperfection of texture comes to have so important an effect the answer is ready. The light which passes through modern glass almost unmitigated, is largely intercepted by the more ancient glass, and is reflected and refracted, moreover, again and again, as it makes its way with difficulty through the heterogeneous substance. Thus its light is softened, its hues are mingled, and it acquires tone and atmosphere. It does not transmit a glare of clearly distinguishable reds, and yellows, and blues; but it sheds a 'soft radiance and collateral light' of all hues and forms combined. The whole process of glass-making, considered as an art of production, was of old, far ruder than it is now. The same person who painted the glass had probably made it with his own hands, had collected the materials as best he might, and of various degrees of purity, or rather of impurity; had fused them in a furnace, often, perhaps, such as might be conveyed from place to place, and altogether incapable of dealing perfectly with large masses very patient of heat. They could not make *so good glass* as we do, and, therefore, they could not make *so bad windows* as we do. But if they only found it worth their while, our manufacturers could, though, perhaps, at first at greater cost and more trouble, make glass as *bad* as the old, and then we might have windows as *good* as the old. It is the old question of supply and demand."

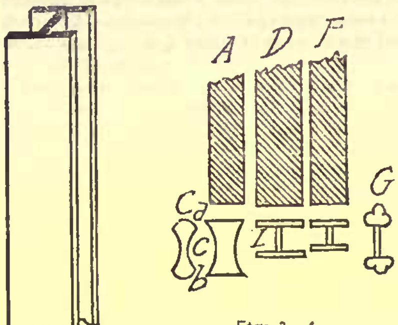
This was written several years ago. The manufacturer of stained-glass has made much advance recently.

VARIETIES OF GLASS.

There are several species of glass employed for this kind of glazing. Amongst those we may specify "sheet" and "plate" glass of various kinds; "colored glass," either "pot-metal" or "flashed" ("pot-metal" being colored throughout its substance by the addition of metallic oxide while the glass is in a state of fusion, while the "flashed" glass is white, with one surface covered by a thin film of colored glass); "flashed" glass being made in ruby, blue, opal, green, violet and pink. These colors can be also modified to red, orange, amber and lemon color by staining. Another species, called "cathedral glass" (rolled and sheet), is generally applied to light tints of a positive color, and is principally used for glazing the windows of churches. "Antique" glass is made in various shades of color, and is usually employed in figure-work in stained-glass windows. It is an imitation of that which is found in old leaded lights, and is rough, nubby, and of uneven thickness. It has recently been made with the coloring oxides encased, and also striped with various colors to produce a more striking effect in the fold of garments in figure-work. "Aventurine" is a glass made in slabs, and used occasionally in mosaic figure-work. It is generally of a brown semi-transparent color, and has a peculiar sparkling effect, caused by the suspension of metallic particles, principally copper filings, which is the chief ingredient. "Ambilti" (single and double) is a sheet glass, originally of Italian manufacture, and much prized by glass-painters on account of its softness for staining, and generally brilliant appearance. "Quarries" is the term applied to small square pieces of stained glass; such as are used in the borders of windows; and "Roundels" and "Bullions" are small discs of glass, some made with a knob in the centre, and used in fret-work with cathedral glass.

GLAZING.

Having thus very briefly touched on some points of our subject, let us now take up the purely technical details of fixing the glass. The use of lead "calmes" for this purpose is of venerable antiquity, the employment of wooden sash-bars being quite a modern innovation. The calmes or leads for the fret-work are slips prepared in the tool known as the "glazier's vice," wherein a slip of lead is drawn between the two horizontal rollers of the thickness of a piece of glass, and the calme, as it emerges from the mill, has a section and appearance as at Figure 3. The German vices are the best, and turn out a variety of lead of different sizes. There are moulds with these vices in which bars of lead of the proper sizes are easily cast. In this form the mill receives them, and turns them out with two sides parallel with each other, and about three-eighths of an inch broad, and a partition connecting the two sides together, about one-eighth of an inch wide, forming on each side a groove near three-sixteenths by one-eighth of an inch and six feet long. At the present day most glaziers buy their calmes at the warehouse. The ancient calmes were apparently cast in a mould. Antique calmes are nearly of one uniform width, and much narrower in the "leaf" than modern leads. "That this was the case," says Gwilt, "can be proved not only by the existence of the original leads themselves, but more satisfactorily, perhaps, by the black lines drawn upon the glass, with which the glass-painters were accustomed sometimes to produce the effect of leads without unnecessarily cutting the glass." A, in Figure 4, represents an ancient lead of the usual width; B is a section, consisting of the "leaf" *a* and *b*, and the "core" *c*; C is the section of a German calme of the early part of the fourteenth century; D is a piece of modern "fret" lead of the ordinary width, and which is now considered very narrow, and L is the section. The process of compressing the modern calme between the rollers to the proper dimensions makes them more rigid than the old leads, which were probably cast in a mould. Calmes even narrower than these are often found in ancient work. An entire window at Stowting church, Kent, probably of the earlier part of the reign of Edward IV, was leaded with leads of the section given at F. The other calme G is of the early part of the reign of Henry VI, and is from Mells Church, Somersetshire, where similar lead is commonly used.— *Building News.*



Figs 3 - 4.

THE ILLUSTRATIONS.

LIBRARY FOR HENRY FIELDS, ESQ., CHICAGO, ILL. MESSRS. BURNHAM & ROOT, ARCHITECTS, CHICAGO, ILL.

RECEPTION-ROOM FOR H. J. WILLING, CHICAGO, ILL. MESSRS. PALMER & SPINNING, ARCHITECTS, CHICAGO, ILL.

See article on "American Interiors" elsewhere in this issue.

CLOISTERS AT ARLES AND ELNE, FRANCE, AND AT GERONA, SPAIN. SKETCHED BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

For description see article on "Spanish Architecture" elsewhere in this issue.

HOUSE AT PASSAIC, N. J. MESSRS. APPLETON & STEPHENSON, ARCHITECTS, BOSTON, MASS.

SPANISH ARCHITECTURE.[1] — XIX.

BARCELONA.—GERONA.

A FLOURISHING seaport, a prosperous lively city where energy and luxury seem to alternate with equal intensity, a series of dusty active manufacturing suburbs, and a great steep hill crowned with an almost unassailable fortification, these are the prominent things among the many which unite to make Barcelona the capital of the province of Catalonia, and the busiest city in Spain. It is claimed that a Laletanian city was founded here by Hercules, 400 years before Rome began making history, and probably very few will want to deny its good old age. The Romans made it one of their colonies, and after Amilcar Barca, father of Hannibal, called it Barcino. Afterward the customary experience of Spanish cities befell it. Moors and Castillians made war one after the other; and in later days the French conquered it with a vengeance almost more barbarous and destructive, and its population was always an effervescent one. To-day, it is a republican, orderly, irreligious city, at peace with itself and its neighbors, yet it is a ready hot-bed of revolution and uncontrollable riot, the seeds of which are only dormant. The Catalonian is unlike the Castillian in that he does not abhor work, indeed he is apt to abhor the Castillian and the "foreign" government; he works and thrives, and thinks, and occasionally loses his temper like a bee annoyed by butterflies. Roman restraint has been thrown aside in the progress of freer thought; but unfortunately from one extreme of religious tyranny these people tend to go to the other of irreligious license, no more moderate faith taking the place of the exploded belief. Such is frequently the case in those parts of Europe where the Roman Church endeavors to continue her old despotic method of ministry.

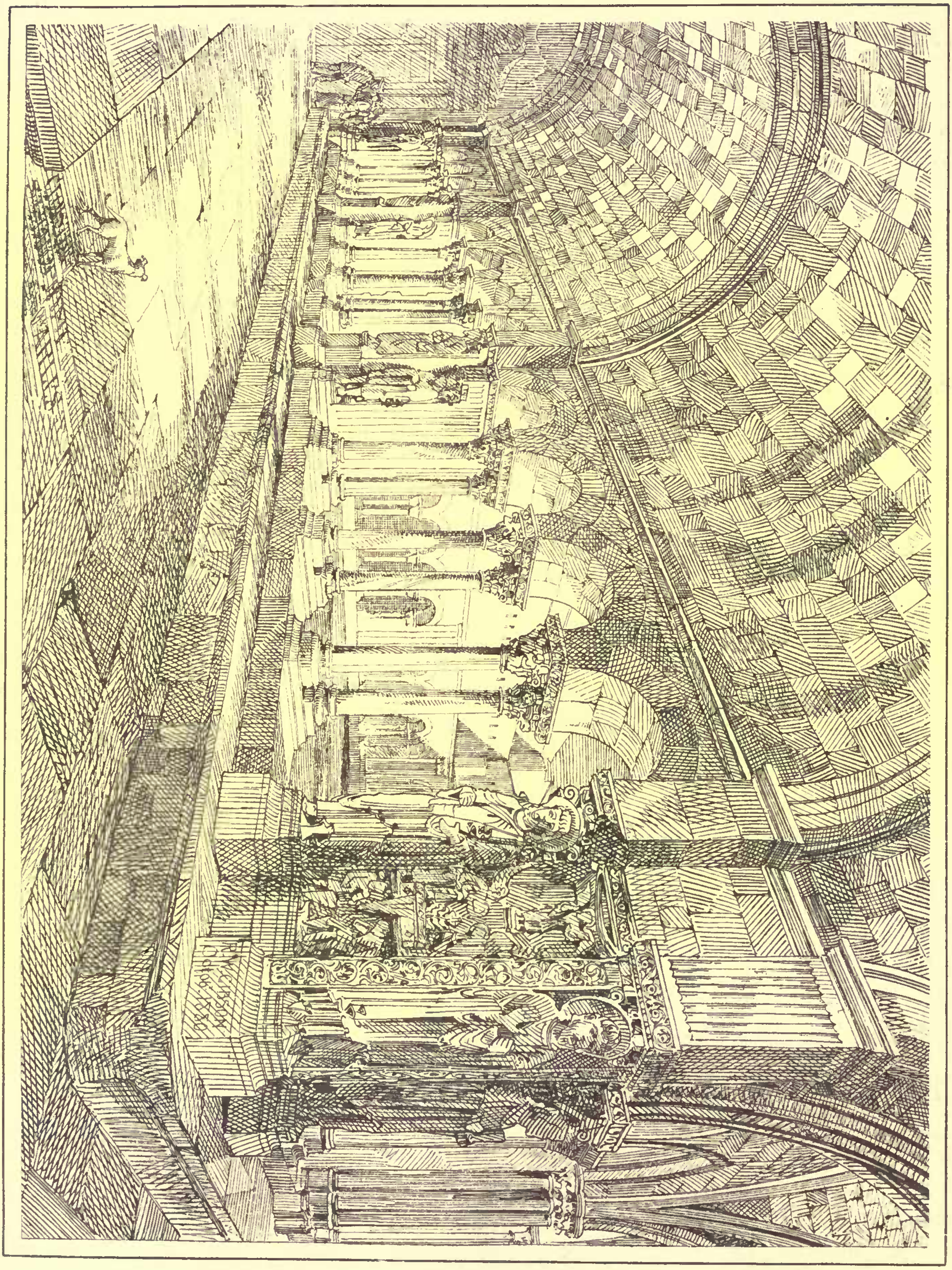
As a city Barcelona is handsome and pleasant. From the crowded harbor where lie numerous English, French, Spanish, and Italian ships, a fine broad avenue leads inland forming the main street whose name "*Rambla*" tells at once its Moorish derivation, and its river bed origin. It has a broad central promenade lined with grand old trees; a roadway on each side, and then footways bounded by the windows of well-furnished shops and innumerable cafés open to the cool air of the shady thoroughfare. The modern architecture has much of French character, yet with a certain independence and much success in experiments with Moorish and other styles; but there is not much spontaneous unaffected art. Of ancient architecture there is enough to occupy the student or architect for some few days, although it is not so important as in some other places, and when I was there the enervating heat of the weather and the attractions of the sea-bath and siesta by day, and of the "*Rambla*" by night, seemed to lessen still more the importance of the ancient buildings. I did no sketching, only a few notes interrupted the pleasures of my vacation. The cathedral of the early fourteenth century is an interesting edifice with many noteworthy features. But I was disappointed in its general effect after reading a too laudatory description. It is large; a nave of four bays with aisles, a crossing and transepts which are carried up as towers, a *capilla mayor* of two bays, with a handsome polygonal apse and aisle in the French fashion, all surrounded by small chapels (thirty at least around the building), constitute this cathedral. It is of considerable dimensions, 300 feet by about 130 feet external measurements, and its style is a rich Geometrical Gothic, with just the commencement of those weaknesses of too many and too slender shafts and mouldings by which the architects of this period began the decline of their style. The quality aimed at was elegance, and to it dignity was sacrificed. But the chief fault is in the utter disproportion of the triforium and clerestory, both of which are crowded into the arch spandrel under the vault and over the capitals. They are therefore of insignificant size, and although the resulting small windows are appropriate to the climate, one cannot help wishing that they had been contracted in some other manner. The arches of the apse are not filled in with screens, and the effect of the openings is certainly good. There are many objects to engage attention, such as furniture, and monuments, altars, and shrines, and stained-glass. The cloisters too, are handsomely proportioned and very pleasant places for rest and meditation, but they are not of great value to the student as their details are of no merit. The octagonal towers over the transepts are good, and furnish a useful hint for treatment where it is desired to emphasize this portion of the church, and circumstances preclude the possibility of a central dome or lantern.

The Church of Sta. Maria del Mar is a rich church of late Geometrical style. It is of great size for its simple plan, being about 270 feet long and 120 feet wide, composed of nave and "*capilla*" with polygonal end with aisles, but without transepts. The nave is in four great square bays, an arrangement which seems to me always to lose much of the charm of perspective which a greater number of shorter bays develops. It dates from the end of the fourteenth century, has a fine western doorway with elaborate mouldings, and a richly traceried circular window over it. This façade is flanked by two octagonal towers, or rather turrets, since they are small in comparison with the building, but apart from that they are of pleasing design. But Sta. Maria and the cathedral and most churches in Barcelona have a strange incomplete appearance owing to their having no apparent roofs. Gables are rare. Buttresses run up with soaring strength and suddenly stop short, and the buildings look as if they had been burned out, and the high roofs had fallen. It is because they are mostly covered with a kind of paving laid immediately upon the backs of the vaults, — not the original intention, evidently, but an economical inartistic kind of repair, the roofs decayed and then they were dispensed with. There is an old church now desecrated, but still known as Sta. Agata which has some good points. It is small, with traceried windows high up (an always successful arrangement), and has a wooden roof supported by cross arches of masonry. Corbels upon the cross walls over the arches support purlins, and these the rafters. It is a method of construction intermediate between the masonry vault and the roof entirely of wood, and a very commendable one. Another curious old church is that of San Pablo del Campo, and yet another San Pedro de las Puellas. Both in early Romanesque style, and of small size.

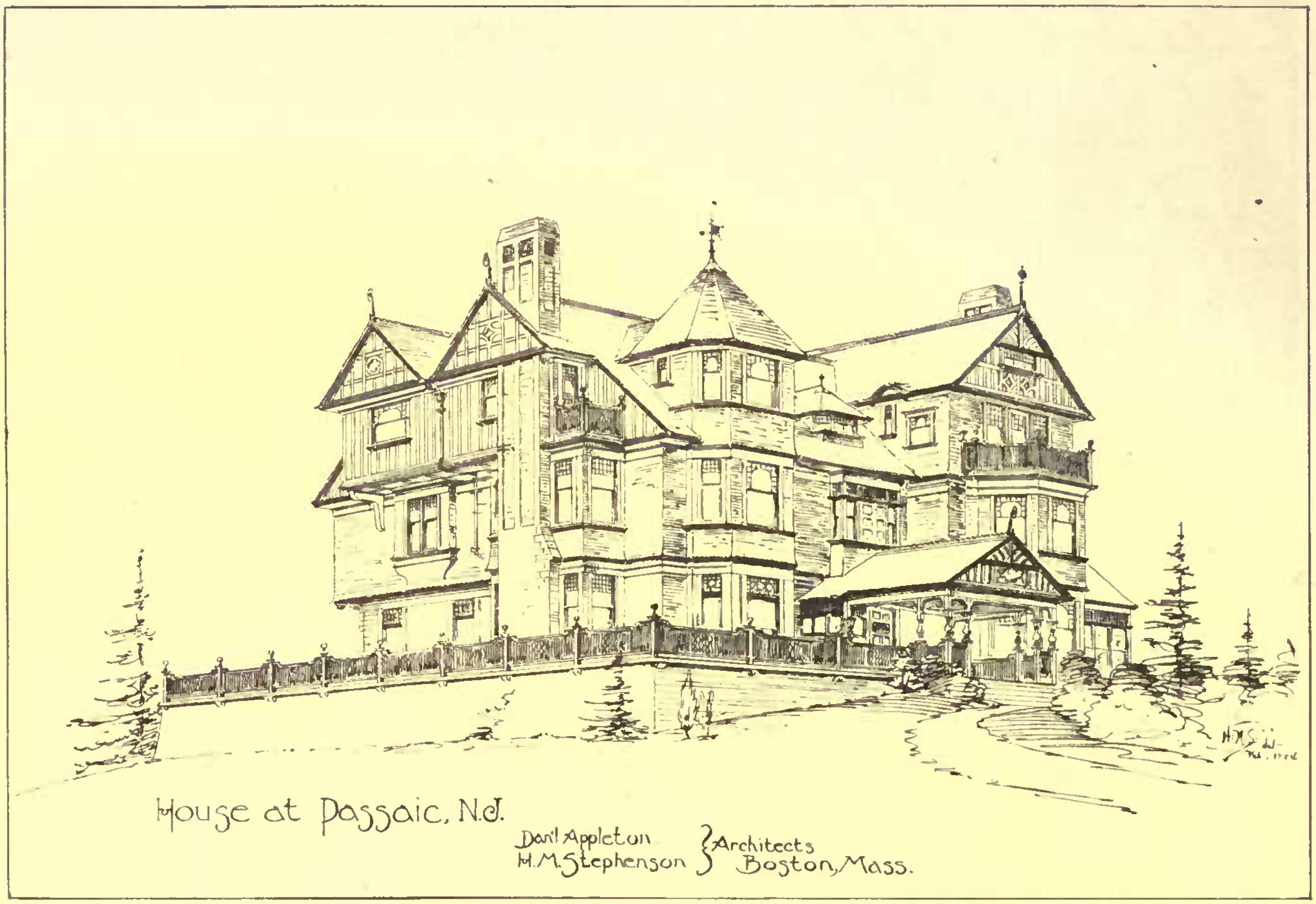
It is scarcely necessary to say that there are in the older parts of Barcelona many "odds and ends" of antique work. The "*Casa Consistorial*" is of late Gothic with one of those small doors arched with voussoirs of enormous height, and elaborate traceried windows.

[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 40, No. 448.

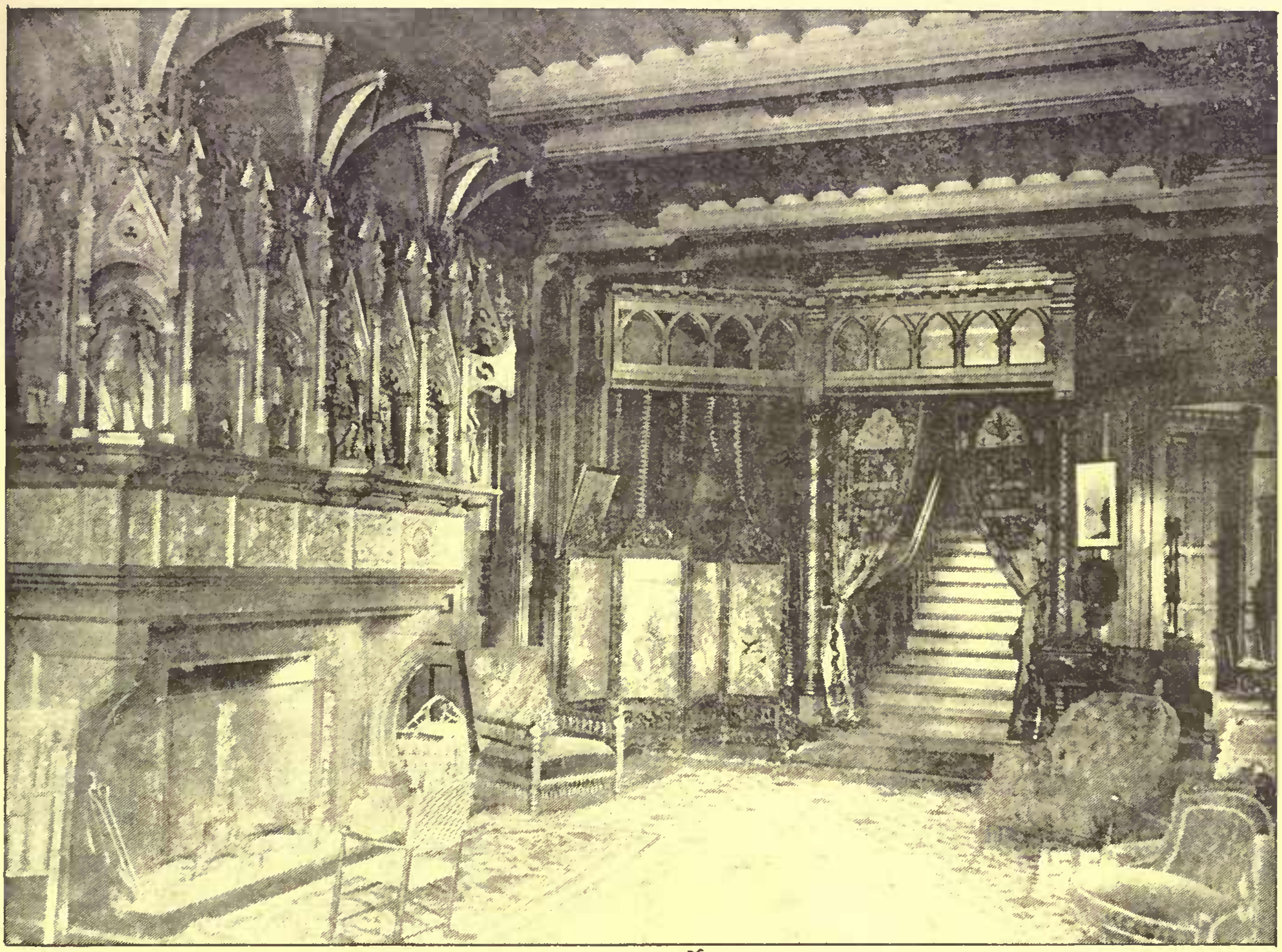
Cloisters at Arles.



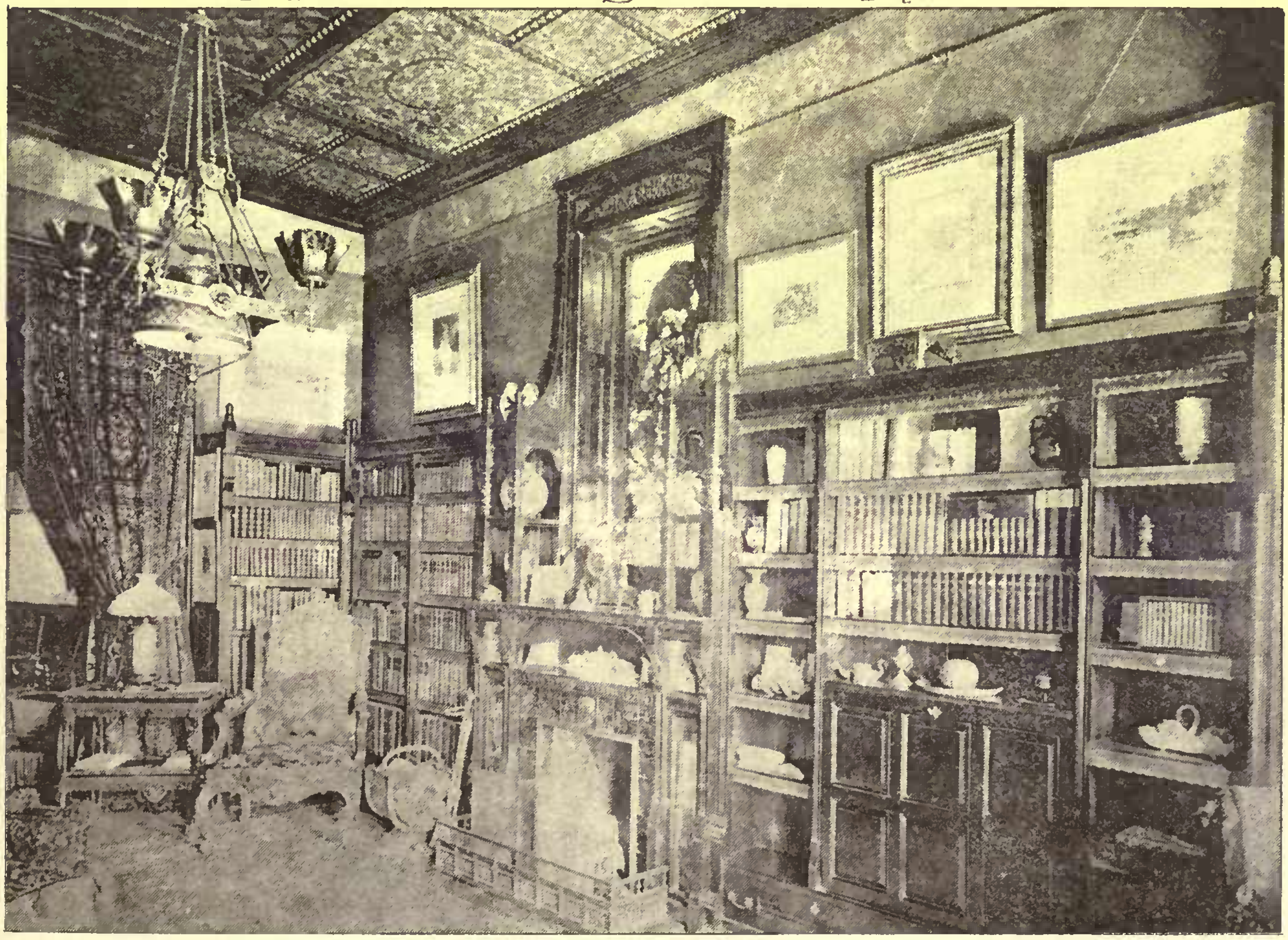
The Heliotype Printing Co. Tremont St. Boston.



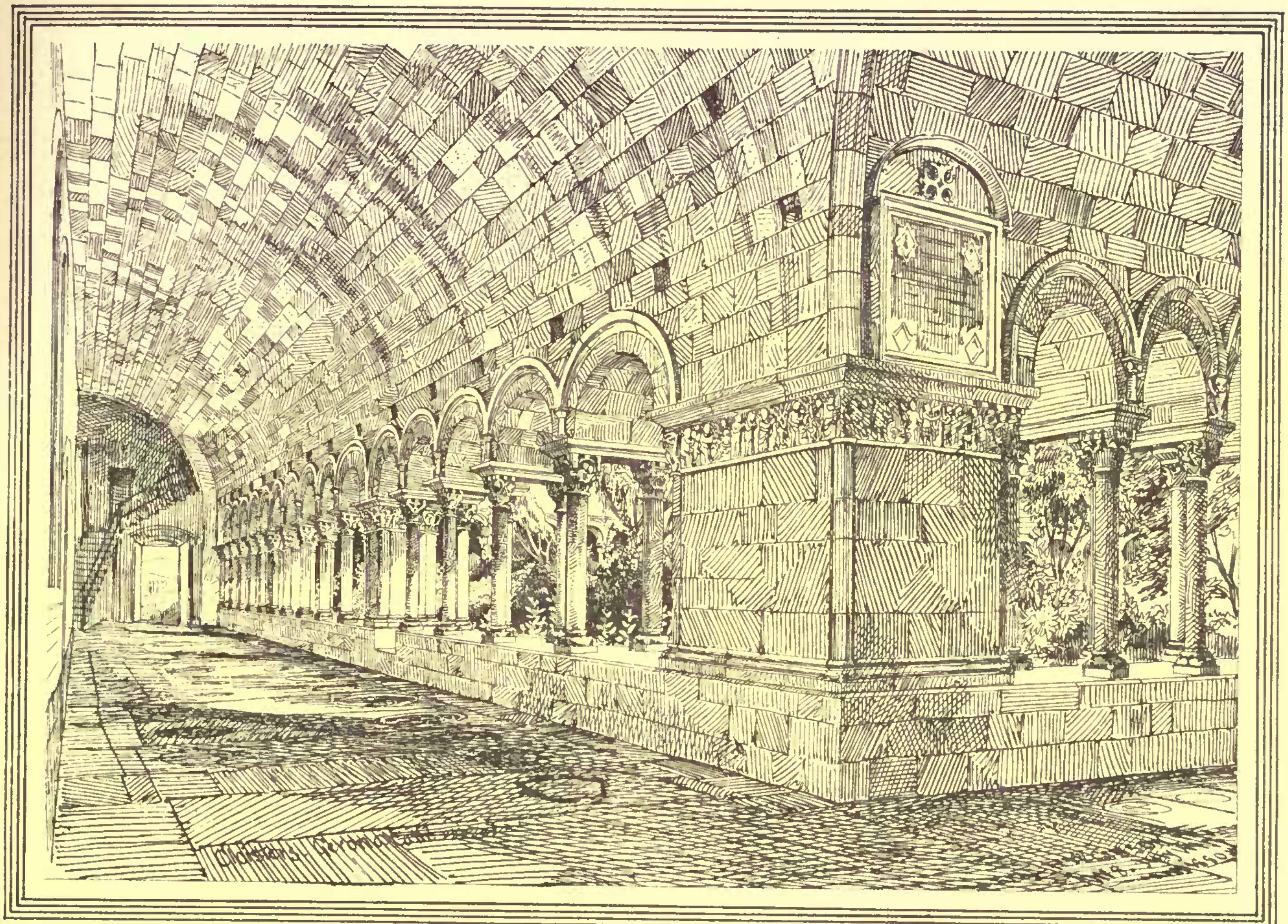
The Heliotype Printing Co. 211 Tremont St. Boston



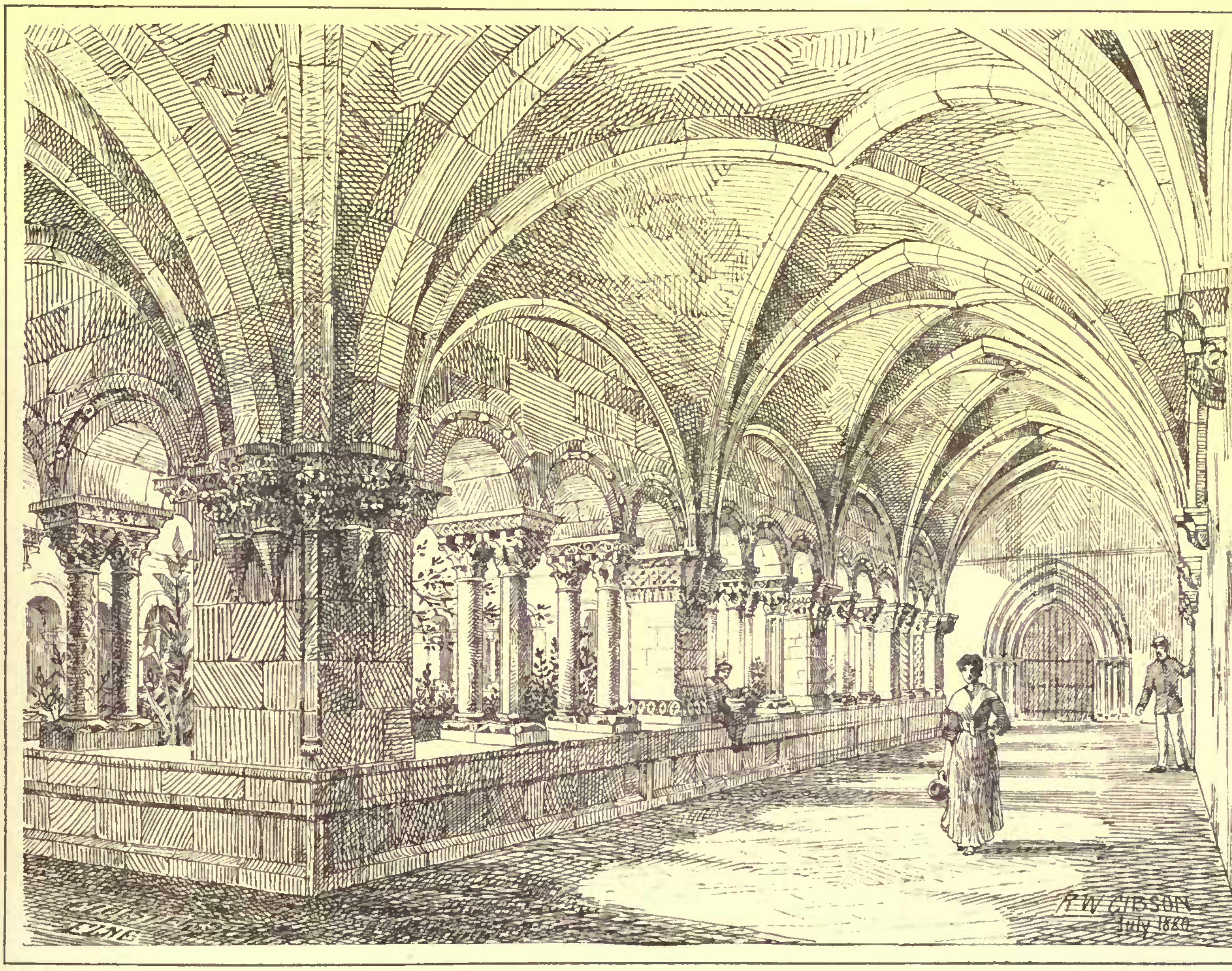
RECEPTION·ROOM for H·J·Willing·Esq·Chicago·ILL·
Messrs. Palmer & Spinning Archts.



LIBRARY for Henry·Fields·Esq·Chicago·ILL:
Messrs. Burnham & Root Archts.



Cloisters · Gerona · Spain.



Cloisters at Elne.

The Heliotype Printing Co. 211 Tremont St. Boston.

Then there are windows and bits of walls and other fragments often very picturesque.

Gerona, although not far distant, is a very different place from Barcelona. While the latter is the most lively, the former is perhaps the most sleepy city in the country; but it is a charming little place. Built upon most irregular ground in the most irregular manner it is full of steep ways with sudden turns and unexpected flights of steps. At the cathedral, for example, one enters the south door on the level of a bare little square, while the western portals are approached by a great terraced slope, with eighty-six steps in three flights, very fine in effect. Then crossing the cloisters to the little door on the north side one overlooks a precipitous valley with a rough path winding down to a little old church, and other buildings in a street at the lower levels. Remnants of the old fortifications and walls offer delightful studies for the artist. Many houses show signs of four or five centuries of age. The hotel is one of them; evidently built for a mansion or palace, it has triple *ajimez* [?mullioned] windows with round arches supported upon shafts with carved capitals almost as old-looking as those in the Romanesque cloisters. All the town has an antiquated air; there are some of those massive old street arcades, great semi-circular arches supporting the house fronts over the footways with low heavy piers; there is a river (nearly dry in summer) with the buildings crowding into it, so that it looks like a picturesque street itself, there is a good modern stone bridge, and two straight ugly iron ones, foot-bridges of one span of uncompromising lattice-work.

There is too, a famous cathedral of peculiar form. It has choir or *capilla mayor* with apse at the east end and side aisles, all as is usual in French and Franco-Spanish examples; but instead of crossing and transepts leading back to a nave of ordinary size, it has one enormous nave of the full width of the *capilla* and its aisles into which these latter open directly. It came about in this way: at the end of the thirteenth and beginning of the fourteenth centuries, the *capilla* and *chevet* were built, the names of certain architects being recorded as being employed, one Jacobo de Favariis, with the interesting information that his salary was 250 *libras* a quarter (about $300), provided he should come from Narbonne to inspect the work six times a year.

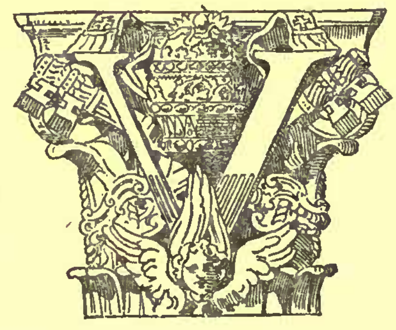
In 1346, this portion of the cathedral was completed. In A. D. 1416, Guillermo Boffiy, architect, proposed to complete the building with a single nave of the full width of the *capilla* and its aisles, and naturally there was a great discussion before so bold a scheme was endorsed. A *junta* of architects was called and the chapter examined them upon oath, and then Boffiy himself was interrogated. This was in 1417, and immediately afterwards it was decided to carry out the daring plan under discussion. Mr. Street published in the appendix to his "*Gothic Architecture in Spain*," a translation of the documents recording these examinations and proceedings, a most valuable and interesting piece of architectural history. Sometime in the sixteenth century this nave was completed, although probably the greater part was executed in the half-century immediately following the adoption of the plans. It is vaulted in stone, the widest Gothic vault in the world, a grand and masterly work and one for its author to be proud of. The nave is seventy-three feet wide, of four bays only, with good buttresses of twenty feet projection on either hand, between which are established small chapels opening into the nave, two to each arch of the vault. The nave is about one hundred and sixty feet long internally, and therefore the span of the diagonal ribs is nearly eighty feet. Truly of magnificent dimensions! The nave of Notre Dame, at Paris, is but little over forty feet wide, York is only about forty-five feet, and Toulouse the next in size to Gerona is only sixty-three feet. The effect of its size is increased by the contrast with the *capilla mayor* and aisles, which open into its eastern wall like subordinate annexes. But I cannot agree with Mr. Street that this is a good contrast. It seems to me the *capilla* loses more than the nave gains by the comparison; it is dwarfed and deformed. It looks like a sectional model arranged to show its constructive system, or like a doll's house with the front down. It was not dealing fairly with the older buildings to put next to them a giant hall so utterly unlike what was contemplated. It may be true that a choir of the same proportions would not give to this nave the same appearance of size. An elephant with an antelope's head would look bigger probably than with his own, but a certain incongruity would be evident. This is how Gerona Cathedral impresses me; of good detail, bold, sound design, and superb dimensions, it is as a whole ill-proportioned and unsatisfying. One examines it with curiosity, not with delight.

The cloisters here again are charming. I am obliged to repeat myself in describing these pleasant shadowy retreats from the almost tropical sunshine of Spain in midsummer. These are covered with simple barrel-vaults of stone, to resist the thrust of which the outer arcaded walls are over three feet thick. They were built before it became usual to concentrate such thrusts upon buttresses. Probably they date from the end of the eleventh century. The shafts and round arches are extremely good; there is a somewhat exaggerated distance between the former, but the thickness of wall already noticed necessitated it. Inscriptions and carvings upon the paving of the floor show that many dead are interred here. The plan of the whole cloister instead of being a regular square is an odd-shaped trapezium, no two sides being equal. This was the last cloister I visited in Spain, and I left it with regret, and recall it with satisfaction; although a little later I found just across the frontier in France some others of even greater beauty. These are at Arles, and at Elne, and I introduce a passing note of them and a view of each, because the dividing line of the two countries was no division of architectural style, and whether the Spanish Romanesque came from France (as is tolerably certain), or whether the converse was the fact, these examples of the border lands are of one and the same style and age, and are beautiful in the same degree.

To conclude with Gerona (and thus with Spain) some of the smaller churches must be mentioned. San Pedro is a quaint Romanesque building with a richly-carved round-headed west door, and circular window, and octagonal steeple, and an old cloister. San Felieu with an unusual form of spire of early massive appearance, yet with rich detail is interesting too, and all merit careful drawing, when some admirer has opportunity to continue the work as yet only begun of describing the architectural inheritance of Spain.

THE END.

ERICSSON'S SOLAR MOTOR.



FROM PIRANESI..

VERY few persons know that the well-known Ericsson hot-air engine, of which thousands have been sold for pumping purposes within the last few years, grew out of Captain Ericsson's experiments with a sun motor. The model of Ericsson's first working sun-engine still stands under a glass case in the big old-fashioned parlor at No. 36 Beach Street, where Captain Ericsson lives all the year round. The model is not more than eight inches high, yet under a hot sun it can work at a rate which shakes the heavy table upon which it stands. It occurred to Captain Ericsson that by turning his solar engine upside down, and getting heat from a coal fire, or a flame of oil or gas instead of from the sun, he could accomplish more in this climate, and the useful Ericsson pumping-engine is the result. A practicable sun-engine, to be used where there is no coal or wood to be had and plenty of sun, has been a problem upon which Captain Ericsson has been at work for twenty-five years. His studies as to the amount of heat radiated by the sun have been of the most exhaustive description, and the published results have led Captain Ericsson into controversies with French and Italian scientists as to the heat of the sun, the French *savants* contending that the sun is not so hot as Captain Ericsson estimates. During the present summer Captain Ericsson hopes to determine by methods which cannot be questioned the exact heat at the surface of the sun.

The solar engine as a practicable working machine was finished last summer, and worked regularly in the back yard of No. 36 Beach Street. Similar engines can now be built whenever there is any need for them. Captain Ericsson gives the following description of this first machine: —

"This mechanical device for utilizing the sun's radiant heat is the result of experiments conducted during a series of twenty years; a succession of experimental machines of similar general design, but varying in detail, having been built during that period. The leading feature of the sun motor is that of concentrating the radiant heat by means of a rectangular trough having a curved bottom lined on the inside with polished plates so arranged that they reflect the sun's rays toward a cylindrical heater placed longitudinally above the trough. This heater, it is scarcely necessary to state, contains the acting medium, steam or air, employed to transfer the solar energy to the motor; the transfer being effected by means of cylinders provided with pistons and valves resembling those of motive engines of the ordinary type. The bottom of the rectangular trough consists of straight wooden staves, supported by iron ribs of parabolic curvature secured to the sides of the trough. On these staves the reflecting plates, consisting of flat window-glass silvered on the under side, are fastened. It will be readily understood that the method thus adopted for concentrating the radiant heat does not call for a structure of great accuracy, provided the wooden staves are secured to the iron ribs in such a position that the silvered plates attached to the same reflect the solar rays toward the heater. The trough, eleven feet long and sixteen feet broad, including a parallel opening in the bottom twelve inches wide, is sustained by a light truss attached to each end; the heater being supported by vertical plates secured to the truss. The heater is $6\frac{1}{4}$ inches in diameter, 11 feet long, exposing $130 \times 9.8 = 1,274$ superficial inches to the action of the reflected solar rays. The reflecting plates, each 3 inches wide and 26 inches long, intercept a sunbeam of $130 \times 180 = 23,400$ square inch section. The trough is supported by a central pivot round which it revolves. The change of inclination is effected by means of a horizontal axle — concealed by the trough — the entire mass being so accurately balanced that a pull of five pounds applied at the extremity enables a person to change the inclination or cause the whole to revolve. A single revolution of the motive engine develops more power than needed to turn the trough and regulate its inclination so as to face the sun during a day's operation. The motor is a steam-engine, the working cylinder being six inches in diameter with 8-inch stroke. The piston-rod, passing through the bottom of the cylinder, operates a force-pump of 5 inches in diameter. By means of an ordinary cross-head secured to the piston-rod below the steam cylinder, and by ordinary connecting-rods, motion is imparted to a crank-shaft and fly-wheel, applied at the top of the engine frame; the object of this arrangement being that of showing the capability of the engine to work either pumps or mills. The average speed of the engine during the trials last summer was 120 turns per minute, the absolute pressure of the working piston being 36 pounds per square inch."

Captain Ericsson concludes from the work of his engine last summer in pumping water that the sun motor of the type described will be a valuable machine for tropical countries where coal and wood are scarce. From the heat obtained from the solar rays for working his engine he bases the calculations which lead him to fix the degree of heat at the surface of the sun at 1,303,640 degrees Fahrenheit. This year's experiments will, he hopes, dispose of some doubts as to the exactitude of these calculations, and also enable him to take into account certain factors which have not yet been considered.

The famous builder of the monitors is now in his eighty-second year, but is as active in mind and body as a man of sixty. He has lived for the last quarter of a century in the big house on Beach Street—a fashionable neighborhood when he moved there—devoting his whole day to scientific research and experiment, assisted by his secretary and some draughtsmen and machinists. He never goes out during the day, but takes a stroll every evening. His health is excellent, and his interest in scientific matters of all kinds unabated. —*New York Evening Post.*

COMPETITIONS.

WE are not quite sure that we grasp either the meaning or the intention of the following circulars issued by the youngest architectural association in the country. But while we question the efficacy of merely rhetorical addresses such as these, we publish them as evidence that the architects of the country, West as well as East, are seemingly of the opinion that the time has arrived for *doing something.*

Circular No. 2.

The St. Louis close competition, which has ended as usual, and the open but straight-jacket one for the Boston Library, not as yet decided, are worthy of general consideration by both the profession and those who have charge of such undertakings.

The $10,000 devoted to the purpose by the city of Boston, and the $5,000 employed in secondary prizes at St. Louis, would undoubtedly produce truly valuable results were the competition open to all civilization, and properly managed.

Those in charge of such competitions are, however, evidently in advance of American architects upon whom they depend, and who, as a rule, do more to hinder them than to encourage. The sums offered are evidently sufficient to obtain good results, and equally expressive of a blind willingness to progress on the part of those in charge.

Why the results rather hinder than advance architecture, should be considered.

It is of first importance, in such undertakings, that affairs be entrusted to the most capable men, who should have full liberty and power of action. Such judges should not only be capable of making just decisions, but have full authority to decide to the best interests of architecture, even to the reporting that a competition has failed to produce results worthy of rewards offered.

We are well aware that American architects will not applaud such decisions; nevertheless, they will have to face such music before many years.

A civilized system of adjudging will most certainly place competition beyond the interference of lawsuits.

Nothing could be of greater service to architecture in America, at the present moment, than what was in the power of Boston to bring about through her library competition. Had she introduced so wise a plan as the employment of three experts to advise in making awards, one valuing first principles as highly as Vaudremer, one as thoroughly versed in the beauties of architecture as Garnier, and one as capable and farseeing as young Nenot, how inestimable would be the value of their criticisms and decisions! They would see that the way pointed out by Labrouste, for the construction of such buildings was not ignored, and impress the fact that some advance beyond what was already known, would be necessary to obtain the reward of a first premium.

The effect of such a blow upon the profession in America would be most healthy.

Respectfully submitted by the Architectural Association of Des Moines, Iowa, July 12, 1884.

E. H. TAYLOR, *Secretary*,

J. S. BLAKE, *President.*

Circular No. 3.

The shameful mismanagement of competitions in this country and in England, greatly blinds the Anglo-Saxon to the only successful method of developing architecture.

This method is so well recognized in more civilized lands that America, not being entirely under British influence, cannot long be kept in ignorance.

Only where competitions are properly conducted has architecture fully proved its usefulness and developed a natural growth. All nations that thus permit architecture to develop, attain one and the same result. This is all the more remarkable when, at the same time, England and America only add to each other's confusion.

On the Continent, especially in Belgium, France and Italy, they are working on a plane that England may never attain to. America must turn from England if she wishes to advance. It is fortunate for her not all her blood has come from such a source.

Architecture is every day proving its high rank among the arts that speak—that speak a language that is universal, superior to dialects. The nations that recognize this give to art free course. They are coming shoulder to shoulder. America should not lag behind.

They who have once listened to that language are too charmed to ever forget the force, the grandeur of its power.

How well it has expressed the strength of organization in the Arc de l' Etoile! With what simplicity it calls attention to the stored-up knowledge in the Libraire Ste. Geneviève; so charmingly re-echoed and applied in the Library and School of Art of the Department of the Bouches du Rhone! With what noble grace, what majesty, it honors, at Marseilles, the entrance of the Durance water to the city! With what wisdom it has taken up the law of primary education of '79! How it proclaims and exalts justice at the Belgian capital!

To-day, in the very ashes of old Rome, it is arousing Italy to a greater empire.

The grayest head uncovers to architecture when acknowledging that the city of the Great King shall be "the perfection of beauty, the joy of the whole earth."

When architecture is honored in this land as it is in the very smallest lands more civilized, it will not fail to show its value. The architects themselves should be the first to show respect.

May they proclaim the achievements that are the glory of architecture under fairer skies, and demand that judges who honor such achievements and not favoritism and rascality, or ignorance, decide the construction of works that would, in this land also, show the worth of architecture, which in no land should be put to shame.

Respectfully submitted by the Architectural Association of Des Moines, Iowa, July 16, 1884.

E. H. TAYLOR, *Secretary.*

J. S. BLAKE, *President.*

TEMPERED GLASS.

IT is not very long since the discovery of M. Alfred de la Bastie filled all our newspapers with paragraphs, more or less ridiculous, about the properties of this glass. Some claimed it was malleable; others that it could not be broken. In fact, tempered glass was called upon to supersede all other materials. The excitement being over, tempered glass may now take its rank among valuable inventions, subject, however, to many defects in its present state.

The process of tempering glass, as is well known, consists in heating a piece of glass, say a window pane, to such a degree as to approach malleability, but not hot enough to lose its shape; the glass in this state is instantly plunged into a bath composed of fatty and resinous matter, which is heated and maintained liquid at a temperature ranging from 300° to 600°, according to the quality of the glass. The difference of temperature between the malleable state, about 1,400°, and that of the bath constitutes the temper.

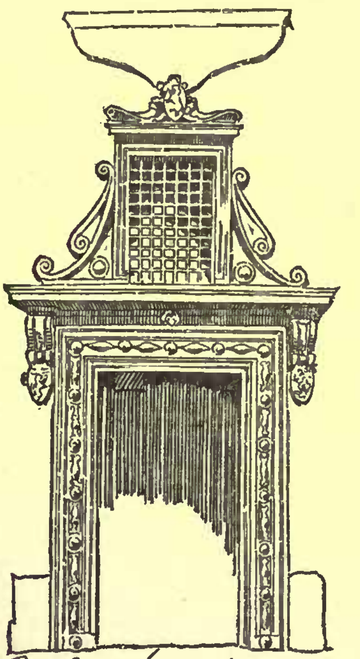
Glass in the plastic state, when plunged into cold water, will fly to pieces if dropped indiscriminately, but if a piece of very fluid glass is allowed to fall into water in the shape of a tear or drop, it will be perceived that the outside of the glass cools at once, while the inside remains partly fluid for some time, as can be distinguished by the red color showing through the water. This cooling will continue until the mass is perfectly solid. This indicates that the outside layer becomes at once condensed by cooling, while the inside remains fluid and consequently more distended. This cooling process goes on, the outside layer compressing the next adjoining, until the whole mass is thoroughly cooled. This peculiar form and state of glass is known as Prince Rupert's drops. Though a hard blow may be struck upon the thick part of these drops, it has no perceptible effect, but if the thin tail end is ruptured, the whole mass instantly flies to pieces. The glass appears to be under a great state of tension, and the least rupture of the equilibrium, such as the breaking of the slender thread terminating the drop, is sufficient to destroy the mass.

Until the discovery of tempered glass by M. De la Bastie, it had always been considered that unless a lamp-chimney or any other piece of glass was perfectly annealed, differences of temperature brought on suddenly would invariably cause a breakage. The Bastie glass would seem to prove this view to be erroneous, as the tempered glass can sustain sudden and extreme changes of temperature without breaking. Molten lead has been poured into a glass bowl or tumbler without producing a fracture. A piece of plate-glass tempered by the Bastie process, having been heated among coals, was suddenly plunged into cold water without producing any effect. This experiment, repeated five times in succession, did not seem to impair the qualities of the glass, for on dropping it from a fifth-story window it did not break. It may be said, however, that if in the heating the temperature should reach the point at which it would be annealed, the temper would be destroyed. This action does not seem to take place when the period of heating is not continued too long. A plate of glass $6\frac{1}{4}$ x $4\frac{3}{4}$ inches and three-sixteenths inch thick could only be broken under the shock of a weight of seven ounces falling thirteen feet, while an ordinary piece of glass of the same dimensions would break under half of that weight falling about sixteen inches.

M. Siemens, of Dresden, says that the strength of glass is increased fifty times by being tempered. A bent plate of glass laid upon the floor with the convex side upward is capable of resisting the weight of an ordinary sized man without breaking. The glass while subjected to the weight will flatten out, but as soon as the pressure is removed it will spring back at once to its original shape. Hardened glass seems to be less dense than ordinary glass; it is harder, however, and is more difficult to cut by the diamond and tempered tools; it also possesses a much superior elasticity over the ordinary glass.

Since tempered glass, however, cannot be cut with the diamond without flying to pieces, its use must necessarily be limited to definite sizes not requiring to be modified; this is quite a drawback to its use. It would seem, however, that some of the defects have already been overcome, for at the Paris Exposition quite a display of tempered goods was made by the *Societe Anonyme du Verre Trempé*, of Paris. Among other things was quite a display of druggists' and chemical glassware, mortars, pestles, beakers, covered bowls, funnels; also a variety of plain and cut-glass tumblers, goblets, decanters, globes, and chimneys; opal plates; a depolished bowl with cut facets; colored glass, engraved, cut, etc. It is said that the making of articles varying in thickness is hazardous, as many of them are apt to fly to pieces either in the making or cutting. — *Glassware Reporter.*

INEXPENSIVE FIRE-PROOF FLOORS.



Doorway of a Venetian Palace. (After L'Art.)

Of the many economical forms of fire-proof floors may be mentioned one or two methods which appear to adapt themselves to buildings of small size where great weights are not carried. One of these is a wood and concrete floor used in the office of the Board of Works. The joists are cut tapering or Λ-shape, the pointed edge being put upwards, and are placed about eighteen inches apart; they thus form skew-backs to a series of flat concrete arches, which are filled in upon a rough movable centring underneath. The upper surface is levelled, leaving the points of the joists to which battens are fixed for the wood boards. Though the floor is not absolutely fire-proof throughout, the joists being imbedded on both sides and only exposed on the lower edge, resists the fire for a long time.

Allen's system, which the late Mr. Allen introduced into several blocks of improved dwellings built by him, is also an exceedingly simple, economical, and efficient mode of flooring houses. The following is the plan pursued: — Bars, three inches by one inch, are placed across from wall to wall and built into them, and across these are laid one-half-inch iron rods about the same distance apart, forming a net-work of meshes two feet square. A temporary scaffolding underneath the iron-work is then fixed, and concrete made of Portland cement and clinkers, slag, etc., one to four, is thrown in to a depth of four inches, and when set the scaffold is removed, and a plaster ceiling can be formed. This system of imbedded iron rods in concrete has been found to insure great strength and rigidity; depth of flooring can be reduced, and the construction rendered quite fire-resisting. The French use several forms of iron net-work flooring, in which rolled-iron I-shaped girders, placed about three feet apart, are crossed by flat iron bars or rods, and concrete or plaster filled in, submerging the iron rods, a temporary scaffold underneath being used. Very frequently coarse plaster-of-Paris is poured in to a thickness of about three inches. When hard this plaster stiffens the floor, and forms a good ceiling when finished by a fine coat. The girders are sometimes tied into the walls at the ends by iron straps secured to vertical bolts. Square wooden joists laid over the girders carry the floor-boards. The system known as Thuasne's is formed in a similar manner, except that flat bars are first fixed across the girders about three feet apart, the ends passing through slits in wrought-iron bands which embrace the girder at these intervals; the ends are then pinned to secure them. Upon these, and crossing them, and parallel to the girders are placed lighter iron rods or "*fentons*" about one-half inch square, about nine inches apart, and bound to the flat bars by wire. Another very strong floor exhibited at the Paris Exhibition is the "*fer tubulaire*" plan. It consists of a girder or inverted trough of ⊓-section. These girders are placed about two feet eight inches apart from centre to centre, and are tied together at intervals by flat bar ties bolted to the bottom, of the flanges. The flooring is either composed of flat hollow-brick arches placed between the girders which form skew-backs, and then joisted and floored with wood; or the spaces between the girders are filled in with hollow blocks of plaster four inches deep, and then floored in the same manner, or tiled upon plaster filling-in. Inverted trough-shaped girders, fixed about two feet eight inches apart, and having a depth of about four and three-quarter inches, and a width at the top of two and three-quarter inches, increasing to three or four inches at the bottom, are suitable for bearings of from eighteen to twenty feet. Thick slabs of concrete might be used in lieu of the arches of hollow-brick or blocks of plaster as a filling-in, and a very strong floor would be the result. In the iron net-work system the liquid concrete forms, with the iron, one solid slab, the bars acting to resist cross strain, and these may be so located in the mass as to afford the resistance to tension in the lower part of the concrete, leaving the concrete to take the compressive strain. It is singular that architects should still adopt floors for offices and other buildings of wooden construction. — *The Building News.*

ONE'S RESPECT FOR STRIKERS.

New York, July 29, 1884.

To the Editors of the American Architect: —

Dear Sirs, — In your comments upon the bricklayers' strike in this city you say that "the man who is content to do only nine-tenths as much work as other people must make up his mind to see himself rewarded with only nine-tenths as much respect and nine-tenths as much comfort and happiness as his neighbors enjoy."

You may live in Arcadia, but remember that everybody does not. It may be conspicuously true in Boston that merit is rewarded; out of Boston it is conspicuously otherwise. So that your assertion to our ears here in New York, at least to the ears of those who look at things as they are, sounds very flat and Sunday-schoolish.

Come here to New York and take me for your Asmodeus, and I will show you things that will make you groan. I will show you trains of pale-faced girls dragging homewards after working your demanded ten hours, yes, and twelve hours and more, and commanding neither respect [?] nor comfort, nor even the necessities of life, unless you call three dollars a week comfort, and rags and contumely respect. Come and I will show you what some of these girls arrive at. Dens, about eight feet high, heavy with smoke and beery smells, where girls who perhaps have "struck" and been "black-listed," finding no work, have turned to sell themselves for a living, for a bare living at that. Depravity? Not a bit of it. Poverty, grinding poverty.

Come then up to Delmonico's, and I will show you the landlord of this place spending twice as much on his lunch as these girls make in a week, carousing at his club, losing his thousands at poker, circulating scandals that no decent hod-carrier would mouth; this is the man that screwed up the rent of the den from eighty to a hundred last January (I speak of specific facts), and he, who has never done an hour's honest work in his life, he enjoys wealth, he enjoys luxury, he enjoys respect — if boot-licking subserviency will pass for it, for it is all the respect that we pay to anybody nowadays in New York.

Come and I will show you lying and avarice, and false-dealing and trickery and greed and covetousness condoned as "business," worshipped as "smartness," courted by ministers of the Gospel because they pay their salaries and support their churches. Come and I will show you that to make money and command respect you must do no work. Those who work have privations, and filthy tenements and scorn for their reward; those who do no work save such work as the confidence-schemer does, have plenty of all good things.

The old political economy is going out, as is the old religion and the bad old times generally, and the new things are coming in. Take measures at once to learn what the new things are, that you may know and teach their beauty.

Truly a time is coming when those who work shall receive the reward of their labors, but that they do now receive it no one with the facts before him can dare to assert.

Respectfully yours, John Beverley Robinson.

[We admit with sorrow the probable truthfulness of the picture our correspondent somewhat needlessly draws, but we do not think the stricture he would apply to our words is called for. He probably employs several draughtsmen, one of whom may do his full day's work and another only nine-tenths of a day's work. Does the latter enjoy as much of his employer's "respect" as the former? And, setting aside the possibility that the conscience of the draughtsman who "soldiers" away one-tenth of his time may be tender enough to prevent his enjoying a moral "comfort and happiness," we can hardly suppose that our correspondent is so lacking in ordinary business faculty as to pay the idler as high wages as the industrious worker receives, so that his material "comfort and happiness" would probably be more restricted than in the case of his fellow. All things are relative, and the man who voluntarily does less of the world's work than those engaged in similar pursuits must expect to be "rewarded" with less of the world's prizes than fall to the share of his fellows. If the bricklayers had struck for so-much per hour, and if the Union would withdraw its claim to dictate how many hours each individual should work in a day, the movement would certainly not have our disapproval, as it would be a perfectly legitimate attempt to better their condition, and would quickly be settled in one way or another by the laws of supply and demand. If the state of the labor market — supposing that laborers are free, unpledged and uncontrolled — does not justify a change, movements to effect a compulsory advance in wages are illegitimate and deserve only the scorn of fair-minded men. — Eds. American Architect.]

ONE MORE COMPETITION.

Cheyenne, Wyo. Ter., July 23, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I would like your opinion on the following: About the 4th of June, the Chamber of Commerce in Denver advertised for competitive plans for a Chamber Building, to cost twenty-five thousand dollars and not to exceed that price. Seven sets of plans were handed in on the day appointed, the 19th of June, and our plans and drawings were accepted; but they were afraid the building would cost more than the stated amount, so they requested us to get up a full set of working-drawings, details and specifications, and then to get some responsible contractor to figure the building. We did so, and got two figures from two of the most responsible contractors in Denver. The lowest figure for the entire job complete was something under twenty-two thousand dollars, and the other between twenty-four and twenty-five thousand dollars. Now they have thrown ours out, and got another architect, of Denver, to put in a plan, and it has been accepted, and we knew nothing of it until our plans were returned yesterday, with thanks, and I understand that the new building will cost more than the amount stated above. Don't you think that we will be perfectly right to sue them for three and one-half per cent on the cost of our building?

We are, yours respectfully, Victims.

[Much depends upon the terms of competition offered by the Chamber of Commerce, and tacitly agreed to by the competitors, and something also upon the mode in which the acceptance of the "Victims'" plan was signified to them. If the latter were, in unmistakeable language, promised the commission for the erection of the building, provided it could be carried out within a given price, and if they further proved, by the estimates of reliable contractors, that it could be built within that price, they can claim the full amount which they would have been entitled to receive for their completed service. In a case of this kind, if a contract for the performance of a given service can be proved, and the one who was engaged to perform the service is ready and willing and able to carry out his part of the agreement, the other party is not at liberty either to withdraw altogether, or to prevent the person whom he has employed from carrying out his commission to the end, except on condition of paying the latter the full amount which he would have earned by complete performance of the duty for which he was engaged, with damages, if any can be proved, for injury to his business or character by an abrupt dismissal.

In order, however, to secure the protection of the law, the "Victims" must be sure that they can establish the fact of having been engaged by the Chamber of Commerce, either as the result of their compliance with terms of competition promising such engagement without reserve to the successful competitor, or by some subsequent act. If they cannot prove this, it would be a waste of time to claim anything from anybody; and the "Victims" may console themselves with the reflection that the "ideas" which they have been gulled into furnishing gratis for the benefit of the friends of members of the Chamber of Commerce in question will probably serve to bring reputation to some one who needs it more than they do. — Eds. American Architect.]

ENGLISH AND FRENCH ARCHITECTURAL JOURNALS.

Hartford, Conn., August 1, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Please mention the best French and the best English illustrated architectural paper, my object being to study contemporary work in those countries.

It would be desirable, although a minor matter, to have the plates similar in size to those of your paper. Yours, H.

[The best English architectural journal so far as illustrations go — number, scope and general excellence being considered — is unquestionably the *Building News*. The French have no illustrated weekly journal of similar character. *La Semaine des Constructeurs*, the leading weekly, contains at most one or two illustrations. Of the monthly publications, *La Revue Generale de l'Architecture* is the best. — Eds. American Architect.]

MEASURING SLATING.

East Saginaw, Mich., July 28, 1884.

To the Editors of the American Architect: —

Gentlemen, — Will you kindly inform me of the customary manner of measuring slater's work. There is a point in dispute between the principal and sub-contractor (slater) on one of my works which must shortly be submitted to me. The question is this: The roof of the building has nine dormer-windows and a tower, all with corresponding openings through the roof, the total area of which amounts to over five squares. Said slater claims for all the openings, also for all the dormer and tower roofs. His agreement with the principal contractor was to do the work at so much "per square." Your advice would be of value to me. Very respectfully,

Subscriber.

[The usual method of measuring slating, so far as we know, is to take the actual number of squares to be slated, allowing six inches extra around hips, valleys, dormers, etc.; and to add to this a figure for hips, valleys and the other cuttings at so much per lineal foot. It is quite possible that a slater might, to save himself the trouble of measuring the latter, estimate the roof as an unbroken surface, thinking that what he saved in the actual area covered would make up the extra cost of cutting for hips and valleys; and "Subscriber" would do well to ascertain whether this was actually the case, and whether the price per square at which the work was taken indicated the fairness of this mode of estimating. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Tennessee Marble. — East Tennessee marble is reported to be selling for 100 per cent more than Italian marble in leading markets.

Accident caused by an Overhead Wire. — The Liverpool *Mercury* of the 25th ultimo, says: A singular accident caused by the breaking of a telegraph-wire connecting the North Staffordshire infirmary with the surgeries of the various visiting surgeons of the district, occurred at Hanley. The wire broke in Cannon Street, Hanley, and knocked down a chimney of a house to which it was attached, the chimney and the brickwork falling on the roof of a kitchen and demolishing it. The wire rebounding and curling up in the street caught hold of a child five years of age, lifted it up in the air some distance and dashed it to the ground, rendering it insensible and injuring one of its legs severely.

Effect of an Electric-Light on an Orchestra. — One of the best electric-light systems was recently introduced into the Court Theatre at Stuttgart. Quite unexpectedly the orchestra immediately showed signs that they disapproved of the new means of illumination, and they have petitioned the management to restore the old oil lamps. The orchestra state that the brilliancy of the electric-lights has an unpleasant effect upon the nerves, and that it has become difficult to follow the baton of the conductor. To ascertain whether there may not be something substantial in these alleged grievances a committee of oculists and disinterested musicians has been officially appointed. — *Exchange.*

Painting Shingled Roofs. — More shingle roofs are painted now than ever before in the history of building in this country. It is mostly seen in cities and suburban towns, although in the country it is by no means rare. Considerable inquiry has led to the conclusion that many have their roofs painted to add to their appearance, which in many cases it certainly does, while others labor under the impression that the paint acts as a preservative to the shingles. The latter are probably right providing the paint is renewed as often as it needs to be. If the roof is allowed to remain with the paint partly worn off the shingles will retain more moisture, and consequently decay sooner than they would were they not painted at all. On the score of durability, however, little can be gained in cost by painting. A good shingle roof unpainted will last a great many years, and the expense of painting it a few times would replace it. One painter, who had painted the roof of his own house, when questioned by a representative of the *Lumberman*, used good logic, from his standpoint. He thought that painting a roof would add somewhat to its length of life. "You see," he said, "that I have painted mine. I do for myself what I desire to do for others. If I did not the influence would be bad." — *Northwestern Lumberman.*

A Colossus of Colossi. — In the course of the excavations at San (Zoan-Tanis) there have been disclosed several portions of a red granite colossal statue of Rameses II, which, when whole, must have been the largest statue known. It appears to have been a standing figure of the usual type, crowned with the crown of Upper Egypt, and supported up the back by a pilaster. Judging from the dimensions of various parts, such as the ear and the instep, and comparing the proportionate size of the cartouches (which are three feet wide) with those engraved upon other statues, this colossus must have been 98 feet high from the foot to the crown. Together with its pedestal, which we can scarcely doubt was in one piece with it, it would altogether be about 115 feet high. The great toe measures 18 inches across. That it was a monolith is almost certain, from the fact that all the largest statues are without any joint; nor does this seem incredible, since there are obelisks nearly as long. But this may claim to have been the tallest and heaviest statue that we know of, as the figure alone would weigh 700 tons to which the accessories would probably add as much again. A total weight of 1,200 tons is most likely under, rather than over the actual sum. The statue has been cut up into building-blocks by Shekank III, and used in the construction of the great pylon; hence, only small pieces of a few tons each are now to be seen. — *W. Flinders Petne's Report.*

Gas-Light *vs.* Electric-Light in Foggy Weather. — Captain Chadwick, naval attaché to the United States Legation in London, is in frequent attendance at the South Foreland, making careful observations of the lights which are being tested there under the superintendence of Trinity House. These tests will extend over a period of several months, and will be the most complete and elaborate ever made. The Elder Brethren of Trinity House appear determined to settle the question of the respective advantages of gas, oil and electricity as light-house illuminators, particularly with regard to their powers of penetration through abnormal atmospheres. The experiments so far made show that the popular notion of the penetrating powers of the three illuminants named is grossly erroneous. For instance, it has been found that an electric-light so brilliant that it can hardly be looked at on a clear night from a distance of three miles is but little more penetrating through a dense fog than a very much smaller illuminating power of gas. The chief objection to gas is the great amount of heat it engenders. This affects the lenses, and makes it necessary to limit the amount of gas used. But for its heat a sufficient amount of gas to equal the illuminating power of a given electric-light could be used, in which case the South Foreland experiment demonstrates that the gas-light would prove the more penetrating light in hazy weather. It has been found that it requires a double quantity of electric-light to make a perceptible increased penetration over a single quantity of gas in a fog. The results of these experiments are deeply interesting the scientists. — *Boston Journal.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

302,581. BURGLAR-ALARM. — Leonard D. North Hannibal H. Ingham, and Frank W. Ingham, Chicago, Ill.

302,582. PNEUMATIC DOOR-CHECK. — Gustavus S. Perkins. Hartford, Conn.

302,583. WATER-CLOSET JOINT. — Charles F. Pike, Philadelphia, Pa.

302,584. MERCURY-SEAL TRAP. — Charles F. Pike, Philadelphia, Pa.

302,585. TRAP FOR WASHSTANDS, ETC. — Charles F. Pike, Philadelphia, Pa.

302,586. METALLIC SHINGLE. — Geo. C. Plummer, Brimfield, Ill.

302,589. ELEVATOR.— Frank M. Reynolds, and Geo. C. Tewksbury, Newark, N. J.

302,592. WATER-CLOSET. — James Laughland Roxburgh, and Wilson Glover, Charleston, S. C.

302,594. LATCH. — Wendelin Seng, Chicago, Ill.

302,595. AUGER-BIT. — Henry L. Shaler, Deep River, Conn.

302,602. — ELEVATOR. — George C. Tewksbury, and Frank M. Reynolds, Newark, N. J.

302,609. FARMER'S AND DRAINER'S COMBINED LEVEL AND PLANE-TABLE. — Harry Wells, Zebulon, Ga.

302,621. CHIMNEY. — Leonard E. Clawson, San Francisco, Cal.

302,628. DOOR-HANGER. — Henry Fleming, Kansas City, Mo.

302,638. WEATHER-BOARD GAUGE.—John T. Shank, Springfield, Mo.

302,646. COMPOSITION AND MANUFACTURE OF BRICK OR ARTIFICIAL STONE. — George R. Bare, and James A. Douglass, Columbiana, O.

302,657. REVERSIBLE LATCH. — C. Raymond Helzmann, and William E. Deibert, Reading, Pa.

302,659. RATCHET-WRENCH. — Walter J. Hunter, Greensburg, Pa.

302,666. WATER-CLOSET AND TRAP. — Samuel G. McFarland, New York, N. Y.

302,667. TRAP FOR WATER-CLOSETS. — Samuel G. McFarland, New York, N. Y.

302,682. FIRE-EXTINGUISHER. — John W. Bishop, New Haven, Conn.

302,702. STEAM-RADIATOR. — Gustav Blau, Jr., Jersey City, N. J.

302,713. CESSPOOL. — Eugene Dieterich, Anniston, Ala.

302,714. FIRE-PROOF SHUTTER. — William H. Dolman, New York, N. Y.

302,721. ELEVATOR. — John Foreman, Pottstown, Pa.

302,728. WASTE-PIPE TRAP. — Thomas C. Hargrave, Minneapolis, Minn.

302,742. COMPOSITION FOR FILLING WOOD. — Michael Kunz, Oberhausen-Augsburg, Germany.

302,743. COMPOSITION FOR POLISHING WOOD. — Michael Kunz, Oberhausen-Augsburg, Germany.

302,760. PIPE-WRENCH. — Thomas Mokler, Ludington, Mich.

302,765. HOLLOW AUGER. — Samuel Harmon Newcomb, Port Williams, Nova Scotia, Can.

302,767. ATTACHMENT FOR SQUARES FOR BUILDERS' AND JOINERS' USE. — Andrew G. Olson, and John McFarlane, Duluth, Minn.

302,771. LUMBER-ELEVATOR. — John Paul, La Crosse, Wis.

302,773. RING FOR HAND-RAILS. — Daniel Peters, Cincinnati, O.

302,776. ELEVATOR. — Charles E. Reid, Brooklyn, N. Y.

302,792. WEATHER-BOARD GAUGE. — Edward D. Stacey, and William K. Vance, Corsicana, Tex.

302,801. CUTTER FOR DRESSING STONE. — Frank Trier, Westminster, County of Middlesex, Eng.

302,824. STAY-ROLLER FOR DOORS. — Jacob Brinkerhoff, Auburn, N. Y.

302,842. MONKEY-WRENCH. — Samuel H. Heginbottom, Robert C. Hayton, and William H. Hayton, East Saginaw, Mich.

302,843. SUBMERGED FORCE-PUMP. — Louis Herbert, Hickville, Cal.

302,847. DOOR-HANGER. — Wm. E. Jaques, Cleveland, O.

302,858. LIME-BIN. — Truman T. Moulton, Neenah, Wis.

302,872. BRICK-MACHINE. — William H. Stewart, Boonville, Mo.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report twenty-two permits have been granted, the more important of which are the following:—

A. H. Brinton, three-st'y brick building (square), n s Chase St., between Greenmount Ave. and Forrest Pl.

G. H. Kuhet, four-st'y brick building, e s Sharp St., between Barnet and Lexington Sts.

Jos. Turner, 4 three-st'y brick buildings, w s Madison St., commencing s w cor. Robert St.

J. Gerwig, 3 three-st'y brick buildings, w s Madison St., e of Robert St., and 14 three-st'y brick buildings, e s Eutaw Pl., commencing n e cor. Presstman St.

Wm. B. Whiteside, 4 three-st'y brick buildings, e s Fremont St., commencing n e cor. Dolphin St.

Myer A. Nusbaum, three-st'y brick building, s s Baltimore St., e of Broadway.

John Coyle, 3 two-st'y brick buildings, w s Fulton Ave., n w cor. Presstman St.

Darby Coen, three-st'y brick building, n s Sugar Alley, between Light and Charles Sts.

Jas. Cassidy, three-st'y brick building, w s Front St., between Low and Fayette Sts.

Boston.

BUILDING PERMITS.—*Brick.* — *Dale St.*, cor. Regent St., Ward 21, for M. C. Grant, family-hotel, 43' x 64', four-st'y flat; M. C. Grant, builder.

Tremont St., Nos. 990–994, cor. Hammond St., Ward 19, Joseph Milmore, store, 20' x 38', one-st'y flat; Martin Beatty, builder.

Wood St., cor. Taylor St., Ward 24, for Old Colony R. R. Co., passenger-station, 28' x 64', one-st'y pitch; H. P. Oakman, builder.

Commonwealth Ave., No. 309, cor. Hereford St., Ward 11, for John F. Andrew, dwell., 45' x 83', four-st'y pitch; Norcross Bros., builders.

Central Sq., Nos. 14 *and* 16, Ward 2, for Robert Rausch, dwell. and stores, 37' and 42' x 42', three-st'y flat; A. & J. McLaren, builders.

Wood.— Trenton St., Nos. 217 *and* 219, for Thomas Kellough, 2 dwells., 21' x 46', two-st'y mansard; Frame & Patten, builders.

Brooklyn.

BUILDING PERMITS. — *Manhattan Ave.*, n e cor. Norman Ave., 5 three-st'y mansard roof stores and dwells., tin roofs; cost, each, $5,000; owners and builders, Randall & Miller, 497 Fourth St.

Dupont St., No. 137, n s, 200' e Manhattan Ave., three-st'y frame tenement, gravel roof; cost, $4,000; owner, Mrs. Margaret Creighton, on premises; architect, J. Denner; builders, Post & Walker.

Sixth Ave., w s, 40' n Twenty-first St., 3 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and carpenter, Sampson B. Oulton, 165 Fourteenth St.; architect, W. Wirth; mason, Anthony McGrath.

Duryea St., s s, 150' w Bushwick Ave., 2 two-st'y dwells., tin roofs; cost, each, $3,600; owner, Elizabeth B. Storty, 913 Hancock St.; builder, A. A. Fardon and S. H. Post.

Kent St., No. 193, n s, 300' e Manhattan Ave., three-st'y frame tenement, gravel roof; cost, $4,200; owner, Peter Bollin, Kent St.; architect, F. Weber; builders, Post & Walker.

Floyd St., No. 338, s s, 175' w Lewis Ave., three-st'y frame dwell., tin roof; cost, $4,700; owner, J. Kirchner, 762 Park Ave.; architect, Th. Engelhardt; builders, Ulrich Maurer and Michael Metzen.

Putnam Ave., n s, 160' w Stuyvesant Ave., 4 two-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner and builder, Jas. W. Stewart, 373 Quincy St.

Bedford Ave., No. 505, n s cor. De Kalb Ave., three-st'y brick store and meeting-room, asphalt roof; cost, about $8,000; owner, etc., John Clarke, 675 Willoughby Ave.

Bergen St., Nos. 20 *and* 22, four-st'y brick manufactory, gravel roof; cost, $8,400; owner, Estate of D. K. Ducker, Fulton St.; architect, W. A. Mundell; builders, Thos. Dobbin and J. B. Jacobs.

Jefferson St., No. 20, s s, 225' e Broadway, two-st'y frame dwell., tin roof; cost, $3,000; owner, Henry Meinck; architect, H. Vollweiler.

Broadway, e s, 25' n Locust St., 2 three-st'y frame tenements, tin roofs; cost, each, $4,500; owner, Magdalena Schneider, 261 Stagg St.; architect, H. Vollweiler; builder, Geo. Loeffler.

Tremont St., No. 98, three-st'y brick tenement, tin roof; cost, $5,300; owner, Ellen Ryan, on premises; architect, Fred. E. Lockwood; builder, D. J. Lynch.

Stuyvesant Ave., n w cor. Hancock St., two-st'y and French roof brick dwell., slate and tin roof; cost, $6,000; owner and builder, B. Linikin, 216 Greene Ave.; architect, A. Hill.

Gates Ave., Nos. 973, 975 and 977, 100' e Patchen Ave., 3 three-st'y brick stores and tenements, tin or gravel roofs; cost, each, $8,500; owner and architect, John McGarry, 583 Monroe St.

Sixth St., n s, 297' 10'' w Sixth Ave., 3 two-st'y brick dwells., tin roofs; cost, each, $3,500; owner, architect and carpenter, Thos. Butler, 457 Sixth Ave.; mason, Thos. Nash.

De Kalb Ave., s s, between Bushwick and Evergreen Aves., two-st'y brick workshop, tin roof; cost, $6,500; owners, The Little Sisters of the Poor, Bushwick and De Kalb Aves.; architects, Parfitt Bros.; builders, E. T. Rutan and H. J. Brown.

Hanover Pl., w s, 132' n Livingston St., two-st'y brick and terra-cotta gymnasium, tin roof; also, *Fulton St.*, s s, 40' e Bond St., four-st'y brick and terra-cotta stone-trimmed building for entrance and class rooms, slate and gravel roof; also, *Bond St.*, e s, 67' s Fulton St., four-st'y brick building, for administrative building of the Young Men's Christian Association, tin, slate and gravel roof; cost for three buildings, estimated $150,000; owners, Alanson Trask, Virginia M. Monroe, and D. W. McWilliams, legatees of Fred. Marquard; architects, Parfitt Bros.; superintending builder, H. N. F. Marshall.

Dean St., n s, 104' 10'' w Clason Ave., 4 three-st'y brick tenements, gravel roofs; cost, each, $5,000; owner, etc., William Taylor, 83 Third Pl.

Decatur St., s s, 80' e Sumner Ave., three-st'y brown-stone dwell., tin roof; cost, $7,000; owner, F. J. McBrien, 21 Bainbridge St.; architect, Amzi Hill.

Broadway, s e cor. Ellery St., three-st'y frame store and dwell., tin roof; cost, $6,000; owner, Wm. Ruthmann, Broadway, cor. Suydam St.; architect, Th. Engelhardt; builders, H. Bruchhauser and Christ. Schneider.

Stockholm St., No. 50, n s, 200' e Evergreen Ave., two-st'y frame dwell., tin roof; cost, $3,800; owner, Wm. Dieckmann, 125 Elm St.; architect, Th. Engelhardt; builder, John Rueger.

Stockton St., Nos. 316 *and* 318, s s, 350' e Lewis Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $4,800; owners, E. & A. Weber, 36 Sumner Ave.; architect, Th. Engelhardt.

North Fourth St., n s, 150' w Fourth St., rear, three-st'y frame tenement, tin roof; cost, $3,800; owner, Mrs. Jane Barrowclift, 127 North Fourth St.; architect and mason, A. Keupp; carpenter, John Rueger.

Prospect Pl., No. 206, three-st'y and basement brick and brown-stone dwell., tin roof; cost, $6,000; owner, Wm. Bruce, 447 West Sixty-first St., New York; architect, W. M. Coots; builder, J. H. Gallagher.

Manhattan Ave., e s, 268' n Calyer St., 6 four-st'y brick tenements, tin roofs; cost, $9,000; owner, John Kuntz, Calyer St., cor. Eckford St.; builder, J. Rooney.

ALTERATIONS. — *Broadway*, cor. Graham and Flushing Aves., add two stories to extension; cost, $5,000; owner, Henry Battermann, on premises; architect, Th. Engelhardt; builders, M. Smith and C. L. Johnson.

Chicago.

BUILDING PERMITS. — L. E. Larson, four-st'y store and dwell., 1058 Milwaukee Ave.; cost, $8,500; architect, H. Kley.

J. B. Sherwood, two-st'y store and dwell., 143 West Jackson St.; cost, $3,000.

Mrs. Green, addition, 47-49 Jefferson St.; cost, $4,-000.

W. H. Steckler, 2 three-st'y dwells., 439-441 Lasalle Ave.; cost, $20,000; architects, Bauer & Hill.

P. Seahan, two-st'y dwell., 3145 Butterfield St.; cost, $2,500.

A. E. Case, 2 one-st'y cottages, 3829-33 Lasalle Ave.; cost, $2,500.

Tobin, Hambler & Co., addition to foundry, 869-875 Halsted St.; cost, $3,000.

A. Pehlke, two-st'y flats, Hastings St.; cost, $3,-700.

H. Bayston, two-st'y dwell., 398 South Western Ave.; cost, $2,500.

F. Sporer, two-st'y dwell., 334 Dayton St.; cost, $2,600.

Mrs. Heller, two-st'y dwell., 2964 Wabash Ave.; cost, $6,000; architect, H. Nelson.

W. H. Thomas & Sons, two-st'y dwell., 1397 Jackson St.; cost, $2,500; architect and builder, W. H. Thomas.

M. Lenaz, two-st'y addition to dwell., 719 Allport Ave.; cost, $4,000; builder, M. Holec.

A. Kuane, three-st'y dwell., 149 Racine Ave.; cost, $2,500.

D. R. Frazier, two-st'y dwell., 916 Monroe St.; cost, $10,000; architect, A. Smith.

E. Hehoe, two-st'y dwell., 3940 Butler St.; cost, $3,000.

P. H. Wick, three-st'y flats, 147 Centre Ave.; cost, $6,000.

L. Jeske, two-st'y dwell., 158 Willow St.; cost, $4,-000.

H. Rosin, two-st'y flats, 99-101 Wood St.; cost, $4,-200.

F. Wolz, three-st'y dwell., 151 Indiana St.; cost, $6,500; architect, E. Baumann.

J. P. Atwater, 8 three-st'y stores and dwells., 353-367 Van Buren St., cost, $50,000; architect, C. Wheeler.

Mrs. Johnson, two-st'y dwell., 303 West Division St.; cost, $2,500.

J. Good, two-st'y dwell., 165 Sheffield St.; cost, $3,500.

A. Moser, two-st'y dwell., 155 Canalport Ave.; cost, $4,000; architect, A. Bessler.

A. L. Waarich, two-st'y dwell., 1475 Milwaukee Ave.; cost, $3,800.

C. J. Dangler, two-st'y dwell., 2918 Prairie Ave.; cost, $14,000; architect, L. B. Dixon; builder, J. Phillips.

Messrs. Trumbull, 2 three-st'y stores and dwells., 2120-22 State St.; cost, $14,000; architects, Burling & Whitehouse.

Cincinnati.

COURT-HOUSE. — The contracts for the cellar of the new county court-house have been awarded as follows: limestone work, James Finnegan, $2,400; freestone, John Boyle, $900; brickwork, J. M. Blair, $20,115.

Mr. J. W. McLaughlin, the architect, is busy now upon the drawings of the superstructure, and it has been decided to tear down the front on Main St., thus giving the architect a clean sheet for that much of the work, which he has taken advantage of by designing a Romanesque façade, and it promises to be very successful.

BUILDING PERMITS. — Wm. Holmes, two-st'y frame dwell., cor. Highland and Carlyle Sts.; cost, $6,000.

John Matthews, two-and-one-half-st'y frame dwell., Mt. Adams; cost, $9,000.

R. E. Taylor, addition to three-st'y brick dwell., cor. Fourth and Broadway; cost, $2,000.

H. J. Eddy, two-st'y brick dwell., cor. Beecher and Orchard Sts.; cost, $5,000.

Theo. Wintering, four-st'y brick dwell., cor. Cleauxbell and Green Sts.; cost, $2,400.

T. P. Carroll, two-and-one-half-st'y brick dwell., Mt. Auburn; cost, $3,500.

F. A. Felthaus, three-st'y brick dwell., cor. Warsaw Pike and Park Ave.; cost, $4,000.

H. Baska, two-and-one-half-st'y brick dwell., cor. Colerain and Forest Sts.; cost, $3,000.

H. Schwilzer, two-st'y frame dwell., cor. Westwood Ave. and Orchard St.; cost, $2,300.

Louis Vogel, two-st'y brick dwell., Lick Run Pike; cost, $2,500.

Alex. Carlor, three-st'y brick dwell., cor. Hatch and Patterson Sts.; cost, $4,000.

Total amount for week, $53,700.

Repairs for week, $6,360.

Total permits to date, 517.

New York.

APARTMENT-HOUSES. — On the n s of One Hundred and Thirty-first St., between Seventh and Eighth Aves., a brick and brown-stone flat, 18' x 80', is to be built for Mr. S. E. Holland, at a cost of $18,000, from designs of Mr. G. W. Da Cunha.

At No. 227 East One Hundred and Sixteenth St., a five-st'y flat, 20' x 63', is to be built for Mr. Isaac E. Wright, from designs of Messrs. Cleverdon & Putzel.

EXTENSION. — The Broner House is to have a 25' x 35' extension built and interior alterations made from designs of Mr. Geo. Edward Harding.

HOUSES. — On the n s of Fifty-seventh St., 250' w of Sixth Ave., a house, 23' front, is to be erected from designs of Mr. Edward E. Raht.

LABORATORY. — The laboratory for Bellevue Hospital, the gift of Mr. Carnegie, is to be from designs of Mr. W. Halsey Wood; the cost will be not less than $50,000.

BUILDING PERMITS. — *East Forty-fifth St., No.* 108½, three-st'y brick stable, gravel roof; cost, $3,000; owners, Cornelius O'Reilly, 34 East Forty-fifth St., also Thos. J. and Michael J. O'Reilly; builders, O'Reilly Bros.

Third Ave., No. 2191, four-st'y brick furniture warehouse, tin roof; cost, $20,000; owner, John Lynch, 265 West One Hundred and Twenty-sixth St.; architect, A. Spence.

One Hundred and Thirty-seventh St., n s, 115' e Alexander Ave., four-st'y brick dwell., school and chapel, tin roof; cost, $14,300; owner, John J. Hughes, 230 Alexander Ave.; architect, A. Arctander.

Bowery, Nos. 45 *and* 47, five-st'y brick and stone hotel, tin roof, with garden-building in rear; cost, main building, $35,000; garden-building, $15,000; owner, Wm. A. Martin, 15 East Thirty-eighth St.; architect, L. H. Broome.

East Sixty-third St., No. 310, four-st'y brick store and tenement, tin roof; cost, $13,500; lessee, Henry Hohn, 314 East Sixty-third St.

Third Ave., e s, 167' n One Hundred and Thirty-ninth St., three-st'y brick store and dwell., tin roof; cost, $4,500; owner, August Stumpfel, 49 Stanton St.; architect, J. Brandt.

East One Hundred and Fifty-second St., No. 478, two-st'y frame dwell. and store, tin roof; cost, $3,500; owner, Thomas Creamer, 480 East One Hundred and Fifty-second St.; architect, Charles McCloskey; builder, Jas. McCloskey.

Tenth Ave., w s, 50' n One Hundred and Second St., 2 five-st'y brick tenements, tin roofs; cost, each, $16,000; owner, Franklin A. Thurston, 62 East One Hundred and Thirty-third St.; architect, Theo. E. Thomson.

West Fifty-third St., No. 131, five-st'y brick and stone tenement, tin roof; cost, $16,000; owner, Christopher Mooney, 220 West Forty-eighth St.; architect, W. S. Jennings; builder, Samuel McMillan.

One Hundred and Fourth St., n s, 200' w Tenth Ave., 3 four-st'y brown-stone front dwells., tin roofs; cost, each, $15,500; owners, Jas. B. Gillie, 538 West Fifty-first St., and Martha A. Lawson and Alexander Walker (one-eighth each); architect, M. Louis Ungrich.

East Sixteenth St., Nos. 521 *and* 523, 2 five-st'y brick tenements, tin roofs; cost, each, $9,000; owner, Michael Larken, 350 East Fifteenth St.; architect, Fred. Jenth.

East Forty-second St., No. 234, five-st'y brick tenement, tin roof; cost, $14,000; owners, Gordon Bros., 139 East Fortieth St.; architect, Jas. W. Cole.

ALTERATIONS. — *West Thirty-seventh St., No.* 39, three-st'y brick extension, tin roof; cost, $5,000; owner, Geo. W. Smith, exr., on premises; architect, John Sexton; builder, Jas. H. Stanley.

West Thirty-eighth St., No. 25, one-st'y and basement brick extension, tin roof: cost, $5,000; owner, Auguste Pottier, 121 East Twenty-ninth St.; architects, D. & J. Jardine.

Fifth Ave., s e cor. Thirtieth St., one-st'y brick extension, tin roof, new store front to first st'y and internal alterations; cost, $30,000; owner, Frederick Beck, 2008 Fifth Ave.; architects, J. C. Cady & Co.

Philadelphia.

BUILDING PERMITS. — *Orrianna St.*, n of Huntingdon St., 2 two-st'y dwells., 13' 6" x 30'; Jno. Freiling, owner.

Lawrence St., n of Huntingdon St., two-st'y dwell., 17' x 25' 6"; Eldridge & Steward, owners.

Mascher St., below York St., two-st'y building, 28' x 74'; Geo. S. Thompson.

East Huntingdon St., No. 548, two-st'y dwell., 20' x 38'; Harbach & Auchter, contractors.

Thirty-first St., cor. Thompson St., four-st'y malthouse, and four-st'y kiln, 39' x 96' and 60' x 60'; Jas. B. Doyle, contractor.

Thirty-first St., cor. Master St., four-st'y brewery, 48' x 48'; J. B. Doyle, contractor.

Point St., cor. Gunn Ave., three-st'y factory, 30' v 32' 6"; J. N. Pattersou, contractor.

Wharton St., cor. Grove St., two-st'y store and dwell., 18' x 40'; Jno. Gibson, contractor.

Mitchell St., below Martin St., two-st'y dwell., 17' x 47'; Geo. Gillett, owner.

Francis St. No. 1701, three-st'y front building, 21' x 41'; Devitt & Son, contractors.

Ninth St., cor. Huntingdon St., three-st'y store and dwell., and 6 two-st'y dwells., 14' x 43' and 18' x 50'; F. A. Collomer, owner.

Darien St., cor. Huntingdon St., two-st'y store and dwell., and 7 two-st'y dwells., 12' x 28' and 18' x 30' 6"; F. A. Collomer, owner.

Fairmount Ave., No. 2324, three-st'y dwell., 17' x 30'; R. W. Sitter, contractor;

Frankford Road, cor. Allegheny Ave., 2 three-st'y stores and dwells., 15' x 52'; F. W. Hauss, contractor.

Forty-sixth St., n of Silverton Ave., one-st'y chapel, 20' x 36'; H. M. Martin, contractor.

St. Louis.

BUILDING PERMITS. — Seventy-three permits have been issued since our last report. Those worth $2,500 and over are as follows: —

A. Coofer, 4 adjacent two-st'y brick tenement-houses; cost, $8,000; contractor, A. Coofer.

A. Coofer, 3 adjacent two-st'y brick tenement-houses; cost, $6,000; contractor, A. Coofer.

Casper Oirter, 2 adjacent two-st'y brick tenement-houses; cost, $6,200; contractor, B. Koester.

G. Boehmer, two-st'y brick mansard roof dwell.; cost, $4,400; architect, C. May; contractor, L. Jaiger.

H. Stanghoener, two-st'y brick mansard roof dwell.; cost, $4,000; architect, C. May; contractor, L. Jaiger.

Margaret Ettling, two-st'y brick mansard roof dwell.; cost, $2,900; contractor, George Gerber.

Mrs. Eliza Walsh, 2 adjacent two-st'y brick tenements; cost, $3,000; contractor, Geo. M. Roeder.

Fred. Tentrap, 4 adjacent two-st'y brick tenements; cost, $2,800; architects, C. B. Clark & Co.; contractor, Henry Pitcher.

H. Ellerbreck, double brick two-st'y dwell.; cost, $3,500; contractor, F. Giese.

Dr. Louis Hauck, two-st'y brick dwell.; cost, $6,500; contractor, W. C. Popp.

Lutheran St. Paul Church, addition to brick church; cost, $2,500; contractor, Erdbuegger.

Mitchell Furniture Co., 3 adjacent three-st'y brick tenements; cost, $12,000; architect, Paul Hush; contract sub-let.

J. J. Swift, 2 adjacent two-st'y brick dwells.; cost, $4,000; contractor, Bollhaggen.

Larenz Koerpel, two-st'y store and dwell.; cost, $2,600; architect, O. Roeder; contractors, W. Herkenhoff & Bro.

A. Deane, two-st'y store and dwell.; cost, $2,500; architect, P. Hush; contractor, D. Clifford.

Stephen Pray, 2 adjacent two-st'y brick tenements; cost, $3,700; architect, W. Shaper; contractor, A. Dietz.

Sacred Heart Parish, two-st'y addition to school; cost, $2,500; contractor, Jno. Castello.

Bitty C. Billufs, two-st'y brick dwell.; cost, $3,450; architect, Johnson; contractor, H. E. Roach.

Mrs. Klyman, two-st'y brick dwell.; cost, $3,800; architect, A. Grable; contractor, W. L. Wickwire.

Chas. E. Illsley, two-st'y brick mansard dwell.; cost, $5,000; architect, Chas. E. Illsley; contractor, J. H. Dunlap.

M. P. Brazill, two-st'y brick dwell.; cost, $2,500; contractor, M. B. Scanlon.

Chas. Schlecht; 2 adjacent two-st'y brick stores and tenements; cost, $3,900; M. Risse, contractor.

F. Kulage, two-st'y brick tenement; cost, $2,800; contractors, S. Quanti & Son.

Jno. Muhoff, 2 adjacent two-st'y brick stores and tenements; cost, $2,800; architect, A. Druiding; contractor, F. C. Schmitz.

Otto Koerner, two-st'y brick dwell.; cost, $6,000; contractor, A. Whri.

A. Waldner, two-st'y brick store and dwell.; cost, $3,800; contractor, T. Gugerty.

J. M. Loenhardt, 2 adjacent two-st'y brick tenements; cost, $3,000; contractors, B. Weber & Co.

E. C. Becker, three-st'y brick warehouse; cost, $18,000; architects, B. Weber & Co.

James Biddle, 3 adjacent two-st'y brick tenement-houses; cost, $12,000; contractors, B. Snyder & Co.

Louis Louenthal, 2 adjacent two-st'y brick tenements; cost, $2,600; contractor, F. Knittel.

Fred. Messmer, two-st'y brick dwell.; cost, $4,500; architect, A. Beinke; contract sub-let.

Mrs. Lipphart, 2 adjacent two-st'y brick tenements; cost, $4,700; contractor, A. Whri.

Washington, D. C.

BUILDING PERMITS. — The following permits for new buildings worth $3,000 have been issued since last report.

L St., bet. Thirteenth and Fourteenth Sts., n w, three-st'y brick dwell., for Thomas J. Fisher; cost, $14,000; T. F. Schneider, architect; W. P. Lipscombe, builder.

L St., bet. Thirteenth and Fourteenth Sts., n w, three-st'y brick dwell., for E. J. Stellwager; cost, $10,000; T. F. Schneider, architect; W. P. Lipscombe, builder.

L St., bet. Thirteenth and Fourteenth Sts., n w, three-st'y brick dwell., for T. M. Gale; cost, $10,000; T. F. Schneider, architect; W. P. Lipscombe, builder.

N St., bet. Seventeenth and Eighteenth Sts., n w, three-st'y brick dwell., for Jno. S. Gulick; cost, $13,000; S. T. G. Morsell, architect.

Fifteenth St., bet. M St. and Massachusetts Ave., n w, two-st'y brick dwell., for Frank Baldwin, Agent; cost, $4,000.

Fifteenth St., cor. Corcoran St., n w, 5 three-st'y brick dwells., for David A. Windsor; cost, $30,000.

Fourth St., bet. E and F Sts., n w, 2 three-st'y brick dwells., for Jno. Bailey; cost, $11,000; Gray & Page, architects; Wade & Hurliby, builders.

Fifteenth St., cor. Massachusetts Ave., 2 three-st'y brick dwells., for R. Goldsmith; cost, $20,000; C. A. Didden, architect; Emmert & Heisley, builders.

R. I. Ave., bet. Thirteenth and Fourteenth Sts., three-st'y brick dwell., for Sam'l Bacon; cost, $10,000; Glenn Brown, architect.

M St., bet. Sixteenth and Seventeenth Sts., n w, two-st'y brick stable, for C. T. Woods & Co.; cost, $4,000.

E St., bet. Tenth and Eleventh Sts., n w, three-st'y brick school, for H. O. Chaughton and E. Carusi; cost, $6,500; Jas. H. McGill, architect; Langley & Gettinger, builders.

Thirty-first St., bet. P and Q Sts., West Washington, three-st'y brick dwell., for Mrs. E. M. Mitchell; cost, $6,000; J. G. Myers, architect.

M St., bet. Twentieth and Twenty-first Sts., n w, 2 two-st'y brick dwells., for Jno. F. Vogts; cost, $6,200; T. F. Schneider, architect; Aug. Getz, builder.

Columbia Heights County, two-st'y brick dwell., for G. B. Towles; cost, $8,000; Jos. Burden, architect.

K St., bet. Fifteenth St. and Vermont Ave., n w, three-st'y brick dwell., for T. W. Palmer; cost, $50,000; J. R. Thomas, architect; R. I. Fleming, builder.

Seventeenth St., cor. N St., n w, three-st'y brick dwell., for N. S. Bates; cost, $9,200; C. H. Willett, builder.

General Notes.

AUGUSTA, ME. — The matter of the enlargement of the Capitol has been placed in the hands of Mr. F. H. Fassett, architect, of Portland.

BELCHERTOWN, MASS. — Ground has been broken for the Clapp memorial library.

PIERRE, DAKOTA. — The South Dakota Presbyterian University was commenced last week. The plans drawn by Earnest Baillie, architect, were adopted, and he was also appointed superintendent.

Bids and Contracts.

BOSTON, MASS. — The Committee of Public Buildings has received proposals for furnishing all materials and doing all labor required for the mason-work, cut-granite and freestone for the building of a repair-shop for the Fire Department, at the corner of Bristol and Albany Sts. The bids were as follows: —

Gooch & Pray, $14,987 (*accepted*).
H. McLaughlin, $16,200.
Robert B. Noyes & Co., $16,791.
Frank Jones & Son, $17,249.
I. H. Kenning & Co., $17,800.
Edward Lynch, $17,885.
Alvah Ripley, $17,985.
Sampson, Clarke & Co., $18,000.
Dady & Flint, $18,373.
W. H. Sayward, $18,380.
J. W. Coburn & Co., $18,473.
Charles H. Dodge, $18,985.
J. N. Coon & Co., $19,400.
Adelerd Phaneuf, $19,755.
W. S. & G. H. Miller, $19,951.
Danney & Co., $19,976.
J. E. McCoy, $21,667.
Gideon Connor, $22,427.

BUFFALO, N. Y. — The Wight Fire-Proofing Company have been awarded the contract for work on the post-office. Their bids are for covering columns, $199; floor arches, $2,593.45; and furring, 29 cents per lineal foot.

PEORIA, ILL. — The work on the post-office has been awarded to the Wight Fire-Proofing Company, at the following prices: for covering columns, $291; floor-arches, $2,119; and furring, 29 cents per lineal foot.

The following is a synopsis of bids for iron columns, beams, etc., for the post-office: —

Thomas H. Brooks, $6,248 (*accepted*).
Snead & Co. Iron Works, $6,593.
Clark, Raffen & Co., $6,794.
Haugh, Ketcham & Co., $6,897.
Union Foundry and Pullman Car Wheel Works, $6,925.
Morris & Marshall, $7,019.52.
Phœnix Iron Co., Trenton, $8,041.
Nicoll, Burr & Co., $9,800.

QUINCY, ILL. — The contract on the tile floor, arches, furring, etc., at the post-office, has been awarded to Wight Fire-Proofing Company. The company's bids are: for covering columns, $293; floor-arches $2,901.00; and furring, 29 cents per lineal foot.

Morris & Marshall have been awarded the contract for putting in place beams and columns at the Quincy post-office. Their bid was $6,497.78.

ST. LOUIS, MO. — The following is a synopsis of bids for non-conducting covering for pipes of heating-apparatus for the custom-house and post-office: —

Stuart & Co., $789.
Chalmers-Spence Co., $848 (*accepted*).
Thos. J. Connor, $890 and $1,000.
Otley Manufacturing Co., $1,250, $1,275, $1,887, and $1,500.
Ainsworth Boiler and Pipe Covering Co., $1,020.63 and $1,508.13.
H. W. Johns Manufacturing Company, $1,620.81 and $1,320.60.

ST. PAUL, MINN. — Skidmore & Gannett have been awarded the contract for furnishing the Union and Court Blocks (W. F. & J. H. Davidson, owners) with thirty mantels and fixtures, which is the largest contract ever given in this city to any one firm.

WASHINGTON, D. C. — The Commissioner has awarded contracts for furnishing terra-cotta pipe for sewers as follows: —

To the Akron Sewer-Pipe Company, 12,600 feet of fifteen-inch pipe, at $3,780; 6,000 feet of 21-inch pipe, at $5,100; 7,000 feet of 6 x 24 inch branch-pipe, at $9,900; and 700 feet of 6 x 24 inch pipe, at $1,540 — total, $20,320.

McMahen & Porter, 20,000 feet of 12-inch pipe, at $4,800; and 10,500 feet of 18-inch pipe, at $5,250 — total, $10,050.

Junction blocks: Potomac Terra-Cotta Company, 16,000 feet of 12-inch, at $5,680; 3,000 18-inch, $1,440; 1,600 21-inch, at $800; 1,000 24-inch, at $1,100; 1,000 6 x 12 inch, at $400; 100 6 x 18 inch, at $1,120; and 500 6 x 21 inch, at $750 — total, $40,840. There were six bidders in this class.

PROPOSALS.

PLUMBING AND GAS-PIPING MATERIALS. [At Jackson, Miss.]

OFFICE OF SUPERVISING ARCHITECT, TREASURY DEPARTMENT, WASHINGTON, D. C., August 1, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 15th day of August, 1884**, for supplying and delivering at the court-house and post-office building, at Jackson, Miss., all the plumbing and gas-piping materials required in accordance with specification and schedule, copies of which, and any additional information may be had on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after time of opening, will not be considered.

M. E. BELL,
451 Supervising Architect.

DAM. [Near Pittsburgh, Pa.]

U. S. ENGINEER OFFICE, 82 W. Third St., CINCINNATI, O., July 19, 1884.

Sealed proposals in duplicate, will be received at this office **until 12 o'clock, noon** (local time), **on Tuesday, August 25, 1884**, for furnishing and delivering at the Davis Island Dam, five miles below Pittsburg, Pa., the following articles:

(Approximate weights). 62 tons of machinery; 6¾ tons of wrought-iron pipe; 17 tons of cast-iron pipe; 9 tons of cast-iron plates; 28¾ tons of bolts, nuts, and washers, divided into five contracts.

For specifications and further information apply to this office, or to Capt. F. A. Mahan, Corps of Engineers, P. O. Box 70, Pittsburgh, Pa.

WM. E. MERRILL, Lt.-Col. of Engineers.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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AUGUST 16, 1884.

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CONTENTS.

WERE it not for two hereditary obstacles — a delicate constitution and a comfortable income — Alfred Greenough would long before this have made for himself a name high up in the list of American artist architects, and at the time of his untimely death would have been as well known by the many for his actual works as he was known to the few as a man of great promise and as seemingly great possibilities. After graduating from Harvard in 1865, and spending a year or so in travel he settled down to the serious study of architecture in Paris, entering the Ecole des Beaux-Arts as a member of the Atelier Vaudremer, where during long years he was a close and indefatigable student, regarded by students and *patron* alike as in the best sense an *homme sérieux*, and a thoroughly lovable companion. We do not believe that even to the time of his death, — which was surrounded with more than the ordinary pathos, as he died alone and absolutely unknown, stricken down by cholera at Rangoon, in British Burmah — he ceased to be a member of the Ecole or of the *atelier*, to which he always returned again after his more or less extended travels in most quarters of the globe where architecture was to be studied. A few years ago he returned to this country intending to begin the practice of his profession, but after examining the ground he thought that it would be best to return to Paris and spend a few years more in the study of scientific construction. This he did, and this seems to offer a striking instance of his strongest characteristic — a conscientious thoroughness. It was at this time that he was approached on the subject of becoming the successor of Professor Ware as the head of the architectural department of the Institute of Technology, but his physician's advice and his own mistrust of his fitness for the position forbade his entertaining the proposition. It is not a little disheartening to think that at the age of forty a man has passed away who had spent nearly half of his life in preparation for a life work that was never to begin; and it may serve as a lesson to the uninstructed public who clamor so at the fact that most architects, perhaps, seem to be only half-taught, which will show the extent and duration of the studies which a thoroughly capable but conscientious man must undertake before he considers himself worthy to begin the practice of one of the most exacting of the professions.

A NEW idea in regard to the protection of audiences in theatres from death by fire has been brought forward by M. Scheurer-Rott, who explains it in a paper read before the Industrial Society of Mulhouse, and quoted by the *Fireman's Journal*. The author of the paper carried on a long investigation into the effects of conflagrations in large closed buildings, including manufactories as well as theatres, and came to the conclusion, which is confirmed by the unanimous testimony of fire engineers, that death from fire in such places is almost always due to the smoke. The actual flames very rarely reach living beings, suffocation having generally extinguished the last vestiges of life long before the fire reaches them. In fact, according to M. Scheurer-Rott's observation, the air of large buildings under such circumstances soon becomes so densely charged with unconsumed gases that the flames dart across the space, in the same way that flashes run through the smoke of a freshly-kindled fire in a fireplace, and ignite in an instant portions of the interior which may be far away from the principal centre of combustion. As a remedy for this, the essayist proposes that openings shall be made in the ceilings of public buildings, closed with valves which can be operated from the outside, and large enough to allow the smoke and heated air from a considerable conflagration to escape. If such vents were provided, he believes that the smoke would pass out through them, leaving the corridors, in which the greatest slaughter now generally takes place, nearly free from the suffocating clouds which are under the present plan soon forced into them. It is true that in one sense these vents would encourage the fire, but they would at the same time, by keeping the surrounding atmosphere clear, enable the firemen to reach the flames with much more precision and effect, while there would, with them, be nothing to fear from the opening of doors or windows by a rescuing party, which, in closed buildings filled with hot smoke, often serves to spread the flames in all directions by the effect of the new supply of oxygen so given.

WE are not a little indignant at the tone of personal hostility which the *Sanitary Engineer* adopts in commenting on the report of Messrs. Putnam and Rice, made to the Boston Board of Health on their experiments on the siphonage of traps, which was published in our issue for June 7. Amongst other things Mr. Putnam is inferentially held up to scorn because Messrs. Philbrick and Bowditch, who were to make the experiments with him, withdrew their co-operation after having assisted at some of the tests, and declined to sign the report, so that these tests had to be repeated with the assistance of Mr. Rice. It seems to us that Messrs. Philbrick and Bowditch made a mistake in withdrawing their assistance. If they were really convinced that Mr. Putnam's experiments did not — as they seemingly did — prove that their conclusions from their own experiments for the National Board of Health were in some degree in error, it seems to us it was their plain duty to follow the usual custom of committees who cannot agree, that is, to submit a majority and a minority report, a course which would have had obvious advantages for them, as theirs would have been the majority report. It seems to us, too, that an editor who had taken an even two months for his investigation should have found time to investigate both sides of a matter which he is apparently willing to make turn on a question of personal veracity. Apparently the *Sanitary Engineer* has "interviewed" everybody except the person who could give the most complete account of all transactions — Mr. Putnam. The inference plainly is, that for some reason — which is not far to seek — the *Sanitary Engineer* had made up its mind to discredit, so far as it could, the results obtained by Mr. Putnam, a thing which, if it could be done at all, should have been done by a logical and scientific analysis of the methods and arrangements employed, and not by maligning Mr. Putnam's private character. We cannot believe that Mr. Philbrick would have allowed a transcript to be made of one of his private letters had he suspected the pettifogging use to which it was to be put. We do not wish to be understood as endorsing the accuracy of Mr. Putnam's conclusions; the experiments and the reasoning which led to the deductions incorporated in the report have been detailed in these columns with unusual particularity, and we believe our readers generally are competent to form their own conclusions. Mr. Putnam's private character certainly needs no endorsement at our hands, and we shall leave him to protect it and his experiments in the columns of the paper which has attacked him, which we will assume are not closed against him as a social and sanitary pariah.

AS to the criticisms which the *Sanitary Engineer* applies after unjustly aspersing Mr. Putnam's personal character, the accusation that the apparatus employed in the tests was not a "fair type of ordinary good practice" can be gauged by those who can agree as to what is "good practice" — in this lies the quibble. It is the old tale of disagreeing doctors: on one side stand Philbrick, Bowditch and the *Sanitary Engineer*, on the other Putnam and Waring. When the *Sanitary Engineer* asks us to believe that the arrangement used is not such as is frequently met with in practice — good, bad or indifferent — it asks too much, as any one knows who is called upon to examine or alter existing systems of plumbing. Its argument that Mr. Putnam had no right to use a closet discharging four and one-half gallons of water is particularly cool, seeing that the closet used is one which has, perhaps, the largest sale of any in the market. The point on which is laid most stress is the employment of a 4″ x 4″ Y-joint instead of a 4″ x 2″ for the experiments on siphonage, it being asserted that the existence of the four-inch branch of the Y caused a suction four times as great as if the branch had been a two-inch one, and in support of this assumption is used the following remarkable statement: "This sort of action [suction] is certainly just in proportion to the size of the side opening in the vertical pipe." It seems to us that the "size of the opening in the vertical pipe" has only to be enlarged indefinitely to reduce this statement to a *reductio ad absurdum.* All that is said about the fall of water from the water-closet forming "a solid piston seven feet in length," which has an unfair effect on a branch forty feet below, is beside the mark, for, even if such an unnatural thing as a "solid" piston of water could exist after a fall of forty feet, as a matter of fact the fall was only eleven feet. We only point out a few of the blunders that occur in this three-column attack to show that those who read it should understand that it is not only "biased," but also inaccurate and illogical.

MR. LAWRENCE HARVEY, a lively young English architect, writes to *La Semaine des Constructeurs* an account of a visit to the Health Exhibition at London. Mr. Harvey does not pretend to be an enthusiast in such matters, but he describes very clearly what he saw, and the account is as interesting to us as to the readers for whom he intended it. A very effective device for illustrating the difference between good and bad house-drainage is shown at the Exhibition in the shape of two model-houses, one fitted up with the plumbing of twenty years ago, and the other with the best work of the present day, according to English ideas. The former is fitted with a bath and water-closet, both supplied from a cistern in the top of the building. The supply-pipe to the bowl of the closet is controlled by a valve in the cistern, and of course stands constantly full of air diffused from the closet-bowl, except when the handle is pulled, when the descending water displaces the air upward, to be absorbed by the contents of the cistern. The water-closet is of the pan type, and is placed in the interior of the house, and drains through a D-trap, into which the waste from the bath enters, on the sewer side of the trap, so that the drain ventilates itself freely through the bath overflow. The soil-pipe ends at the closet, so that even if the trap is not siphoned out, any irregularity of pressure in the sewer would force bubbles of gas into the house.

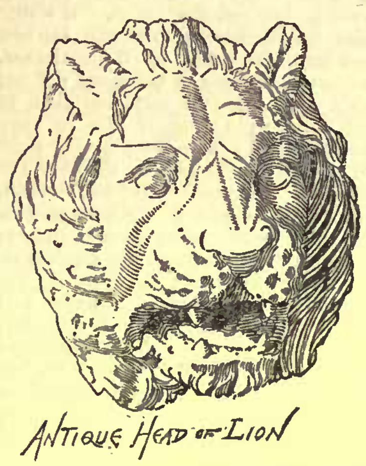
IN the second house, which is intended to show the work as it ought to be, the plumbing is ventilated in a manner which would startle a New York or Boston architect. It is hardly necessary to say that the soil-pipe is carried above the roof, and those who know something of English plumbing will not be surprised to hear that the soil-pipe is wholly outside the house; but besides the exterior soil-pipe, the house wall is adorned with a general basin and bath waste-pipe, in sections, each a story high, and ending at the top with a hopper mouth, over which empty separate waste-pipes from each bath and basin, besides overflows and safe wastes from these and from the cisterns. All these pipes have independent mouths outside the wall, a single basin, bath and water-closet thus requiring eleven pipes passing through the wall, besides the two main vertical pipes. In Mr. Harvey's sketch none of the pipes are trapped except the waste from the water-closet, but we presume the traps are inadvertently omitted in the drawing, since, as we know by personal experience, an untrapped waste-pipe emptying over a disconnecting hopper serves to carry the odors exhaling from the hopper back into the house in a way which no trained American nose would tolerate. To say nothing of the exposure of the whole system to freezing, which would effectually prevent its adoption in any climate colder than that of England, one cannot help thinking that the multitude of little orifices in the wall, each diffusing the exhalations from three or four feet, at least, of slime-lined overflow or waste pipe, must give anything but a pleasant character to the air of that side of the house.

THE Paris Congress of Architects seems to have been conducted in much the same way, and with much the same good feeling, as the Conventions of our own Institute. According to the report in *La Semaine des Constructeurs*, the last day of the Congress was spent in the pleasantest duties. The principal business of the day was the presentation of medals and other honors to persons distinguished during the past year in professional work, silver medals having been awarded to pupils in the School of Fine Arts, the School of Decorative Art, the City Apprentices' School and the private architectural school, besides a bronze medal to M. René de la Blanchère, a Grand Prize Student at Rome, and silver and bronze medals to various workmen of special skill in masonry, stone-cutting, carpentry, painting and other trades. Perhaps the most interesting award was that of three silver medals, paid for out of the Lesoufaché foundation, established ten years ago, for examples of domestic architecture of special excellence; the three recipients for this year being MM. Sanson and Magne of Paris, and M. Delaistre of Villers-sur-Mer. After conferring these distinctions, the members of the Congress dined together at the Hôtel Continental, now a very popular place for such affairs. One hundred and forty gentlemen participated in the dinner, and the amiable feeling which prevailed seems to have been well expressed by a member from Bordeaux, who regretted sincerely that he had never been present before. Among the pleasant speeches one is to be noticed, which was made by M. Bertrand, President of the Association of Master-Builders of the Department of the Seine, offering to the Congress, in the name of those whom he represented, the warm sentiments of regard which the contractors feel toward the architects "who show them the path of science and duty."

THE *Hydraulic and Sanitary Plumber* quotes, apparently from a letter, the excellent suggestion that in places where plumbers are required to obtain a license before practising their trade, as is now the case in most of our large cities, the applicant for the license should be obliged to pass an examination on the principles of plumbing and drainage work before receiving it. The writer of the letter complains, with reason, that men are constantly deserting other kinds of business to take up that of plumbing, without any knowledge whatever of the latter beyond a silly notion that it is profitable; and being alike ignorant of the proper method and necessary cost of doing good work, these new-made sanitarians secure contracts by bidding for them at random, and of course try to save their pockets afterwards by devices which frequently involve sickness and death to their patrons. Architects will sympathize sincerely with the good plumbers in their desire to keep such ignorant meddlers out of the trade, for there are few of them who have not experienced the anxiety and disgust which accompany the attempt to supervise the work of a cheap plumber. Especially with houses in the country, where the local tinman is apt, not only to profess the art of plumbing, but to make himself disagreeable to those residents who hesitate to commit the health of their families to his skill, the architect is often obliged, in deference to the representations of his client, to try to make the best of the work of men who not only put in traps upside down, and lay drains with dry joints, but hate and despise all who think there is any better way of doing such things. We do not say that all, or even most country plumbers are of this kind; on the contrary, the very best plumber we ever knew carried on his modest business in a small seashore town, and there are many like him in similar places; but the botchers and bunglers are far too common in the rural districts, and careful architects cannot help preferring to give their country work to city men, who at least have had the advantage of practice under municipal regulations, rather than trust to such skill as they have learned to look for in smaller places.

THE *Builder* in a notice of the International Forestry Exhibition now open in Edinburgh, mentions that much attention has recently been paid to the care and extension of the forests of South Africa. Timber is rare in the southern parts of Africa, and at the Cape of Good Hope only a small strip, twenty miles wide by one hundred miles long, remains out of the vast primeval forests. This strip is now carefully guarded, to prevent fires, and to see that the cutting of timber is carried on judiciously, while, under the care of the Government, nurseries have been established, from which vacant places in the forest are filled, while stock is also sold to private planters.

THE DRAINAGE OF THE VILLARD HOUSE IN NEW YORK.



THE illustrations published in connection herewith are reproductions of the record drawings accompanying the description of the work supplied to the owner for future reference.

The plumbing was executed by the Drainage Construction Company of Newport and Boston, under my own direction, and under the immediate control of Mr. S. P. Poland, an assistant engineer of the Company.

The house stands on the north-east corner of Madison Avenue and Fiftieth Street, and covers about 60′ x 100′. The street on which its longest side faces has a sewer of sufficient depth and capacity for all requirements.

Under the New York law the plans and specifications for the work had to be passed upon by the Board of Health. They were submitted with adequate explanations. They were rejected for several reasons, as follows: —

1. There was no back-ventilation of traps as required by the New York law.

2. Some of the four-inch soil-pipes recommended were rejected because of the number of bath-rooms connected with them. The four-inch horizontal pipes under the ceiling of the cellar were rejected because of their connection with rain-water leaders.

3. The "Dececo" water-closet prescribed to be used was rejected as being "a very complicated piece of earthenware."

4. The "Weaver waste" prescribed for wash-basins was rejected because of its liability to favor the deposit of solid matters in the branch below the bowl.

On consultation the following results were reached as to these objections: —

1. The back-ventilation of traps was insisted upon by the Board of Health, and was necessarily accepted by the engineer, but accepted under protest, and with the statement that in his judgment it would be better that the proprietor should pay the large cost of this part of the work for the privilege of omitting it rather than for its execution, and for these reasons: —

(*a*) The free circulation of air in the immediate vicinity of the sealing water would, unless constant attention were given, ensure the unsealing of all the traps during any considerable period when the house might not be occupied.

(*b*) Aside from the cost of the extra work, the additional introduction of such a great length of pipe, some of it of lead and some of it of iron, with its many joints and its liability to accidental injury, would add a serious element of danger to the system, the belief being that the waste-piping connected with the drainage system should always be restricted to the least possible amount.

(*c*) Experience had sufficiently shown that long and intricate air-channels are often ineffective in preventing the siphonage of traps, while the choking of the lower end of the vent-pipe, by an accumulation of foul matters dashed into it by frequent discharges of foul water, much more frequently renders it inoperative — by entire closure, or by such a restriction of area as to prevent the sufficiently free movement of air; it was thought that such causes would at times operate to render nugatory the apparent means of safety.

(*d*) Aside from its inefficiency, its dangers and its cost, it seemed impolitic to apply the ventilation system in this house, where every vessel, with the exception of the water-closets, was to be trapped with a mechanical trap of positive action, and while the water-closets themselves would have traps of such volume, and so exposed to view that not only would their unsealing by siphonage be impossible, but their exact condition would always be obvious.

2. It was equally unavailing to protest against the larger soil-pipe required, and a diameter of five inches was accepted perforce, — but with a protest based on the fact that no roof of the size of the one here to be provided for could deliver its water into the upper ends of its numerous leaders so rapidly that the four-inch pipes intended for its ultimate discharge into the main drain would not be more than doubly sufficient for its removal; also, with reference to the number of fixtures connected with each soil-pipe, it was maintained that even though every water-closet and every bath-tub on each stack should be discharged at the same moment, the whole flow would not nearly equal the capacity of the pipe. It was represented also that the flow of water through the soil-pipe — the most effective flush coming from the use of the water-closet—would be relatively stronger and more cleansing in a four-inch pipe than in a five-inch pipe.

3. This objection was withdrawn on demonstration that so far from being complicated the "Dececo" water-closet is as simple as a plain funnel with a bent exit-pipe can be.

4. This objection was withdrawn on demonstration that, while it is true that the lateral chamber of the "Weaver waste" is subject to a slight encroachment of foul matters, it is not so much so as is the lateral pipe of the "Boston waste," the use of which is permitted by the regulations of the Board of Health, and that this channel is entirely shut off from the air of the house—while that of the "Boston waste" is not. It was shown also that while the chain and plug, also permitted, is extremely untidy, there being an inevitable fouling of the links of the chain and its attachment to the plug, the "Weaver waste" affords a perfectly smooth interior to the bowl, which is kept clean without extra attention.

These points having been settled, and the character of the workmanship having been found acceptable there was no further interference from the authorities.

DESCRIPTION.

The main outlet for all of the drainage is on the south side of the house and into the street sewer, at a point below the floor of the cellar.

Before the work was taken in hand by the Company there had been laid around nearly the whole of the cellar, below the level of the concrete and generally near to the foundation walls, a brick drain which was not disturbed. Later, a tile drain was laid running under the centre of the cellar connected with this brick drain. These drains are now covered under the concrete flooring, and are connected, by a valved and constantly submerged trap, with the main outlet pipe of the foul-drainage and rain-water system. Connected with them is an iron drain leading from an area on the north side of the house.

The arrangement of these drains, and also of the Croton supply-pipes, which are under the basement floor, is shown in Figure 1, which gives the cellar-plan of the house.

Figure 2 is an elevation showing the arrangement of various pipes centering at this point of outlet, and supported mainly against the outer wall of the house. In this illustration, as in the others given, the various systems are represented as follows: —

Foul-drainage, rain-water, and fresh-air inlet pipes by solid buff color.

Vent-pipes for the ventilation of traps against siphonage by cross-shading.

Cold-water supply-pipes, whether from the tank or from the Croton pipes, by blue.

Hot-water supply and circulation pipes by red.

Drip-pipes from the safes under wash-basins, baths, etc., by green.

The circular section at the bottom of the illustration is a section of the main eight-inch outlet-pipe leading to the street sewer.[1] The branch to the right, above the trap, is a fresh-air inlet opening into the area outside of the house. The smaller branch to the right receives the waste of the scullery-sink to the right, and of the kitchen-sink to the left. The first branch to the left receives the waste of a water-closet in the cellar, and of a sink in the cellar which is connected with the water-closet branch. The next branch to the left is a rain leader which, from a point above the basement floor, is carried inside the wall of the house. The vertical pipe over the trap turns at a point below the cellar ceiling to receive the horizontal runs connecting the other soil-pipes and rain-water leaders of the house, with the main outlet, as shown in Figure 3.

The two sinks shown in the basement (Fig. 2) are provided with "Dececo" flush-pots, which are closed at the bottom with plugs attached to a spindle rising through a large strainer in the floor of the sink. There is no discharge from these flush-pots, except while the plug is held up. Ordinarily the outlet is closed, and the waste from the sink accumulates until it appears above the strainer. When the plug is raised the whole contents, six or seven gallons, are discharged with great rapidity through the waste-pipe, preventing the accumulation of grease, which is sure to result from a trickling stream. The strainer and plug can be entirely removed at pleasure for the cleansing of the interior of the flush-pot. These flush-pots are of iron. That under the copper sink of the butler's pantry is of tinned copper — nickel-plated on the outside. All of the flush-pots are exposed to view; no casing.

Under the second floor is shown the weir of the "Dececo" closet with the other attachments of fixtures of the bath-room with the waste, ventilation, supply and drip pipes.

Figure 4 shows the area drain running under the house, and the location of the horizontal run across it with its different branches as indicated in Figure 3.

Figure 5 shows an elevation of the soil-pipe connected with a series of bath-rooms on the second, third and fourth floors; also the openings into the same for the drainage of other fixtures, and for the back-venting of other traps than those of the "Dececo" closets.

This soil-pipe is five inches in diameter, as far as a point in the attic where it is increased to eight inches — this increase in size, securing a better movement of air through the pipes, being carried out on each of the lines.

The connections with the fixtures of this line on the second floor are shown in Figure 6, and the arrangement of the fixtures themselves in Figure 7. The connections with this line on the third floor are shown in Figure 8, and those on the fourth floor in Figure 9.

In like manner the connections of all of the fixtures in different parts of the house with the different supply, waste, drip and vent

[1] This pipe was laid before I took charge of the work. It is large enough for a small village.

pipes are shown in similar drawings which give the exact size, location, character and connection of the whole system.

The difficulty of arranging and of accommodating to each other these various pipes is especially illustrated by Figures 10 and 11. Incidentally they illustrate the tortuous course necessarily followed, where work must be laid under the floor or behind the plastering of walls, by the vent-pipes required by modern Board-of-Health regulations. This is a serious matter in view of the fact that every bend in an air-pipe, through which a sudden movement is to be depended on for the protection of traps, is an added obstruction to its flow.

The numbers on the different faucets of the supply-pipes correspond with a record table indicating the point at which each supply may be cut off at pleasure.

In constructing the work every soil-pipe, vent-pipe and leader was tested by having its outlets closed, and by being filled with water, every joint being recalked as often as necessary to insure absolute tightness. It is believed that in no portion of the whole system is there the least possibility of any communication through leaky joints or otherwise between the interior of the drainage system and atmosphere of any part of the house.

The whole work is of the most simple arrangement compatible with such a general distribution of bath-rooms and other points where water is drawn or discharged on the different floors.

The baths are of porcelain (English), *with their inlets and outlets rearranged*, so as to avoid on the one hand the foul overflow for which they were originally constructed, and on the other the liability of a back-suction of the contents of the bath in the event that, its supply-pipe being open, water might be drawn from a fixture below it in sufficient volume to reverse the flow. For the overflows and waste-plugs there have been substituted in all cases simple stand-pipe overflows inserted in the outlets. Water is supplied through stationary cocks overhanging the foot of the tub.

The wash-basins are supplied through compression-cocks. The wastes are all closed with the Weaver device, which leaves the interior of the bowl entirely smooth, with no point for the accumulation of slime, and the traps are in all cases Cudell traps, closed with balls of tested accuracy of fit. The space under each wash-stand is entirely open, and is finished to the height of the marble slab with glazed tiles. The supply and waste pipes and the traps are nickel-plated.

The water-closets, thirteen in number, are all "Dececo" closets supplied with separate flushing-cisterns operated by pendent chains. The space under the seat is entirely open to sight and ventilation, the floors and walls being covered with tiles. These closets are arranged to be used as urinals or as slop-hoppers, the seats being hinged to turn back out of the way. In the whole house there is only one "slop-sink" — on the floor containing the servants' bedrooms.

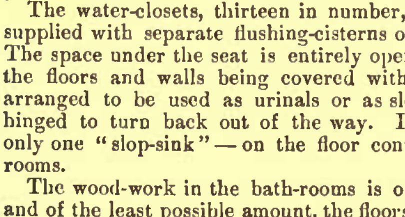
The wood-work in the bath-rooms is of the simplest description, and of the least possible amount, the floors being generally of *terrazzo* work, and the walls of the rooms of tiles or of marble.

The public water-supply being unreliable for the upper floors the entire system of supply-pipes is connected with duplicate tanks, each of 1,500 gallons capacity in the attic. In addition to the ordinary telltales these tanks are supplied with electric tell-tales, registering near the steam-pump in the cellar, which indicates when each tank is nearly full or nearly empty. The tanks are entirely independent of each other, and may be worked separately or together at pleasure. Each has an independent overflow to the roof gutter, and each is covered by a light wooden frame over which muslin is stretched, affording sufficient ventilation, but excluding dust and insects.

My aim in this work has been to secure the fullest measure of convenience, with great simplicity, and absolute security and durability. For its "elegance" it depends on the highest finish, and the entire absence of ornamental work. I believe it to be free from sanitary defect. For the reason above given I should have preferred to omit the "ventilation" of the traps, but, as the work has been done, I think this weak point has been sufficiently guarded.

George E. Waring, Jr.

DRAIN-TESTING.[1]



SOME years since a letter appeared in a contemporary, drawing attention to the importance of house-draining being free from leakage, and advising every one who had a drain in their house to procure a certain quantity of ether, and pour it down a sink or closet, and then, if any defect existed, the ether would escape, and the defect be discovered. This amateur system of drain-testing took immensely with the public, and, I dare say, there was a run upon the ether market for a time, and even now I meet with people who have just tested with ether. The letter did good, for it taught the public that it was important that their house-drains should be sound and free from leakage. There are in England and Wales about 4,000,000 houses, and I should not be astonished that, if these were tested, at least 3,000,000 would be found defective.

[1] A paper by Henry Masters in the *Sanitary Record*.

Drain-testing by strong scents is not a new thing, for in my early days (nigh fifty years ago), I have a vivid recollection that if water in which cabbage had been boiled was discharged into the kitchen sink, its odor invariably escaped into the cellar, up the staircase, and, I dare say, the air of the reception-rooms and bedrooms did not escape being highly charged with this vegetable test; but then in those days everybody considered it the right thing, if able, to have drains under their houses. As a matter of course, such drains must emit a bad odor, or how should a stranger be able to discover the locality of that useful appendage to a house — the water-closet. "Follow your nose," was the order of the day, and your nose seldom played you false. In these later days we are more alive to defects in drains, and drain-testing has become quite a business, and consequently we all have our fads in this direction; one is strong for chemicals, another for smoke, another for filling with water, and another trusts to the sense of smell to detect the natural drain odor, and the latter class of testers are legion, and they are generally of "opinion strong," for, say they, if you cannot detect any drain odor, the drains must be perfect. As I have for many years practised in each and every of these testings, I will give my experience, and in doing so I trust that I shall throw some light upon the question of drain-testing, for I find that some of those who ought to know are not all so well informed as they should be.

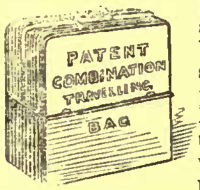
I take rather a broad view of this drain-testing, for I do not believe that either of the systems enumerated above are applicable in all cases. Take, for instance, the case of an old house; you want to know if the drains are free from leakage, and your client will not hear of breaking ground, as he feels sure all is right, for he has constantly had traps put in. Now these traps are the rub. There is a trap at the closet, and at the foot of the soil-pipe; another at the end of the passage, another under the cellar, another just out of the house, and another close to the common sewer or cesspool. So here we have the drain divided into six sections or pockets, and it is found that water passes freely from the water-closet to the cesspool, for you can hear it enter that receptacle by applying your ear to the bung-hole of the man-hole stone, or cesspool ventilator. To apply a smoke test in a case like this would be absurd, for the most you could do would be to try one or two sections through a sink or bung-hole, but if you put carefully a strong peppermint oil, ether, aniseseed oil or nitro-benzole, and plenty of hot water to follow, the chances are you may fairly test the drain from end to end, and may find, if this test has been effective, by applying your nose to the bung-hole or ventilating-pipe, and so discover if the test has gone from end to end. The advantage of the chemical test in such a case as I have described is that no trap in the line of the drain will interfere with its free action, for wherever the drainage flows the test will also flow, leaving particles upon the sides of the drain; so you have a long line of scent from closet to cesspool, and, if proper precautions are taken, you will be able to discover about the locality of the fault, if any.

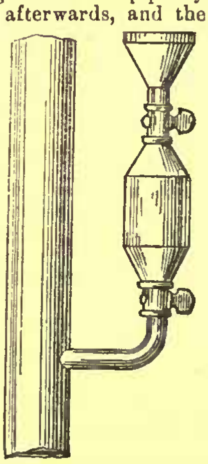
If we have laid down new drains, and know where the traps are, there is no better test than smoke by the fan, and the machine made by Messrs. John Watts & Co., engineers, of Bristol (who also supply test-paper), I believe to be the best in the market; at any rate I find it handy and effective, and, if packed in a box, is not a heavy package to travel with.

Water-testing has its limits, for seldom will a system of drains stand water pressure. Take a case: a small house has a 6-inch drain from back to front, is trapped at the sewer, has a scullery and a yard-sink. The trap and sinks are plugged securely, and you let on the first floor water-closet service-pipe, until the basin is nearly full; all at once the water sinks, for something has given way; probably an underground pipe burst. You inquire into this, and find that the drains have been submitted to a pressure of about 12 lbs. per square inch. This upon the 6-inch pipe is more than 200 lbs. per inch run. To my mind this is a pressure that no drain should be submitted to, for drains are not made to carry high pressure water. It may be said that should a stoppage take place in the underground drain, everything should be strong enough to resist the water rising in the soil-pipe; but this can seldom, if ever, take place, for an escape at the scullery or yard-sink would at once draw attention to the stoppage. Water-testing is very well for a ware drain that has three or four feet rise, but nothing above that height should be filled with water, except the drain is of iron. There is this advantage in a water-test — you fill the pipes and watch the effect; if it falls but slightly it shows that there is a leak somewhere; if they are tested before being covered up you can detect the spot; but if the drain is covered the whole must be opened and examined, for the leaking water will travel under the pipes for many yards, and possibly be absorbed by the soil. Water-testing should only be tried upon new open drains, and after the cement-jointing is well set. Some consider that a soil-pipe is best tested by water — if the pipes are strong, well and good; but I have a lively recollection of a lead soil-pipe being so tested, and the lower end of the pipe gradually assuming a leek-like shape. In drain-testing by water it is well to be provided with turned plugs of several sizes, about three inches long, covered with India-rubber. Some prefer leather cups, with plugs of cork inside them.

Upon applying the smoke-test it is necessary to take some precautions. All outlets (such as air-openings) should be plugged, and also the outlet of the drain should be cut off; for I have known cases when a strong current set in the direction of the main sewer, in which circumstances, the smoke would be found to pass from the house instead of to it. You must also regulate the quantity of smoky material according to the capacity of the drains and pipes to be tested, for a mansion will require more smoke than a cottage; and if you can cut a small hole into the drain at several places, and cork all but one up, an examination of cork after cork will assure you that smoke is present at certain points, and disclose if the drain-pipes have been laid without pockets or accidental cesspools, caused by the pipe-layer allowing the pipe here and there to sink. In some cases you will find a difficulty in getting at the pipe to make a hole into it. In such cases attack a gully or trap outside the house, or even the kitchen-sink, extract all the water from the trap with a sponge, and insert the smoke-pipe, bound round with a duster or house-cloth, or a flexible tube may be passed through the trap water, and the water in the tube expelled by your breath. The great advantage of smoke-testing is that you can see, as well as smell, the exact locality of the leak, or at any rate you can follow the smoke to the defective parts, for it is of a strong flavor, flavoring the earth round a defect. In some cases I have known it leave a sort of tint upon the earth. With the smoke-test you do not require to be so careful of handling the apparatus as in chemicals, for touching a peppermint cork will scent your fingers or dress, and will occasionally give a false scent; therefore too much care cannot be taken in chemical-testing.

The sketch herewith shows a suitable bag for carrying your chemical apparatus; it is in two parts, the upper a Gladstone or other approved leather receptacle, and should contain a set of tools, viz.: a square-faced and pointed-backed geological hammer, useful for cutting a small hole in a ware-pipe, and also as a centre punch; an American drill, to make 3-16th inch holes in iron pipes; a square reamer; a screw-tap, such as used by gas-fitters; a curved pipe, with taper screwed ends, for fixing into a soil-pipe; several receptacles for chemicals, which may be screwed upon the curved-pipe. These receptacles have taps bottom and top, and the contents are discharged into the pipe by opening the under tap first, and the upper afterwards, and the chemical will pass down by gravitation; but it may be advisable occasionally to screw a funnel on the upper end, so as to run some water through from a jug. This test is better applied out of doors, if possible, for it is next to impossible not to allow a small escape. Some lead or gutta-percha plugs, to screw into the pipe holes after you have finished; a screw-driver; a light hard chisel; a taper-piercer, to make holes in lead pipes; some nails, string, and wax tapers; some slips of brown paper, which have been soaked in vinegar and saltpetre, for simple smoke-testing, such as waste-pipes, etc. There should also be some tin divisions, to contain two stoppered bottles, having a tablespoonful of diluted sulphuric acid in each, and about six "torpedoes," each charged with two ounces of oil of peppermint.





The lower part of the bag is a box, having a cover well screwed and jointed with rubber, so that no scent can escape. This box should not be taken inside the house, and it should be fitted inside with tin divisions, to receive, say, two stoppered bottles, each to contain ¼ pound of ether; two bottles, each to contain two ounces Hotchkiss's oil of peppermint, two bottles, each to contain ½ lb. of oil of murbane (artificial almonds); a duster or two, and practice will perhaps suggest other tools, apparatus, and tests. With such a bag, fitted, you can commence operations; and first I should advise you to make an inspection of the whole premises, and take a rough sketch of the basement floor, noting by an **X** every sink, by a ● every soil or waste-pipe, by **O** every rain-water pipe, and by dotted lines the supposed position of drains, underground tanks, bench-marks, cesspools, etc., and the more notes you take the better. Examine all upstairs apartments, making separate sketches of closets, bath-rooms, and lavatories, with notes of fittings, water-supply pipes, overflows, etc. You will be now in a position to commence testing, as you will have a fair knowledge of the scheme of drainage. At the same time, if you can get a local mason and plumber who have had something to do with the drains, they can give you much out-of-sight information which you will find valuable. Having studied the various directions of the drains and pipes, endeavor to inject into each section a test of different odor; but, before commencing, all doors and windows must be closed, air-pipes and main drains stopped. Give your assistant full instructions, and keep him outside the house. He should be provided with the chemical box, several buckets of hot water, and a jug. Your position is inside the house, having previously provided yourself with what you require. Your assistant will drill the outside soil-pipe, or see that an outside sink is clear, and inject a test, which he washes down with hot water. If the test should be put in an outside soil-pipe you can assist its development by pouring some hot water into the inside closet. Your next duty will be to enter each apartment, commencing near to where the test is applied, carefully closing each door after you; and if any test is discovered escaping, endeavor to find its exact point of escape, and make a note. You may find it necessary to try inside soil-pipes, because there may be traps top and bottom, and this may be done by putting down the closet a "torpedo," suspended by about a yard of string.

To describe the mode of testing in every case would far exceed the limit of this paper, but like everything else, to be successful requires experience and a large amount of ingenuity, for the difficulties are many, and not least is having inaccurate smelling powers; and it is astonishing how defective the sense of smell is with some people. I have met with individuals who have failed to detect any scent even from oil of peppermint dropped into a glass of hot water, and again others who have scented out one's test-bag as it was taken through the house. A successful tester must, therefore, cultivate this important sense, so as to be able to distinguish the difference between one scent or another, and it is well to procure the use of an inmate's nose also, as it confirms your own opinion, and is evidence. A perfumer can tell to a nicety the kind of scent contained in a bottle or cake of soap, and their proportions, and I see no reason why drain-testers should not be able to distinguish the scent escaping into the house that his assistant has injected into the drain outside.

Another important matter in drain-testing is temperature. If the house to be tested be occupied, and plenty of fires going, and the outside air at freezing point, the probability is that your testing will be very successful; on the other hand, should your test be applied to an empty house, and the outside temperature warm, very leaky drains may not be detected; in the latter case it is better to put off your testing till a more suitable day.

For chemical-testing, Hotchkiss's oil of peppermint stands first on the list — dose, from one to two ounces — and it can be detected in the drain for twenty-four hours after it has been applied; next, sulphurated ether — dose, four to six ounces — this passes off in about four hours, and care should be taken not to allow a light to come near the ether, or for it to accumulate in pockets.

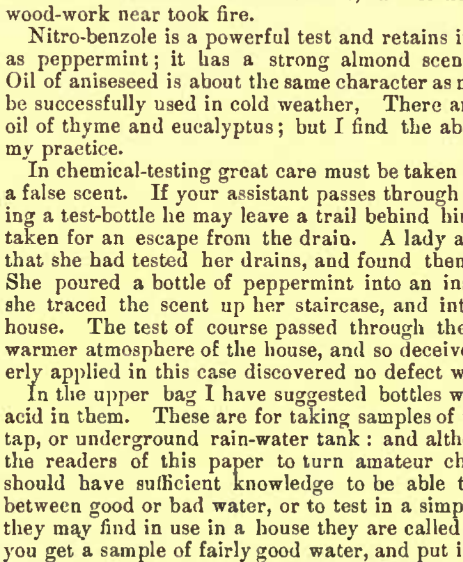
I tested the drain of one house with ether, and a fortnight afterwards a workman opened a cesspool into which the test had found its way, and upon striking a light to examine the cesspool, he was blown about three feet into the air, and had some slight burns; and a lady client once informed me that she had tested her own drains at night, by pouring into an outside sink a bottle of ether; the result was that she was thrown some distance from the seat of operation, and her servant who had the candle, ran for her life, and some light wood-work near took fire.

Nitro-benzole is a powerful test and retains its smell about as long as peppermint; it has a strong almond scent — dose, six ounces. Oil of aniseseed is about the same character as murbane, but it cannot be successfully used in cold weather. There are other tests, such as oil of thyme and eucalyptus; but I find the above are sufficient for my practice.

In chemical-testing great care must be taken not to be deceived by a false scent. If your assistant passes through the house after opening a test-bottle he may leave a trail behind him, which may be mistaken for an escape from the drain. A lady amateur informed me that she had tested her drains, and found them in a dreadful state. She poured a bottle of peppermint into an inside water-closet, and she traced the scent up her staircase, and into every room of the house. The test of course passed through the closet door into the warmer atmosphere of the house, and so deceived her. A test properly applied in this case discovered no defect whatever.

In the upper bag I have suggested bottles with a little sulphuric acid in them. These are for taking samples of water from the pump, tap, or underground rain-water tank: and although I do not advise the readers of this paper to turn amateur chemists, I think they should have sufficient knowledge to be able to tell the difference between good or bad water, or to test in a simple manner the water they may find in use in a house they are called upon to inspect. If you get a sample of fairly good water, and put it into a test-tube with a drop of permanganate of potash, it will color it a very light pink, and it should retain this color for a day at least; but if you treat a sample of foul water in a similar manner it will immediately assume a yellowish color, showing that it is not pure; and if such water as this be found in a house, the sooner an analytical chemist's opinion upon it is taken the better.

STROLLS ABOUT MEXICO. — III.



We took the train for a day's trip to Amecameca at eight o'clock on a keen-aired and sunny February morning. Amecameca lies close at the feet of the two great mountains, Popocatepetl and Ixtaccihuatl, and is reached from the capital by the Morelos division of the Interoceanic Railway. It is a famous pilgrimage resort, and the locomotive which drew our train was appropriately named the "Sagro Monte" (Sacred

Mount), in honor of the hill where stands the celebrated shrine. The trip is full of interest like most of the routes out of the Mexican capital. First across the wide marshes surrounding the city with Lake Texcoco spreading far away to the left, passing close to the isolated great rock, the Peñon del Marques, which in the days of the Conquerors was a bold island rising from the lake's depths, but now stands upon the dry plain with one of the hottest of hot springs gushing from its base; then entering among the foot-hills, running by gray olive orchards, through the heart of a quaint village; now along the reedy shores of Lakes Xochimilco and Chalco, with clear, sweet waters; volcanic cones rising around, and the mountain monarchs rising higher, grander, and more majestic as we draw nearer.

It is about eleven o'clock as the train halts under the shadows of the great cedars of the Sagro Monte. The railway station strikes the key-note of the place. It is an old building utilized for the purpose, with thick walls, and a Swiss-like roof of light shingles weighed down with stones. A prominent wooden balcony, painted green, runs along the second story, and the walls are strengthened with heavy buttresses at irregular intervals, throwing, with the eaves which project four or five feet, together with the balconies, broad bands of rich shadow along the sunlit surface. The whole town has a strong Alpine character produced by its architecture, and its glorious environment of lofty pine-clad and snow-mantled slopes.

The Sagro Monte rises close beside the railway track at the station, and a high wall of masonry encloses the sacred limits. The entire mount is covered with a magnificent grove of densely growing cedars and pines, and the track is literally overhung by low-swinging dark cedar branches. Above us, on a shoulder of the mount, there stands upon a terraced level the chapel and former monastery of the miraculous shrine. We enter at the gate near by, and climb the mount by a sylvan, zigzag path, which for its surroundings might be upon a Berkshire hill-side. It brings us to the chapel of the shrine, but as it continues up the hill we keep on to the summit. There in a clear, open space amid the grove, stands a more ancient chapel. The view is peerless of its kind. Above all, the incomparable heights of the mountains, with soft clouds, like bits of floating down, hovering about their glittering, dazzling peaks; the billows of pine slopes rolling between; the broad, golden-hued valley stretching gently away, basking in the sunshine; the tawny surface varied everywhere by sheets of the young wheat's delicious green. Below is the town, silent as if sleeping, and off in the blue southwest, the valley dips down into the perennial warmth of the lands where summer ever abides.

We descend to the pilgrimage shrine. The chapel is comparatively new, but is architecturally interesting. It nestles in among the ledges, with a broad, flag-paved platform in front, bordered by the adjacent ecclesiastical buildings upon one side, and by a heavy parapet along the edge of the precipitous hillside. Handsome stone steps rise to a beautiful terrace running along the chapel front, and on a level with the interior gallery. The chapel consists of a rotunda crowned by a fine dome. At the main altar is the image representing the apparition which caused the founding of the shrine. It represents Christ in the sepulchre, in which form the Saviour was seen by an Indian upon this spot, so goes the story. The date is modern — some time in the second quarter of the present century, I believe. The story gained credence rapidly, and Amecameca became famous throughout the land, thousands flocking hither annually. Around the chapel are hung hundreds of votive offerings, mostly crude paintings representing miraculous cures, and escapes from danger. The apparition is always represented upon these pictures, the figure floating horizontally in mid-air, making an extraordinary effect.

We took another way down the hill; a gently sloping tree-arched way with gray moss pendant from the branches above, the even stone pavement flecked with sunshine, and the Stations of the Cross standing in stone monuments along one side. At the foot of the hill, the path made a turning with some fine broad steps, and left the sacred limits through a monumental archway.

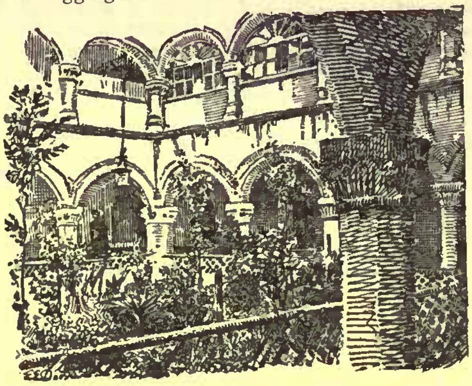
All through the town the narrow sidewalks were about as well sheltered by the broad projecting eaves of the buildings as they would be by arcades. The evidences of modern innovation were seen here and there in the substitution of corrugated-iron for shingles as a roof-covering. The original forms were preserved, however, and as the effect was not materially marred, as lovers of progress as well as picturesqueness we could not find it in our hearts to blame the builders for constructing more weather-proof and enduring roofs.

The town is full of picturesque bits. The main plaza is particularly effective, with its market-place under and around a long colonnade, a very old church, and interesting structures on every side.

Adjoining the church are old convent buildings, and a shy and handsome young sacerdotal student admitted us into a cloister court of thoroughly Romanesque character. The walls were brilliantly whitewashed; the massive arches were supported by short, sturdy pillars; on the walls the arches were emphasized and enriched by a band of carving following their lines. The arches of the upper tier were closed in, forming a corridor, and some of their segments were strikingly irregular; evidently the result of faulty repairs. "*Es muy, muy antiguo*" (It is very, very old), explained the sacerdotal youth, and he said that it was built in the early days of the Conquest.

Being on the lookout for antiquities, we were directed to the shop of a dealer in old junk. Amecameca is an exceptionally fine place for the finding of Aztec relics, for Popocatepetl was a sacred spot, and the people used to bury their idols and their pottery in the sides of the volcano in great numbers. The dealer had no ancient pottery, but he showed us a fine stone idol which he offered for five dollars, but it was too large and heavy for us to take away.

Returning to the railway station to await our train, a bright Indian boy whom we had taken as a guide, brought to us a workman who was digging a hole to make a foundation for a new gateway in the wall of the Sagro Monte, opposite. He had that morning dug up some terra-cotta heads, he said, and he would bring them if we would like to see them. In a minute he returned with three fine heads, well modelled, and with firm, decisive features. They were undoubtedly genuine, having the peculiar, rich, deep color, and smoothness of surface never seen in the imitations. They evidently belonged to the ornamentation of a peculiar kind of vase made by the Aztecs, having a row of heads around the upper edge, as shown by some fine specimens in the National Museum.



"How much did he want for them?" we asked.

"*Lo que Vds quieren darme*" (Whatever you may choose to give me), he replied, evidently unused to bargaining.

We offered him twenty-five cents for the three, and he took it with a pleased smile, and a "*Gracias, Señores,*" as if he had made a good bargain in disposing of what had little commercial value through its superabundance in that locality.

It was warm and pleasant sitting in the sunshine, and waiting for the train, but soon the shadow of the Sagro Monte fell upon us, and instantly a chill filled the thin air, while a breeze bearing the breath of snow banks came down from the mountain sides. So we were glad to don the overcoats, which until then had seemed needless.

Sylvester Baxter.

THE ILLUSTRATIONS.

CHURCH OF ST. AUGUSTIN, PARIS, FRANCE. M. BALTARD, ARCHITECT.

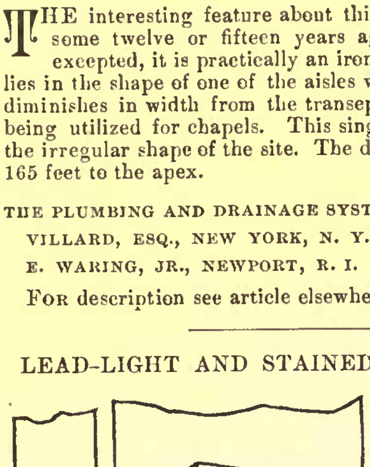
The interesting feature about this church, which was completed some twelve or fifteen years ago, is that, the exterior walls excepted, it is practically an iron church. Another peculiarity lies in the shape of one of the aisles which, as the illustration shows, diminishes in width from the transept toward the front, the space being utilized for chapels. This singularity in plan was caused by the irregular shape of the site. The dome is 80 feet in diameter, and 165 feet to the apex.

THE PLUMBING AND DRAINAGE SYSTEMS IN THE HOUSE OF HENRY VILLARD, ESQ., NEW YORK, N. Y. DESIGNED BY MR. GEORGE E. WARING, JR., NEWPORT, R. I.

For description see article elsewhere in this issue.

LEAD-LIGHT AND STAINED-GLASS GLAZING.[1]—II.

There is but little doubt that in the earliest glazed windows the glass was set in lead. It is certain that in the earliest remnants we have it was so; and we must surely give the unknown inventor of the method the greatest credit for ingenuity, for a better framing could not have been devised, and, after superseding lead for a time, we now see the wooden sash-bar succumbing to the ancient method, and especially for the fretwork of ecclesiastical stained-glass windows; nothing but lead would be of any use there. Of course the glazing of ordinary wooden sashes is not within our province, so before proceeding to stained-glass work we will briefly touch on the ordinary leaded casement still to be found plentifully in cottage windows in the provinces. These are formed of every shape and size, some glazed with rectangular and some with diamond-shaped panes. The calmes in which these are set are often very broad in the leaf, much more so than could be used for fretwork.



Figs. 5, 6 and 7.

[1] Continued from page 66, No. 450.

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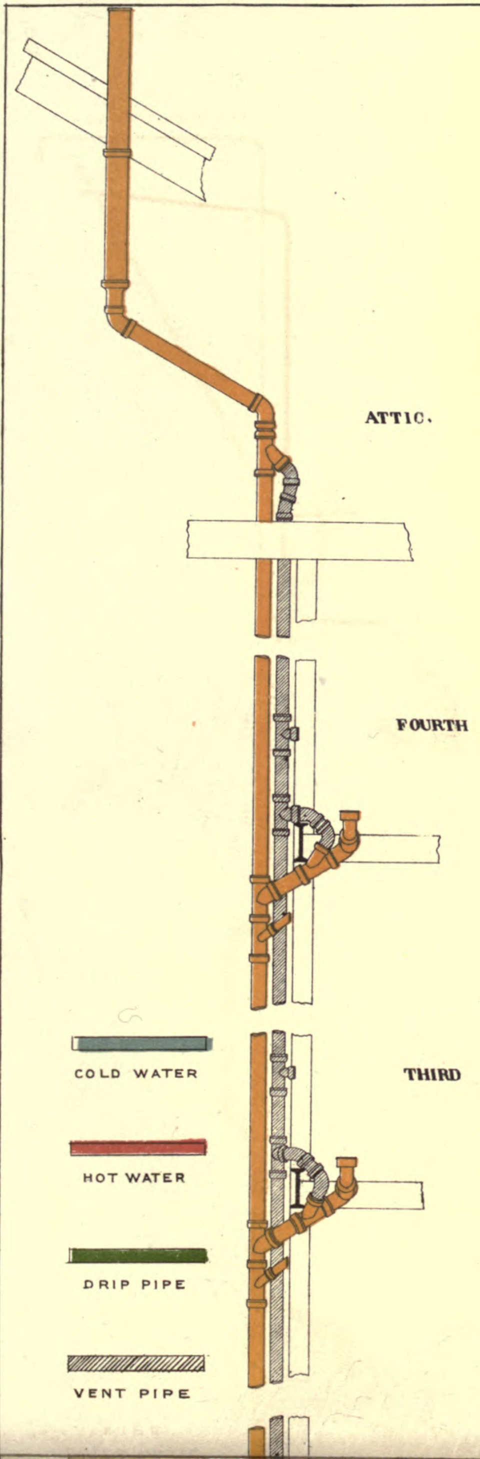
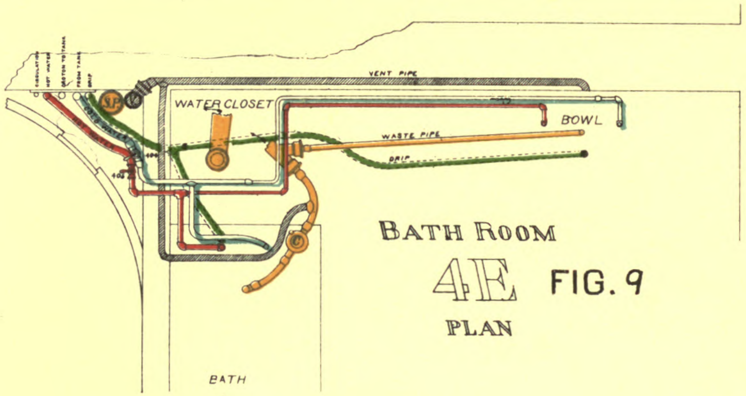
M · Baltard · Architect ·

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

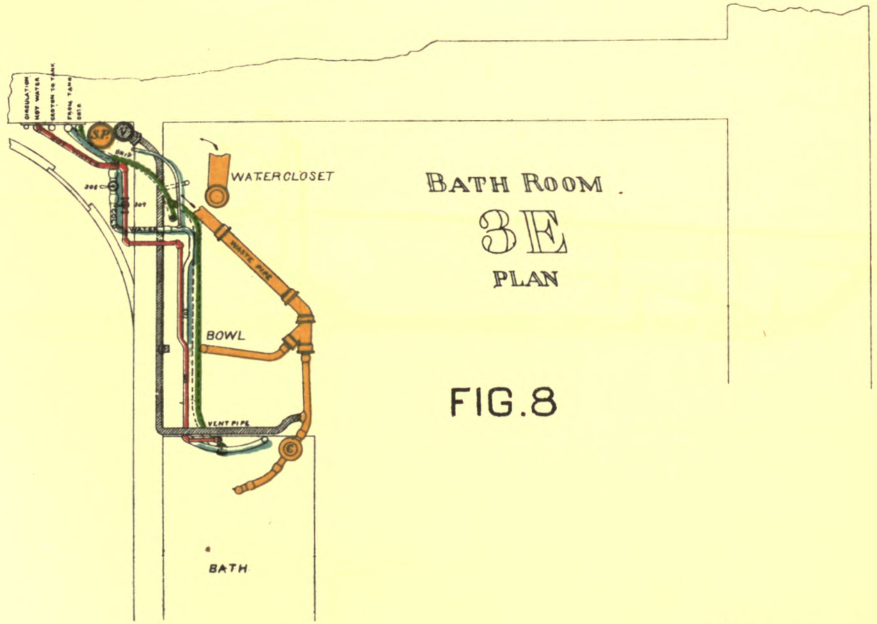
THE SUPPLY AND DRAINAGE SYSTEMS IN THE HOUSE OF HENRY VILLARD, NEW YORK, N.Y.

BY GEORGE E. WARING, JR.



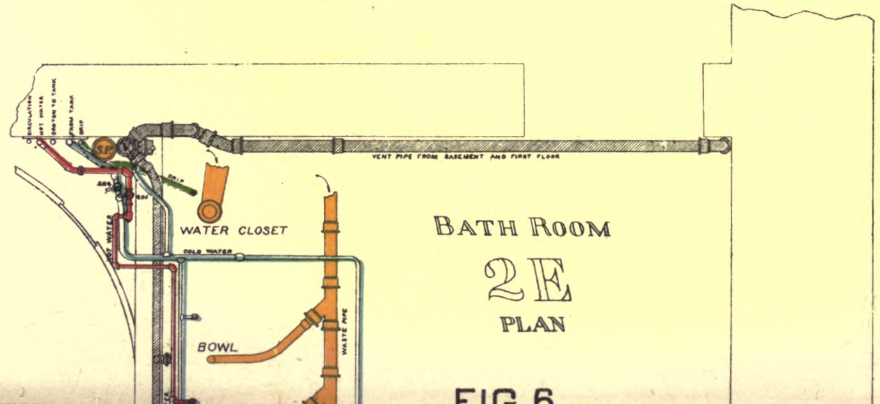


BATH ROOM 4E FIG. 9 PLAN



BATH ROOM 3E PLAN

FIG. 8



BATH ROOM 2E PLAN

FIG. 6

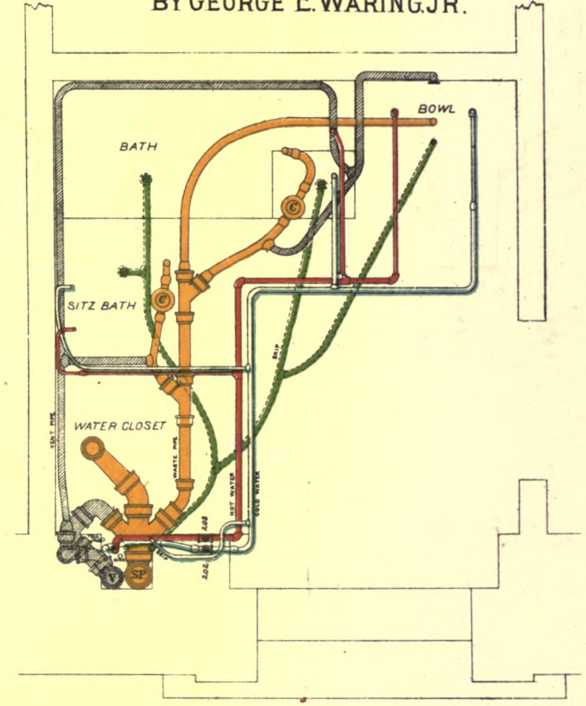
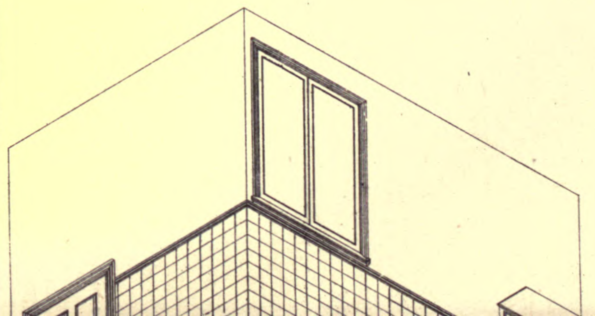
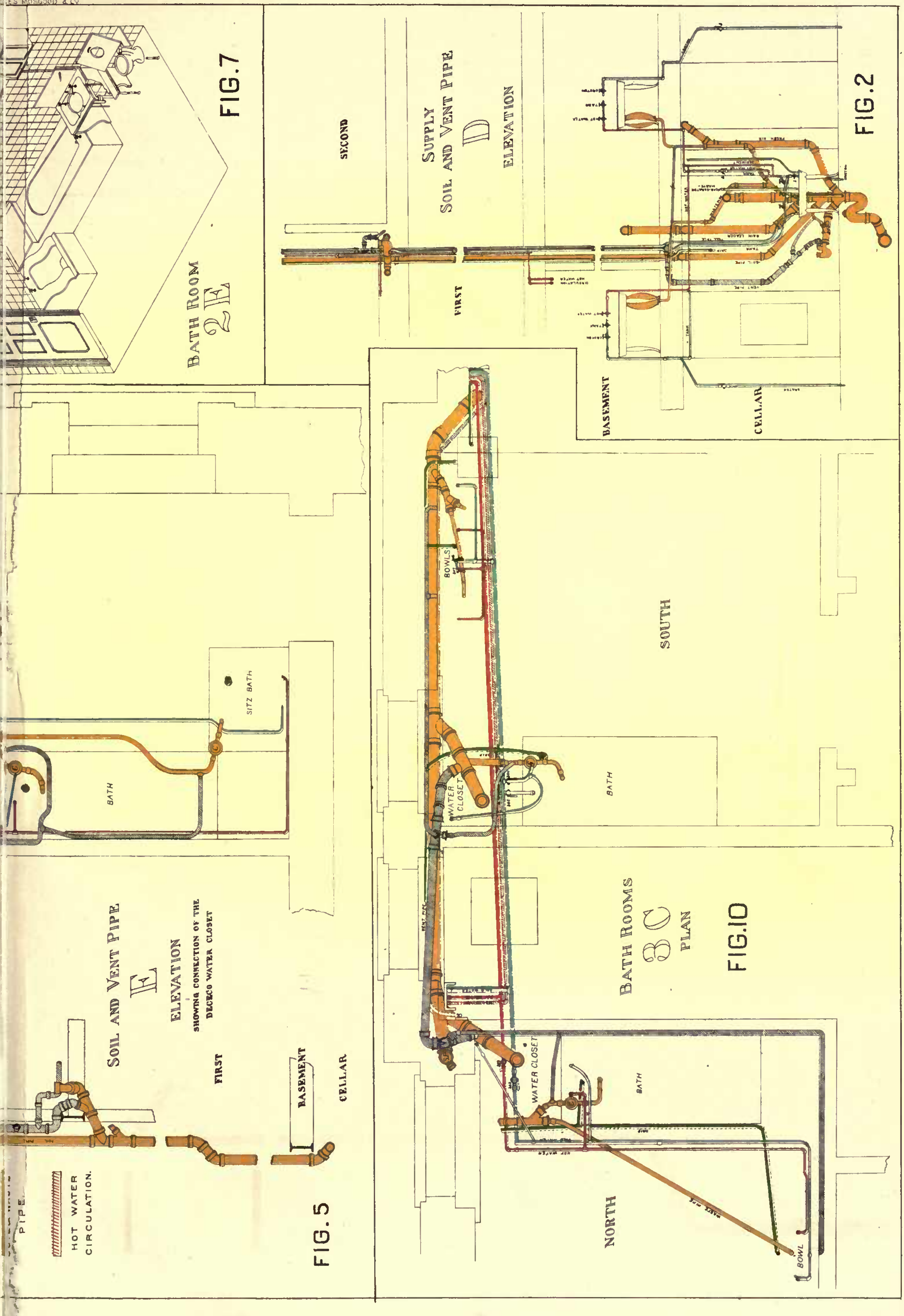


FIG. 11

BATH ROOM 2D PLAN



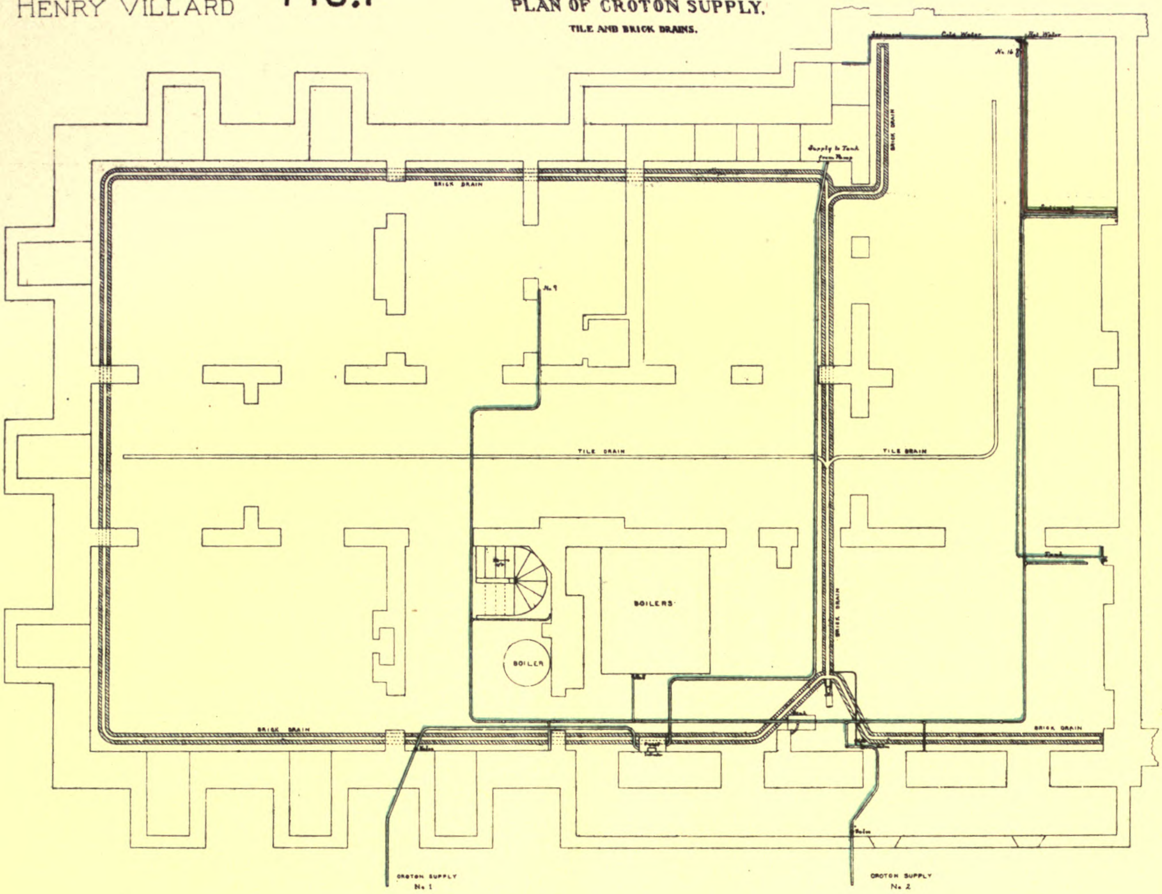


The Heliotype Printing Co. Tremont St. Boston.

HENRY VILLARD

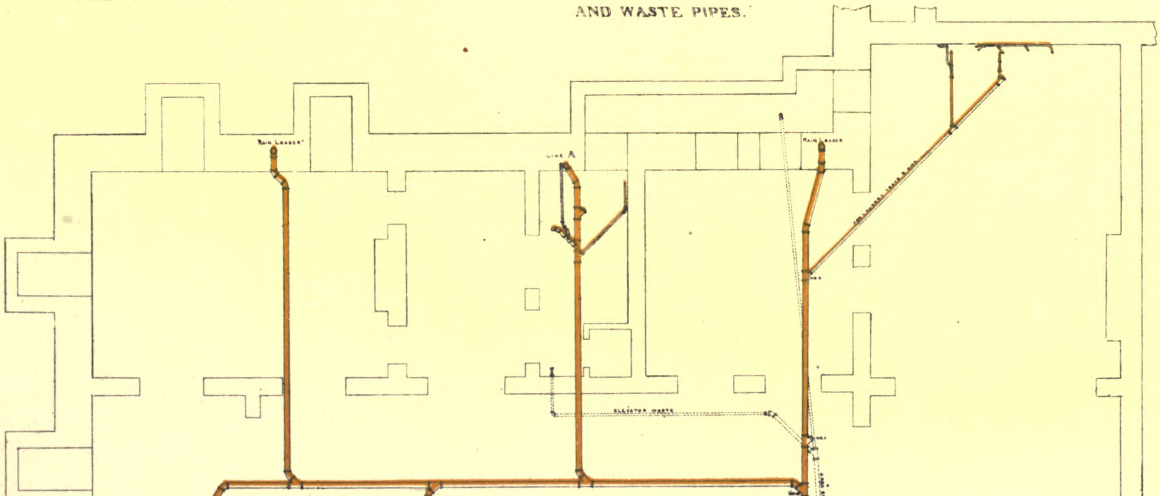
FIG. 1

CELLAR
PLAN OF CROTON SUPPLY.
TILE AND BRICK DRAINS.



HENRY VILLARD

CELLAR
PLAN OF SEWER, DRAIN
AND WASTE PIPES.



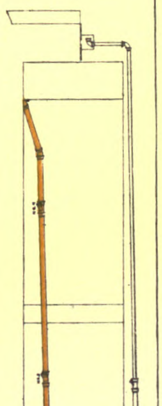


FIG. 3

FIG. 4

THE SUPPLY AND DRAINAGE SYSTEMS
IN THE HOUSE OF
HENRY VILLARD, NEW YORK, N.Y.
BY GEORGE E. WARING, JR.

The Heliotype Printing Co. Boston.

Glass is almost universally cut with the glazier's diamond. Who first discovered that the precious gem had this property we do not know, but we are aware that the knowledge is of respectable antiquity. The diamond is, so far as we at present know, the only substance that will *cut* glass. Many substances will *scratch* it, but will not cut. Dr. Wollaston has well characterized the essential difference in these operations, that is to say, between *scratching* and *cutting*. "In the former," he says, "the surface is irregularly torn into a rough furrow; in the latter a smooth fissure or superficial crack is made, which should be continued without interruption from one end to the other of the line in which the glass is intended to be cut. The skilful workman then applies a small force solely at one extremity of this line, and the crack which he forms is led by the fissure almost certainly to the other."

In all cases the diamond that cuts the glass most successfully has the cutting edges of the crystal placed exactly at right angles to each other, and passing exactly through a point of intersection made by the crossing of the edges. In this case it appears to be that portion of one of the edges which is very near the point of intersection that cuts, and scarcely any other. Figures 5 and 6 are an end and side elevation of the end of a glazier's diamond, and Figure 7 a plan, all drawn on a magnified scale. *A B* represents the leading curved part of the cutting edge, and *D* (Fig. 6) and *C D* (Fig. 7) the line of intersection, crossing the line *A B* at right angles, *E* being the following part of the cutting edge. The general figure of the stone is indicated in all the figures by the lines, and its position in a hole formed in the metal block *F*, in which it is first adjusted and afterwards secured by hard solder, is shown.

Figure 8 is a side view, a front view, and an end view of a glazier's diamond mounted with a swivel adjustment for the block when connected with the handle, by means of the screw entering into a gap drilled half-way through and across the metal stem. By this means the cut of the diamond is more easily obtained than when it is mounted firmly on its stem, the swivel permitting the block to play freely, and keeping the cutting edge of the diamond parallel with the edge of the straight-edge or other shaped pattern, it is carried along, and thus removing the difficulty of finding its true position, and leaving the cutters the task of merely attending to the proper inclination of the handle, as to whether it is carried more or less upright, or leaning to the one or other side, to suit the cut, and which a very little practice will soon ascertain.

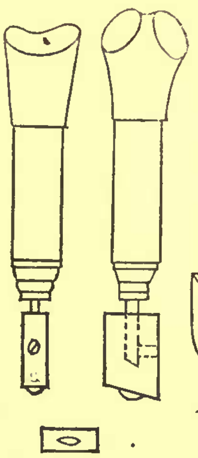


Fig. 8.

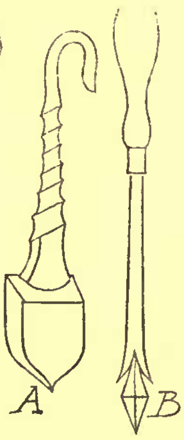


Fig. 10.

Recently various tools (principally small wheels of hardened steel) of American invention have been introduced as glass-cutters, but nothing is likely to supersede the diamond for general purposes.

It must not be supposed that because the ordinary glazier makes one diamond last him a lifetime, that the diamond does not wear out. It is usual to reset the diamond, to expose another angle when one is worn down; and in some glass-works, where enormous quantities of glass are cut up, one or two dozen diamonds are used every week, it is said. If you have many panes of glass to cut, it is advisable to cut them by a gauge, as shown at Figure 9, which will much facilitate matters. Brad down to the work-bench a couple of pieces of lath or thin wood at right angles, as at *A B* and *C D*. Then drive in the gauge nails *E F* and *G H*. If an angle of the glass be now placed in the angles of the fixed laths *A B*, *C D*, a straight-edge lath can be held to either pair of gauge nails, as shown by the dotted lines, and will serve to guide the diamond. Or if the glass be cut correctly in a strip of the width required, the two gauge nails *G H* will be sufficient to guide the straight edge in cutting off the panes to the proper length.

The other tools required may be briefly enumerated. Glaziers differ in opinion as to the best tools for soldering the calmes. Some continue to use the old soldering-iron (Figure 10 *A*): this has simply an iron end about a couple of inches square, brought to a pointed edge as shown, which is tinned and has a twisted handle about eighteen inches long, and terminating in a hook for convenience of hanging up. As this has no handle, it is usually grasped with a bit of felt, or sometimes by a couple of "hand-sticks" (which are the hollow sticks made to fit the handle). But many glaziers (ourselves among them) prefer the ordinary copper bit (Figure 10 *B*), which will do anything that can or need be done. The cutting-knife, used for dividing the calmes, has sometimes the form shown at *A*, Figure 11, and is sometimes shaped as at *B*, Figure 11. In the latter the blade has its cutting edge at *a*, and the top of the handle *C* is usually formed of a lump of solder, which is handy for driving home the panes in the calmes, driving a brad or tack, etc. *C*, Figure 11, is the "ladikin," which is a small tool of bone, or box, or beechwood, about sixteen inches long, one inch in width, and three-eighths inches thick, with one end bevelled off for about one-half inch as shown. This is used for opening the leaves of the calme as shown at Figure 12.

The first step in making a lead-light of square panes is to measure the opening and set out on a board or the work-bench in chalk the number of panes decided on; next the glass can be cut, not forgetting to allow for the thickness of the calme, and this being done, we will proceed to put the casement together, as shown at Figure 13.

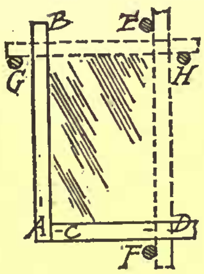


Fig. 9.

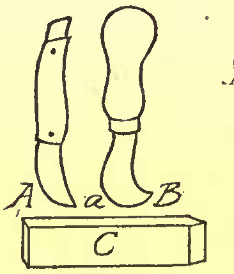


Fig. 11.


Fig. 12.

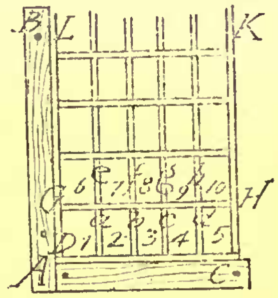


Fig. 13.

Tack down to the bench a couple of laths at right angles, as shown at *A B*, *A C* (Figure 13). Take a calme, and putting your foot on one end to hold it steady, stretch it out, by pulling, perfectly straight; now cut a piece of about the depth of the window, and place it against the lath *A B*, as shown at *D L*, and secure it to the bench by a couple of brads as shown. Next cut another length of the calme the breadth of the casements; open the end of the calme *D L*, with the ladikin, as shown at Figure 12, insert the end of the calme last cut in the one already fixed at *D*, taking care to see that this end is bright, and brad this second calme down, as at *D F*, at right angles to the former, and along the lath *A C*. The calmes are cut with the cutting-knife. The pane of glass 1 is now taken, the ends of the calmes *D E* and *D F* opened out with the ladikin, the square of glass placed in and tapped up home with the heavy handle of the cutting-knife. Having set pane No. 1, cut with the knife a piece of calme of the exact length of the side of the square, taking care to see that the end is bright; open both sides with the ladikin, then place the end in the calmes *D F*, as shown at *a*; pane 2 is now placed in this and carefully tapped home with the handle of the knife; then the lead *b* is cut and placed; next follow pane 3, calme *c* and pane 4, etc., and the first row is glazed. Take especial care that each pane has been knocked in home and that the whole row is tight. Now comes the cross calme *G H*. Stretch another calme and cut it to the proper length and open it up with the ladikin. Insert the end of this in the vertical calme *D E*, and place the ends of the spurs *a b c d* in it. Now begin another row with the pane 6, follow this with the short lead *e*; then the pane 7, lead *f*, pane 8, and till the second row is complete. When all the panes are fixed in and the casement is complete the end calme is fixed, and then the side one, *I K*. All is now ready for the soldering. The bit or soldering-iron is heated and the operator takes a strip of fine solder in his left hand, of an easily fusible kind. He then sprinkles a small quantity of *black* resin at the place to be soldered, places the end of the solder strip to the first and applies the heated bit until a good joint is made, and the solder makes a neat little raised circle at the place. This operation is repeated at each joint until all are secured. Some workmen prefer "killed" spirits of salts (hydrochloric acid) to resin for the flux. The bit or iron should not be too hot and should not be held in contact with the calmes too long. It is important that the ends of the lead be bright, or a good joint cannot be secured. The bands which secured calmes *A B D*, *B E* to the brads must now be loosened, the light turned over, and the other side be soldered in a similar manner.

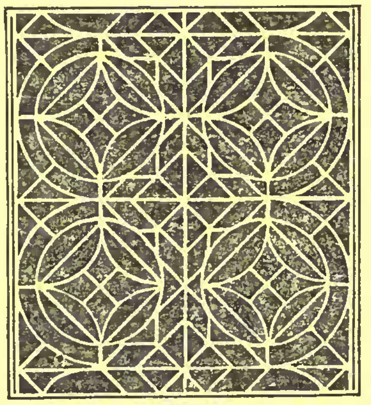


Fig. 14.

Next the "bands" or "ties" have to be fixed. These are small strips of lead or little bits of copper wire, intended to secure the lights to the "saddle-bars" of the window. The saddle-bars are horizontal bars of small iron rod crossing the window-opening, their ends being set in the stone-work or wood, and are intended to support the glass. As many bands should be soldered on as the glazier deems requisite. Copper wire ties are generally preferred for fretwork. In the rectangular iron frame for opening casements, to which the lead light is fitted, the smith generally drills small holes all round, and the glazier will require to solder his ties around the lead light at such places as will correspond with these holes, and in such a manner that the ties stand up at right angles to the calme to which they are soldered. They must also be of such size that they will pass through the holes. These ties are put through the holes in the casement frame, cut off flush with the top surface of the iron. A bead of solder is now dropped on the end of the tie, well spread with the bit, and finally pressed down into a nice flat round bottom by the sudden and momentary application of the thumb, well wetted with saliva.

The lead-light is now finished all but the "cementing." This process is adopted for several reasons. In the first place it helps to secure the glass in the lead-work, something as putty does in sash-windows, then it keeps the whole window water-tight and wind-tight, etc. Proceed thus: take an old sash-tool and a little stiff lead-colored paint, and rub the joints and calmes therewith. Then take a small blacklead brush and a small quantity of whiting, and with this brush rub the paint until it appears all brushed out of the crevices, brush off the whiting, and repeat the process with some lamp-black, and brush away until the joints become as lustrous as if blackleaded. Finally, clear off and clean the glass in the usual way.

VENTILATION AND HEATING.[1]

STONEWALL JACKSON BY J. H. FOLEY. CAPITOL GROUNDS, RICHMOND, VA.

IN one of the old tales for children, a princess who incurs in infancy the hatred of a fairy godmother is doomed, under heavy penalties, to entire seclusion from the light of day during the period of her minority, and to make this seclusion bearable, the ingenuity of the court is taxed to the utmost to imitate within the walls of a palace the light and color of the open country. The legend is typical of the condition of civilized humanity at the present time. Doomed by the supposed requirements of fashion and business to an indoor and artificial existence, life becomes one long struggle to maintain itself under unnatural conditions, and scientists are employed and money is lavished to furnish within our palace prison walls the healthful atmosphere that the beggar in the street may enjoy gratis. Most of the ills that flesh is heir to may be avoided by living out of doors in any healthful climate. Even to live out of doors during working hours so fortifies the system against indoor poisons that the evil effects of close sleeping-rooms on the condition of the laboring man is hardly noticeable. After centuries of experiment on permanent hospitals, physicians have been driven back to the tent or temporary one-story pavilion as the best form of shelter for the sick and wounded, so far as climate will permit its use. No practical arrangement of ventilating machinery can give more healthful results than the frequent flush of fresh air from open doors and windows.

The English settlers of America were an open-air-loving people. Their descendants have improved on the parent stock in many ways, but have deteriorated in this. The reform of the morals and habits of a people is not the special business of architects, except perhaps in indirect ways. While they may advise, they cannot dictate what their clients shall build; but their employer's election being made, they can do much for their safety, comfort and enjoyment, by the skilful treatment of given conditions. They co-operate with the physician and sanitarian to make an artificial mode of life as healthful as possible under the circumstances. In doing this the first difficulty encountered is in the supply of pure warm air; and this, in New England at least, in a climate of extremes and sudden changes.

The dwellers in our northern cities are about as sensitive to cold draughts as their ancestors would have been if denuded of their clothing. Skins are bleached by close and heavy covering, and softened by insensible perspiration. The circulation of the blood is sluggish, and reaction from effects of exposure slow and uncertain. This hot-house growth is especially characteristic of our women and children, and we must treat their condition as we find it.

Pure air is free to all if taken out of doors, as nature intended; but pure warm air indoors and in cold weather is a luxury unattainable in perfection, and only approximated to at great expense and as the result of unceasing vigilance. There is no royal road to ventilation, and all ventilation necessitates waste, *i. e.*, the throwing away of warm air.

That much of the world's progress in sanitary matters is due to the work of specialists, few would be disposed to deny; but the constant study of one class of evils is apt to lead to the neglect of all others. The experimenter who devotes his life to the perfection of vaccination for hydrophobia, or faces death in his efforts to identify the germs of cholera, will laugh at the theories of the Ruskinite who finds cause for the decadence of humanity in the introduction of steam and a disregard of the teachings of the Old Testament. The advocate of fire-proof construction insists that walls and floors shall be solid and non-conducting; while the apostle of fresh air would perforate them with a labyrinth of pipes and flues, ready channels for the spread of fire. Special devotion to one branch of reform tends to a certain positiveness of conviction and statement that holds general intelligence in slight esteem.

One of the most difficult branches of the architects many-sided calling is mediation between his employer and the increasing number of specialists, and in the proper interpretation of the great excess of printed matter which is suited neither to the wants of the amateur nor the expert. The treatise under consideration seems to add another to this class. Originally printed in the *Sanitary Engineer*, under the title of "Letters to a young Architect," it has been put into book form with some changes and additions. The author frankly admits that "it is not intended to be a systematic manual on ventilation for the skilled architect or engineer, but rather to present the general principles which should guide one in judging of the merits of various systems of and appliances for ventilation." But the young architect, while he might find in it many useful facts culled from various and more or less reliable sources, and useful reproductions of several notable examples of ventilation, with their illustrating diagrams, together with much sharp criticism of systems and practitioners, including those of his own calling, would not be able to learn from it nearly all that he ought to know; whereas the amateur would probably be left after its perusal in a condition of confusion and discouragement, or driven to the office of an expert adviser.

It is an ungracious task to find fault with the tone of a work which professes to be devoted to the enlightenment of the reader, but in this case the aggressiveness of many of the statements seems to require more than a passing notice. Architects, some popular belief to the contrary notwithstanding, are as willing "*as a rule*" to sit at the feet of wisdom and experience, and to learn what can be learned in no other way as are other classes of men; but many of us are old enough to have seen the most advanced theories of our earlier study become objects of ridicule in the light of the ampler knowledge of to-day. Such experience leads to the feeling that great modesty of claim and reserve of positive assertion are becoming in the treatment of the yet undeveloped and inexact sanitary sciences. It is not only a useless manner of criticism, but only a very long and intimate knowledge of the practice of a profession should justify an author in saying, as on page 48: —

> "As a rule, architects make no special provision for the fresh-air supply to a furnace, and the furnace-setter is left to adjust this as best he can. . . "

And again: —

> "As a rule, our architects give no attention to the details of heating apparatus, and prepare their plans without any special reference to such details, other than providing space and a chimney-flue for the boiler, and other flues in the walls."

This neglect is still further emphasized by the statement on page 88, that

> "Each house is, to a certain extent, a problem by itself, but it is a very simple problem, which any moderately ingenious tinner or sheet-iron worker will have no difficulty in solving, if he will only master the few simple laws of the movement of air, which have been given in previous chapters.
>
> "Every stove-dealer should possess this knowledge in order to deal understandingly with the complaints which will be made to him about bad draught, etc., etc. . . ."

Although the road to science is thus smoothed for the intelligent "tinner," the writer goes on to say, on page 161: —

> "I am by no means advising that every architect should endeavor to make himself an expert on the subject of heating and ventilation, but he ought to know enough of these subjects to see his own ignorance, and to be able to judge of the relative merits of those who do profess to be experts, and who come to him seeking employment, and also he should know enough, for the sake of his own reputation, not to be dogmatic in his assertions about the merits of this or that method which he has never seen tried, and with regard to which he has no scientific data whatever."

That ignorance and dogmatism are to be deplored, and that all knowledge is a good thing are propositions that few will be disposed to deny; but are such moral truisms very essential parts of the science of ventilation? Our author does not stop with general principles, however, but, on page 14, maps out more in detail the duty of a professional adviser as follows: —

> "I do not mean . . . that when a gentleman comes to an architect for a plan for a house, giving the usual data as to location, dimensions, and proposed cost, that he is to be asked as to how much of this cost he is willing to devote to ventilation. It is the business of the architect to tell him that, and to be careful, from the very beginning that, even in his first rough-sketch-plans, satisfactory arrangements for ventilation are included. It is his duty also to see that, after the various additions to the plan which will be made at the suggestion of the owner's wife and several of his friends on whose taste he relies, have increased the

[1] *The Principles of Ventilation and Heating and their practical Application.* By John S. Billings, M. D., LL. D. (Edinb.), Surgeon U. S. Army. Profusely illustrated; large 8vo, cloth. Price, $3.00, postage paid. Address, *The Sanitary Engineer*, 140 William Street, New York.

cost above what he had intended, he does not, in the spasm of economy and retrenchment which will attack him, make a reduction in some point which will affect the ventilation, rather than on some of the ornamental work outside."

So much for the dwelling-house; but in another class of edifices the moral obligation is raised to a standard involving a moderate prospect of martyrdom to principle.

"When it comes to the planning of such a building as a public school, I consider it to be the duty of the architect not only to advise, but to insist upon proper arrangements for heating, ventilation, drainage and plumbing . . . and it will be his duty to decline to have anything to do with the matter rather than suffer himself to be used as a tool to execute work which he knows will be dangerous to the health and life of the children of his fellow-citizens."

The question of the moral responsibility of the architect to the public, as opposed to the interests and even the commands of his employer, is one on which many otherwise sensible people have very peculiar ideas. That there is a responsibility few would question, but that it is of that degree to enforce the loss of all compensation for work on which there may be an honest, and even an expert, difference of opinion is, to say the least, absurd. An architect is responsible to the world to the extent that everybody is, and no more. It would be well for justice if all errors of omission and commission were as plainly to be seen and judged as his.

But leaving further discussion of taste and morals, let us see from the writer's own words how simple and easy of attainment is a satisfactory system of heating and ventilation. To begin with the highest standard, we find, on page 16, that: —

"Perfect ventilation can be said to have been secured in an inhabited room only when any and every person in that room takes into his lungs at each respiration air of the same composition as that surrounding the building, and no part of which has recently been in his own lungs or those of his neighbors, or which consists of products of combustion generated in the building, while at the same time he feels no currents or draughts of air, and is perfectly comfortable as regards temperature, being neither too hot nor too cold. Very rarely, indeed, can such perfect ventilation be secured if the number of persons in the room exceeds two or three; in fact, I have never seen but three or four attempts in this direction."

Farther on he continues, page 17,

"that it would require at least thirty times as much coal to heat a room thus supplied as would be used for heating a room of the same size having only the ordinary heating and ventilating arrangements."

But this high standard, although not the perfection of nature, even the specialists abandon, and allow that the architect or other authority may be permitted to furnish in place of Nature's element a compound more or less contaminated by injurious elements, and we find as a guide that: —

"Good, ordinary ventilation is to be secured by keeping the vitiated air constantly diluted to a certain standard."

What this standard is, is variously stated by different authorities, the tendency being to increase the proportion of air to poison with each new set of experiments — a tendency certainly favored by the dictates of common sense, and with which the writer in question seems to agree. The serious obstacles to this tendency are, however, indicated in the admission that: —

"First of all, then, keep in mind this axiom, which applies especially to the large cities in our Northern States, viz.: In this climate it is impossible to have at the same time good ventilation, sufficient heating, and cheapness.

And again: —

". . . the sanitarian who asks for a liberal allowance of fresh air combined with a comfortable temperature and freedom from draughts, will find, if he sets a high standard, his views will be promptly condemned as being unpractical."

And again: —

"Finally, it should be remembered and impressed on the managers of public institutions that every system of heating and ventilating apparatus requires constant care as to its cleanliness, efficiency, and adjustment to the demands of the season and the hour, to produce the best results, and that the most wasteful of all expenditure is to provide an elaborate and costly apparatus, and then intrust it to the care of an ignorant or careless engineer, on the ground that he is somebody's "nephew," or is "an active politician."

That there is sound truth in all this may be freely admitted, even in the covert attack in the last sentence on our American "spoils system." But the difficulty is that in connection with the various impressive remarks on the duty of the architect it proves too much. No such demands for absolute or approximate perfection are made on any other calling. Even the skilled physician cannot always secure or maintain health.

The standard of attainment demanded in the ventilation of buildings, if applied to all other departments of building, would be simply prohibitory. The reformer must begin with the *occupants* of our buildings. A craving for pure air and a recognition of variations in its purity must precede the demand for expensive appliances and close supervision. We could instance a number of costly systems of ventilation, fairly successful for a time, that have stood disused for from ten to twenty years, because the public did not demand the pure air to which they were entitled and for which they paid liberally each night. This condition of affairs is notorious, and should not be ignored by any apostle of this particular reform. Such is the apathy of the public, that an architect seldom has the opportunity to make a generous provision for ventilation without a considerable personal sacrifice. There is a good deal of random talk and writing on the subject, but no great number of people avoid a draughty church, or discriminate against a theatre where they are moderately sure of getting a headache; consequently no money-pressure is brought to bear on proprietors, and the architect is left powerless in their hands. Show, convenience, and a decent regard for safety are known to pay, and can be "insisted on." Beyond these, the professional advice is politely listened to, carefully considered in the light of profit and loss, and too often ultimately disregarded.

THE LONGEST BRIDGES IN THE WORLD.

A LATE number of the *Moniteur Industriel* gives the following as a list of the twenty-six longest bridges in the world: —

Montreal Bridge, over the St. Lawrence,	8,791 L. feet.
Brooklyn, over the East River,	5,989 "
Rapperswyl, Lake Zurich,	5,333 "
Volga, over the Sysran, Russia,	4,947 "
Moerdyck, Holland,	4,927 "
Dnieper, near Jékaterinoslaw, Russia,	4,213 "
Kiew, over the Dnieper,	3,607 "
Barrage-bridge, Delta of the Nile,	3,353 "
"Kronprinz Rudolph," over the Danube at Vienna,	3,266 "
Dneiper, near Krementchoug, Russia.	3,250 "
Bommel, over the Meuse, Holland,	3,060 "
Two Bridges of Rotterdam, over the Meuse,	2,833 "
Mississippi Bridge (?),	2,588 "
St. Louis, over the Mississippi,	2,574 "
Saint-Esprit, over the Rhone, France,	2,460 "
Kiulinbourg, over the Rhine, Holland,	2,347 "
Cincinnati, over the Ohio,	2,233 "
Chaumont Viaduct, Valley of the Suize, France,	2,000 "
Menai, England,	1,957 "
Cubzac, over the Dordogne,	1,817 "
Varsovie, over the Vistula,	1,693 "
Iron-bridge at Bordeaux, over the Garonne,	1,667 "
Stone-bridge " " "	1,623 "
Beaucaire, over the Rhone,	1,460 "
Tours, over the Loire,	1,457 "
Alexandre, at St. Petersburg,	1,350 "

Of the above, the sixth on the list has just been opened; the Rapperswyl bridge is merely a pile structure and is only 13 feet wide; the Sysran bridge, over the Volga, carries the Orenbourg Railway, and was only finished in 1880; it has 13 spans, and is raised 131 feet above the level of the river; it cost 13,500,000 francs ($2,700,000).

The Moerdyck bridge carries the Anvers and Rotterdam railways over the Meuse, which is about 8,800 feet wide at this point, and has been reduced by dykes; it has fourteen spans of 328 feet each. It was commenced in 1868 and finished in 1871; it cost about 12,000,000 francs ($2,400,000).

The above list is given as printed, but the compiler in the *Moniteur* has in his table wholly ignored many of our long American bridges. A complete list of the length of modern iron bridges is not just now accessible, but among the omissions may be noted: —

The B. & O. bridge, at Havre de Grace (being built),	6,000 L. feet.
Wooden bridge at Columbia, Pa.,	5,366 "
Louisville R. R. bridge, over the Ohio,	5,218 "
Cincinnati Southern R. R. over Ohio,	3,950 "
Havre de Grace bridge, over Susquehanna,	3,271 "
Dauphin Bridge, over Susquehanna,	3,590 "
Monongahela bridge, near Homestead,	5,300 "
Plattsmouth bridge, over Missouri,	3,000 "
Quincy bridge, over Mississippi,	2,847 "
Omaha bridge, over Missouri,	2,750 "
Keokuk, Iowa, over Mississippi,	2,008 "
La Crosse bridge, over Mississippi,	1,672 "
Booneville bridge, over Missouri,	1,651 "

To the above many other long bridges could doubtless be added, were the data at hand. The longest bridge in the world was the late Tay bridge, which was 10,320 feet in length, and the Forth bridge now under construction is to be about 9,200 feet long. Although it does not strictly belong to the class in question, the New York Elevated Railway is really a continuous iron-truss bridge, and the aggregate length is thirty miles. — *Engineering News.*

THE *SANITARY ENGINEER'S* ATTACK ON MR. PUTNAM.

Boston, Aug. 12, 1884.

To the Editors of the American Architect: —

Dear Sirs, — The criticism which appeared in the *Sanitary Engineer* of last week, on the report on the "Siphonage and Evaporation of Traps," contains many unpardonable misstatements, one of which, since it consists in a very unjust aspersion on my personal character, I should much like to have you point out and correct in your next issue.

The *Sanitary Engineer* says that I had invented and patented a new device for a trap, and made no mention of it when the appropriation for the tests was made by the City Board of Health, and that I used part of the money appropriated to test my own device.

This is absolutely false. The invention of my trap, from the first idea to its final complete development, was made several weeks subsequently to the time when the Board of Health, through its chairman, made the appropriation, and as soon as the idea occurred to me, and before the preparation for the tests had begun, I mentioned it to the chairman, with the statement that I proposed to patent it, to ascertain if the fact of my having made such a discovery would affect my relations with the Board in the matter of these tests. I was informed that it would not, provided none of the money appropriated were used in testing my device. None of the money was so used. On the contrary two-thirds of the expense of the entire investigation was borne by myself, as well as the expenses of preparing the report.

A short record of the tests on this trap was included with the rest without comment, as showing a simple remedy for the dangerous and expensive trap-ventilation; some of the evils of which are pointed out in the report.

Had the *Sanitary Engineer* applied to the only source from which the correct information on these points could evidently possibly have been obtained, it could have avoided its errors and evinced a desire to present the truth. As it did not follow this course, the day after the issue of the article, I wrote a reply and sent it at once to the *Sanitary Engineer*, with the request that it publish the correction in its next issue. Respectfully yours,

J. Pickering Putnam.

CRACKED BRICKWORK.

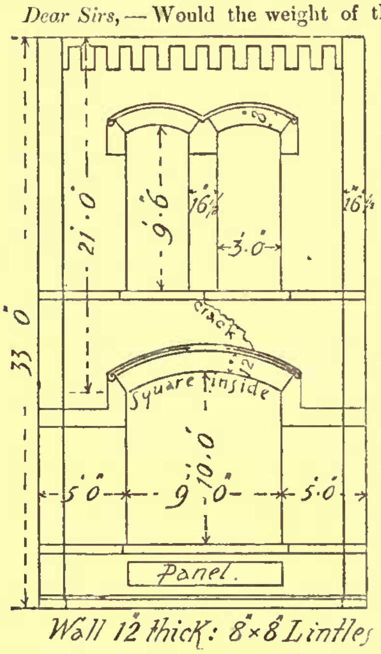
Pierre, Dak., July 29, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Would the weight of the brickwork on arch in enclosed sketch cause the wall to crack where shown? Also, is there enough weight to cause spreading of walls?

Please favor me with an early reply, either by mail or through columns of the *American Architect.*

Respectfully yours,
Dakota.



[We should say that the crack shown was due to the shrinkage of the mortar joints in the arch, either by drying or compression, which had allowed the crown of the arch to settle, and the weight concentrated under the central pier above had pushed down the brickwork below it to follow the retreating arch. If the lintels behind the arches are of wood, the shrinkage of this would increase the effect. We do not quite understand from the drawing whether there are return walls at the sides of the bay shown. If so, their mass, with that of the pier, ought, we think, to be sufficient to resist the thrust of a brick arch laid in reasonably adhesive mortar. Without the help of return walls we should wish to lay the arch in cement, and thus fortified we should feel pretty safe about it.—Eds. American Architect.]

NOTES AND CLIPPINGS.

Chestnut Timber. — There is a common tradition that the timbers of old churches were made of chestnut wood. If this were the case, chestnut trees must once have been common in countries where now they are extremely rare. A skilful chemist, M. Payen, has procured a large number of specimens of timber from the old churches and buildings in Paris, which he has subjected to careful examination, and he believes that none of them were chestnut. If letters are drawn upon oak and chestnut planks, by means of pure sulphate of iron dissolved in distilled water, the characters appear at once, in black, upon the oak, and in deep violet upon the chestnut. Ammonia produces a red color, of short duration upon the chestnut, paler and less distinct upon the oak. All the French and American varieties of oak show very distinctly, on their transverse sections, medullary rays crossing the woody fibres from the centre across the circumference. Chestnut timber possesses only concentric layers.— *La Science pour Tous; Les Mondes.*

The Music of the Buddhist Bells. — The sounds of Japan, says an exchange, are nearly all unmusical to the foreign ear, the exceptions being the laughter of the women and the sweet, almost indescribable melody of the Buddhist bells. Some of the latter, called *tsuri-gane*, are of the ordinary shape, weigh several tons, are wonderful specimens of bronze castings, and are suspended in strongly-built belfries; others, termed *rin*, concave in form, are portable, and are used in the temple service, or carried about the country by begging priests. Beyond their graceful outlines and beauty of metal, there is, at the first glance, little in the *rin* to indicate the high value placed by the Japanese upon these bronze bowls, but no sooner is the slightest touch applied to their rims than their extraordinary qualities are revealed and the listener acknowledges that, in the making of bells, as in many other arts, the Japanese possess secrets as yet unsolved by science. Although every Buddhist temple in the empire contains one or more of these *rin*, few of those that have been dedicated to religious use are ever offered for sale. They can only be secured after the destruction of some temple by fire, or by the poverty of the priests, who, deprived of Government patronage and support, have of late years been compelled to rely upon their congregations for subsistence, and have parted, piecemeal, with their most cherished treasures. The first *rin* used in Japan were brought from Corea, during the sixth century, by the Buddhist missionaries, who "peacefully invaded Nihon, and succeeded in converting the mass of the inhabitants to their faith." These antique objects, some of which are still preserved in the temples, were simply brass bowls, such as had been used for many centuries in India, and were only slightly sonorous, The æsthetic Japanese quickly improved upon the Corean bell by making a peculiar combination of metals, which they cast and hammered until they produced the wonderful-toned *rin* that excite the admiration of the foreigner and affect their own people so profoundly. The traveller, on approaching a Japanese temple, often hears a low, humming sound that, upon his listening intently, resolves itself into the one prayer of the Buddhist devotee. Then follows a rapid succession of strokes upon the *rin*, and musical vibrations that are sometimes prolonged nearly two minutes, and whenever heard possess the same wonderful charm that caused Mark Twain to say, while listening to one of these bells, "I don't believe I shall ever hear more heavenly sounds until I reach the Golden City." Very many *rin* have the Buddhist prayer inscribed upon their rims, or bear the names of pious persons who united to present them to their temples; others are *ex voto* or *in memoriam* offerings; some of the dedications being quite touching in their simple earnestness.

The Bartholdi Statue and the Colossus of Rhodes. — It may not be without interest to compare this curiously ingenious contrivance, evolved by M. Bartholdi from a little statuette one-third smaller than life, with what is known as the Colossus of Rhodes. M. Bartholdi's figure of Liberty stands, without reckoning the diadem, 105 feet high; but the extreme height from the feet to the upper end of the torch held by the outstretched hand is 137 feet 9 inches. The statue will be placed on a granite pedestal 83 feet high. To those who like to be told that the letters in the inscription, "*Tu es Petrus,*" running round the interior of the drum of the Dome of St. Peter's at Rome are as tall as a Life Guardsman, and that the pen held by the Apostle St. Luke in one of the spandrils of the arches of the dome is 11 feet long, it may be interesting to learn that a person six feet in height, standing on the lips of M. Bartholdi's head of Liberty, can only just reach the eyebrow; that people can jump with ease in and out of the tip of the nose, and that the eyes measure 6 feet from corner to corner. Turning to the old "Wonder of the World," we find that it was the largest of the hundred colossal statues of the Sun, which at one time embellished the city of Rhodes. It was upward of 105 feet high; few persons had arms long enough to embrace its thumb; the fingers were longer than the whole bodies of the majority of the statues then extant; the hollows of the limbs, when broken, resembled caves, and inside might be seen huge stones inserted to keep the statue in position. It took twelve years to erect, and cost three hundred talents. The story that the legs of the Colossus extended across the mouth of the harbor is generally considered to be a fiction; but that it stood close to the entrance of the port of Rhodes, and was made to serve as a pharos or light-house, seems certain enough. It was overthrown and smashed to pieces by an earthquake fifty-six years after its erection. For 903 years the fragments of this Wonder of the World strewed the mole at Rhodes, and then they were sold by the Caliph Omar to a merchant at Emesa, who carried away these prodigious marine stores on the backs of 900 camels. Hence Scaliger calculated that the aggregate weight of the bronze must have been 700,000 pounds.—*London Telegraph.*

The Paseo de la Reforma, Mexico.— The Paseo de la Reforma, in the city of Mexico, is pronounced by travelled persons to be the most beautiful drive in the world. Beginning at the main plaza in the centre of the city, and going westward to the castle of Chepultepec, the distance is exactly 5,450 yards. The "Paseo" proper begins at the foot of San Francisco Street, the Broadway of Mexico, and the exact line of demarcation is at the equestrian statue of Charles IV of Spain—which, by the way, is the first bronze cast in this hemisphere, a beautiful work, executed by an Indian artist, Tolsa. Beginning with the statue are six *glorietas*, or circles, each 400 feet in diameter. In the centre of each a statue is to be placed, and others at proper intervals along the way. In the second circle is a magnificent Columbus in marble and bronze, the great explorer standing on the summit of a lofty pedestal, and sitting at the four angles are the Spanish fathers to whom Mexico considers herself indebted for her present civilization — Fray Bartolme de Las Casas, Fray Viego Deza, Fray Pedro de Gante and Fray Juan Perez de Marchena. In the next circle will soon be placed a Guatimozin, the last Indian emperor of Mexico, which is to cost $100,000, and, judging from photographs of the design, will far exceed the others as a work of art. Then a Cortez is to come in the next *glorieta*, which, as Bishop aptly says, "will stand face to face with Guatimozin, their countrymen, now one people, the heroic defender and the heroic conquerer, the two characters of such contradictory traits within themselves, who both acted according to their lights in their day and generation, and but followed the path of inevitable destiny." At the fourth circle, crossing the Paseo in its centre, will be placed a magnificent arch of liberty, designed to be one of the most imposing structures ever erected by man to the mythical goddess, who in this country is surely blind. The arch will cost $250,000, and is intended to be as durable as the mountains looking down upon it. Each of these *glorietas* is described by massive marble and granite seats, in continuous crescent form, carved in artistic style. The width of the Paseo, including sidewalks, is 170 feet, and is shaded by a double row of ash and eucalyptus trees. Maximillian laid out this Bois and Central Park, the afternoon drive promenade of fashionable Mexico, and his wife planned the Zocole opposite the grand cathedral. — *Correspondence of Springfield Republican.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

302,887. BRICK-MACHINE.—Frances C. Burrell, La Salle, Ill.
302,896. ROOF-BRACKET. — Eben W. Dailey, West Berlin, Mass.
302,898. TOOL-STOCK.—Daniel F. Dwyer, Brooklyn, N. Y.
302,905. BOLT-HINGE. — Richard H. Garland, Chicago, Ill.
302,913. HEATING APPARATUS. — Isaac Kirk, Warren, O.
302,916. FLY-SCREEN-DOOR ATTACHMENT.—Phebe R. Lamborn, West Liberty, Io.
302,924. WINDOW-TONGS. — Alexander McMillen, Lowell, Mass.
302,942. PAPER-FLOOR BLOCK. — William E. Rockwood, Indianapolis, Ind.
302,943. PAPER FLOOR. — William E. Rockwood, Indianapolis, Ind.
302,980. FIRE-EXTINGUISHER AND ALARM.— Chas. E. Buell, New Haven, Conn.
302,981. SASH-HOLDER. — Eber C. Byam, Rochester, N. Y.
302,991. AUTOMATIC SPRINKLER, OR FIRE-EXTINGUISHER. — Walter Baker Fowler, Lawrence, Mass.
303,003. SCREW-DRIVER. — George W. Hael, Minneapolis, Minn.
303,004. FIRE-ESCAPE. — Richard Hammill, Chicago, Ill.
303,009. OPAQUE OR SEMI-TRANSPARENT ENAMELED GLASS OR COLORED GLASS. — Ernst Franz Wilhelm Hirsch, Radeburg, Saxony, Germany.
303,023. EARTH-CLOSET.—Cyrus D. Lane, Batavia, N. Y.
303,027. BIDET. — James J. McComb, Dobb's Ferry, N. Y.
303,028. PILE FOR THE MANUFACTURE OF BEAMS. — James K. McDonough, Philadelphia, Pa.
303,042. FIRE-ESCAPE. — Lester G. Pettis, Platea, Pa.
303,055. FIRE-ESCAPE. — George Ryer, Rocky Hill, Conn.
303,074. STONE-CUTTER'S MALLET. — Jas. Thompson, Boston, Mass.
303,077. COMBINED RULE AND SQUARE. — George D. Umland, Osceola Mills, Wis.
303,174. HEATING APPARATUS. — Jas. R. Mason, New York, N. Y.
303,181. MASON'S AND BUILDER'S SCAFFOLD.— Orrin Osborn, Gloversville, N. Y.
303,183. LOCK. — Dexter W. Parker, and Edmond B. Slater, Meriden, Conn.
303,193-194. SELF-CLOSING HATCHWAY. — Richard D. Thackston, St. Louis, Mo.
303,198. KILN FOR BURNING BRICKS, TILES, ETC. — Garrard Davis Wilgus, Lexington, Ky.
303,213. COMPOUND FOR MAKING BRICKS, ARTIFICIAL STONE, ETC. — Henry A. Cooke, Ocala, Fla.
303,247. INDICATOR FOR ELEVATORS. — Thomas S. Young, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report seventeen permits have been granted, the more important of which are the following: —

C. H. Michelman, 3 three-st'y brick buildings, e s Burke St., n of Lancaster St.; and 3 two-st'y brick buildings in rear, fronting w s Port Alley.

Annie Pinning, three-st'y brick building, and two-st'y brick stable, n w cor. Biddle and McKim Sts.

Chas. Roabe, 2 two-st'y brick buildings (square), e s Dallas St., between Chase and Biddle Sts.

Miller & Coleman, 12 two-st'y brick buildings, s w s Bayard St., commencing s e cor. Carroll St.; 16 two-st'y brick buildings, s e s Carroll St., s of Bayard St.; and 17 two-st'y brick buildings, n w s Ward St., s of Bayard St.

Boston.

BUILDING PERMITS. — *Brick.* — *Hammond St.*, Ward 19, for City of Boston, school-house, 32′ x 124′ 4″, three-st'y pitch; Sampson & Clark, builders.

Willard Pl., No. 8, Ware 19, for Joseph Feldman, dwell., 42′ x 47′ 6″, five-st'y flat.

Purchase St., Nos. 99–103, cor. Oliver St., Ward 12, for F. H. Austin's heirs, mercantile, 44′ and 31′ x 44′, five-st'y flat; Robert R. Mayers, builder.

Albany St., near East Concord St., Ward 18, for Mass. Homœopathic Hospital, hospital, 25′ 6″ x 34′, one-st'y pitch; D. Connery & Co., builders.

Newbury St., No. 152, Ward 11, for Albert A. Pope, club-house, 24′ x 60′ 4″, three-st'y flat; Vinal & Dodge, builders.

Purchase St., High St., and Belcher Lane, Ward 12, for John L. Whiting, manufactory, 70′ and 80′ x 95′, six-st'y flat; G. W. Pope, builder.

Wood. — *Rockwell St.*, near Washington St., Ward 24, for R. G. Parker & Co., green-house, 9′ x 130′; potting shed and storage, 16′ x 40′; green-house, 16′ x 60′, one-st'y pitch; R. G. Parker & Co., builders.

Wyoming St., No. 13, Ward 21, for C. E. Rodman, dwell., 16′ x 17′ and 23′ 6″ x 30′ 6″ x 32′, two-st'y pitch.

Lexington St., cor. Prescott St., Ward 1, for Mrs. F. E. Demmick, dwell., 15′ x 35′ and 21′ 6″ x 30′, two-st'y mansard; John C. Frame, builder.

Tremont St., No. 1600, cor. Worthington Pl., Ward 22, for Bernard Dooley, dwell., 24′ x 45′, three-st'y hip; Fred McKenzie, builder.

Unnamed Pl., near Prescott St., Ward 1, for Wilbur Goodwin, 3 dwells., 12′ x 15′ and 20′ x 30′, one-st'y pitch; Wilbur Goodwin, builder.

Meridan St., No. 420, Ward 1, for W. T. Jackson, 21′ 4″ and 29′ 4″ x 45′ 9″, two-st'y mansard; David McPherson, builder.

Danforth St., near Boylston St., Ward 23, for Dougald McDonald, dwell., 15′ x 20′ and 21′ x 30′, three-st'y flat; Dougald McDonald, builder.

East Fourth St., Nos. 592–596, Ward 14, for Lyman Locke, 2 dwells., 15′ x 20′ and 20′ x 40′, three-st'y flat; Lyman Locke, builder.

Bearse Ave., near River View Ave., Ward 24, for Fred'k Gibson, dwell., 24′ x 30′, one-st'y mansard, Fred'k Gibson, builder.

Sunderland St., cor Blue Hill Ave., Ward 21, for Leonidas Murray, dwell., 24′ and 32′ x 36′, two-st'y pitch; J. Philbrick, builder.

Brookside Ave., near Green St., Ward 23, for J. P. Shaw, stable, 36′ x 45′, two-st'y pitch; J. P. Shaw, builder.

Terrace Ave., near Orient Ave., Ward 1, for F. M. Wosgate, dwell., 21′ and 28′ x 30′, two-st'y pitch; Thos. Yeomans, builder.

Saratoga St., Nos. 64–66, Ward 1, for T. C. Powers, 2 dwells., 17′ x 27′ and 21′ x 31′, two-st'y mansard; T. C. Powers, builder.

Brown Ave., cor. Prospect St., Ward 23, for John L. Dakin, dwell., 21′ 6″ and 27′ 6″ x 38′ 6″, three-st'y pitch; W. S. Mitchell, builder.

Porter St., rear, near Bremen St., Ward 2, for F. D. Edmunds, storage, 20′ x 50′, one-st'y pitch; John McCunnie, builder.

Pond St., near May St., Ward 23, for Alfred Bowditch, dwell., 39′ x 45′ and 54′, two-st'y pitch; Sam'l D. Gerry, builder.

Woodbine St., Nos. 46–50, Ward 21, for Nathan P. Ryder, 3 dwells., 20′ 6″ and 26′ 6″ x 32′, two-st'y pitch; J. H. Deluc, builder.

Crescent Ave., opp. Spring Garden St., Ward 24, for Geo. R. Clarke, dwell., 11′ x 14′ and 22′ x 27′, one-st'y mansard; Geo. McCoan, builder.

North Harvard St., near Cambridge St., Ward 25, for Miss S. F. Boynton, 2 dwells., 17′ 6″ x 41′ 6″, two-st'y pitch; W. W. Berry, builder.

Pynchon St., No. 200, Ward 22, for Anthony Hankey, dwell. and store, 25′ x 50′, two-st'y flat, McDonald & Tobin, builders.

Washington St., No. 2608, Ward 21, for Nelson Goodwin, blacksmith shop, 22′ x 28′, one-st'y pitch.

West Third St., No. 203, Ward 13, for John Swanton, dwell., 20′ x 36′, two-st'y flat.

Shepherd St., near Washington St., Ward 25, for John Fay, dwell., 28′ x 32′, two-st'y pitch; Daniel O'Connell, builder.

South St., cor. Jamaica St., Ward 23, for J. J. Williams, dwell., 25′ x 25′ and 42′ x 42′, three-st'y mansard.

Roxbury Ave., near Englewood Ave., Ward 25, for R. L. Woodbury, dwell., 21′ 4″ and 29′ x 33′, two-st'y pitch; Morton & Chesley, builders.

Elm St., near Breed St., Ward 1, for John Casson, dwell., 24′ x 27′, two-st'y flat; M. R. McDonald, builder.

Howard Ave., No. 6, rear, Ward 20, for Albert Fellner, dwell., 18′ x 33′, one-st'y pitch; J. Bass, builder.

Milton Ave., near Prospect St., Ward 24, for Chas. A. Hall, dwell., 20′ and 26′ x 28′, two-st'y pitch; J. and F. H. McDonald, builders.

Wise St., near Roys St., Ward 23, for Alexander Freier, stable, 18′ x 24′, one-st'y pitch; Jos. Hammerlee, builder.

Brooklyn.

BUILDING PERMITS. — *Central Ave.*, w s, 25′ n Melrose St., three-st'y brick tenement, tin roof; cost, $4,500; owner, John Biegerman, Central Ave., cor. Melrose St.; architect, J. Platte; builder, F. J. Berlenbach.

South Fifth St., No. 420, three-st'y brick tenement, tin roof; cost, $5,500; owners, Voelbel & Ihrig, South Fourth St., near Ninth St.; architects and builders, C. L. Johnson's Sons.

Sumner Ave., w s, 20′ s Hart St., three houses and one on rear of lot, s s Hart St., 80′ w Sumner Ave., in all 4 two-st'y brown-stone dwells.; cost, each, $5,500; owner, R. F. Clayton, 401 Fourteenth St.; architect, W. F. Clayton.

Manhattan Ave., s e cor. Noble St., 4 four-st'y brick, stone and terra-cotta flats and stores, tin roofs; total cost, $40,000; owner, Jas. Thompson, Far Rockaway, L. I.; builders, Van Riper Bros. and Andrew Hulse.

Eighth Ave., n e cor. Seventeenth St., 4 three-st'y brick tenements, gravel roofs; cost, each, $5,000; owner, W. H. Conklin, 475½ First St.; architect, I. H. Herbert.

President St., s s, 230′ w Third Ave., 5 three-st'y frame tenements, tin roofs; cost, each, $4,500; owner and carpenter, Sampson B. Oulton; architect, Wm. H. Wirth; mason, Anthony McGrath.

Third Ave., w s, 100′ s Third St., one-st'y brick and stone storage warehouse, tin roof; cost, $3,500; owner, Brooklyn Improvement Co., Third Ave., cor. Third St.; architects, Parfitt Bros.; builders, E. P. Crane and D. E. Harris.

Myrtle Ave., n s, 75′ e Charles Pl., three-st'y frame (brick filled) store and tenement, tin roof; cost, $4,600; owner, Mr. Keeps; architect, John Platte; builder, Ernst Loerch.

Sixth Ave., e s, extending from Thirteenth to Fourteenth St., 10 two-st'y brown-stone dwells., tin roofs; cost, each, $4,500; and 2 three-st'y brown-stone stores and flats, tin roofs; cost, each, $6,500; owner, Stillman P. Lincoln, 174 Hall St.; architect and carpenter, Chas. Lincoln; masons, Buchanon & Riley.

Fourteenth St., n s, 80′ 10″ e Sixth Ave., also Thirteenth St., s s, 80′ 10″ Sixth Ave., 2 two-st'y brick dwells., tin roofs; cost, each, $4,000; owner, Stillman P. Lincoln, 174 Hall St.; architect and carpenter, Charles L. Lincoln; masons, Buchanon & Riley.

Powers St., No. 71, n s, 175′ w Lorimer St., three-st'y frame (brick filled) tenement, tin roof; cost, $4,600; owner, S. M. Munn, 71 Powers St.; architects and carpenters, Sammis & Bedford; mason, Michael Keupp.

Park Pl., n s, 250′ w Brooklyn Ave., three-st'y brick dwell., slate roof; cost, $15,000; owner, Edward H. Hobbs, Mansion House; architect, Geo. P. Chappell.

Ninth St., n s, 20′ w Sixth Ave., 2 three-st'y brown-stone dwells., tin roofs; cost, each, $6,000; owner, John Fey, Ninth St., near Sixth Ave.; architect, Francis Ryan.

Boerum St., n s, 125′ e Leonard St., three-st'y brick school-house, tin roof; cost, $57,000; owner, Board of Education; architect, J. W. Naughton; builders, John McQuaid and R. B. Ferguson.

Degraw St., s s, 100′ w Smith St., three-st'y brick school-house, tin roof, wooden cornice; cost, $38,600; owner, Board of Education; architect, J. W. Naughton; builders, Frank Kelly and John S. McRea.

Berkeley Pl., n s, 350′ w Sixth Ave., three-st'y brick school-house, tin roof; cost, $48,000; owner and architect, same as last; builders, John H. O'Rourke and John S. McRea.

Nelson St., s s, 140′ e Clinton St., 2 three-st'y brick tenements, tin roofs; cost, each, $4,500; owner, Edward Keogh, Jr., 146 Luquer St.; builder, Thomas Keogh.

Washington Park, No. 171, e s, 120′ n Willoughby Ave., three-and-a-half-st'y brick dwell., tin and slate roof; cost, $12,500; owner, Wm. N. Dykman, Montague St., near Clinton St.; architect, Mercein Thomas; builders, P. J. Carlin and J. S. McRea.

Greene Ave., s s, 160′ e Throop Ave., 2 three-st'y brick and brown-stone dwells., tin roofs; cost, each, $6,500; owner, Paul C. Grening, 420 Gates Ave.

Clifton Pl., n s, 375′ e Grand Ave., two-st'y brick stable, felt and gravel roof; cost, $7,000; owner, R. R. Bennett, 79 Madison St.; architect and builder, J. N. Smith.

Clifton Pl., s s, 100′ e Clason Ave., two-st'y brick dwell. and stable, tin roof; cost, $5,000; owner, A. J. Pauch, 315 Greene Ave.; architects, Eastman & Daws; builders, P. J. Carlin and Long & Barnes.

Garfield Pl., s s, 260′ w Fifth Ave., three-st'y brick tenement, tin roof; cost, about $4,000; owner, Thos. Dowd, Macomb St.; architect and builder, Thos. J. Nash.

Douglass St., n s, 250′ w Bond St., 2 three-st'y brick tenements, gravel and felt roofs; cost, each, $4,900; owner, John M. O'Neil; architect and builder, John S. O'Neil.

Madison St., s s, 170′ w Ralph Ave., 4 three-st'y frame (brick filled) flats, tin roofs; cost, each, $3,500; owner, W. J. Caufield, New York City; architect, I. D. Reynolds.

Gates Ave., s s, 225′ e Clason Ave., three-st'y free-stone dwell., slate and tin roof; cost, $14,000; owner, Miguel Alvers; architect, Amzi Hill; builder, Benjamin Linikin.

Hart St., n s, 100′ e Nostrand Ave., 5 buildings; also, *Hart St.*, n s, 138′ w Marcy Ave., 5 buildings, in all 10 two-and-a-half-st'y and basement brown-stone dwells., tin roofs; cost, each, $6,000; owner, F. R. Boerum; architect, I. D. Reynolds; builder, Thos. E. Greenland.

Myrtle Ave., Nos. 1154 *and* 1156, s s, 250′ e Broadway, 2 three-st'y frame tenements; cost, each, $4,200; owner, Salomon Wolf; architect, Th. Engelhardt; builder, Jos. Wagner, Jr.

Herbert St., No. 54, s s, 150′ e Humboldt St., three-st'y frame tenement, tin roof; cost, $4,000; owner, Sarah M. E. Hall, 122 Mott St., New York; architect, A. Herbert; builder, Daniel O'Keeffe.

Flushing Ave., No. 837, n s, 25′ e Morrell St., three-st'y frame store and tenement, tin roof; cost, $4,500; owner and builder, Chas. Lehmann, Goerck St., New York; architect, Th. Engelhardt.

Remsen St., s w cor. Clinton St., five-st'y brick and stone club-house, tin roof; cost, about $90,000; owner, Hamilton Club, Brooklyn; architect, Geo. B. Post; builder, D. H. King, Jr.

Broadway, e s, 60′ s Kosciusko St., 2 three-st'y brick tenements, tin roofs; total cost, $9,000; owner, Mary J. Hutchthouse, Grove St.; architect and carpenter, George A. Bohannon; mason, J. Lambert.

Garfield Pl., s s, 56′ e Seventh Ave., 2 three-st'y brown-stone dwells., tin roofs; cost, each, $9,000; owners, architects and builders, Martin & Lee, 440 Clermont Ave.

Manhattan Ave., w s, 25′ n Norman Ave., 3 three-st'y brick stores and dwells., tin roofs; cost, each, $5,000; owner, Adrian Meserole, Lorimer St.; architect, F. Weber; builders, Smith & Gately and S. Randall.

ALTERATIONS. — *Clinton St., Nos.* 12 *and* 14, add one-st'y, also three-st'y brick extension, tin roof; also front altered; cost, $8,000; owner, A. Hardenbergh, cor. Clinton and Fulton Sts.; architects, Eastman & Daws; builder, not selected.

Greene Ave., s e cor. Clermont Ave., add to tower, also one-st'y terra-cotta and brick extension; cost, $15,000; owner, Church of the Messiah; architect, R. H. Robertson; builders, Terence Kiernan and Jeans & Taylor.

Adelphi St., e s, 100′ n Myrtle Ave., four-st'y brick extension, tin roof; cost, $10,000; owner, Board of Education, Red Hook Lane; architect, J. W. Naughton; builder, F. D. Norris.

Heyward St., s s, 71′ 4″ w Broadway, three-st'y brick extension, slate roof, also rear wall rebuilt; cost, $15,000; owner, Board of Education, Red Hook Lane; architect, J. W. Naughton; builder, John McQuaid.

Seventeenth St., n s, 100′ e Seventh Ave., two-st'y brick extension, tin roof; cost, $14,000; owner, Board of Education; architect, J. W. Naughton; builder, F. D. Norris.

McKibben St., n s, 150′ e Ewen St., three-st'y brick extension, tin roof, also interior alterations, etc.; cost, $19,000; owner, Board of Education; architect, J. W. Naughton; builder, P. F. O'Brien.

The Academy of Music is to be redecorated by Mr. W. H. Day, of New York, under directions of Messrs. Kimball & Wisedell, who have also designed some interior alterations to the Academy.

Chicago.

BUILDING PERMITS. — N. Eek, two-st'y addition, 146 Oak St.; cost, $3,000; builder, J. A. Modin.

A. Schwarz, one-st'y addition, 152 Illinois St.; cost, $3,000.
J. Mayer, two-st'y store and flats, 134 West Eighteenth St.; cost, $3,500.
G. N. Hall, 2 two-st'y flats, 1148–50 West Harrison St.; cost, $5,000; builder, W. Kerr.
A. Doering, two-st'y dwell., 894 Monroe St.; cost, $7,000; architect, J. M. Van Osdel & Co.; builders, Fox & Hinds.
B. J. Kenneally, three-st'y store and dwell., 1197 Blue Island Ave.; cost, $5,600.
Dickey Bros., two-st'y barn, Sherman Pl.; cost, $3,500.
T. C. Octigon, three-st'y flats, 11 Twenty-sixth St.; cost, $5,000.
J. Noonon, two-st'y dwell., 789 Clybourne Ave.; cost, $3,000.
E. Jacobs, two-st'y dwell., 20 Kemper Pl.; cost, $4,000.
Dr. P. H. McElroy, two-st'y store and dwell., 528 West Indiana St.; cost, $9,000; architect, W. H. Drake; builder, J. O'Connell.
Mrs. S. Turner, three-st'y store and flats, 221 Blue Island Ave., cost, $6,000; architect, A. Bessler, builder, R. Tobin.
G. M. Thoesell, three-st'y store and dwell., 70 Chicago Ave.; cost, $8,000; architect, J. Otter; builder, C. Landstrom.
N. Davis, three-st'y store and dwell., 33 Chicago Ave.; cost, $8,000; architect, H. Rehwoldt.
J. Tobey, three-st'y dwell., 204 Centre Ave.; cost, $6,500.
W. H. Jung, three-st'y flats, 328 North Market St., cost, $6,500; architect, J. H. Huber.
McCormick Estate, additional, 185–189 Kinzie St.; cost, $3,000.
J. Schultz, two-st'y flats, 40 Bradley St.; cost, $3,400.
J. Vanis, two-st'y dwell., 641 Centre Ave.; cost, $3,700.
J. Kownorsky, two-st'y dwell., 290 West Twentieth St.; cost, $3,700.
C. Jorn, 2 three-st'y stores and dwells., Twenty-sixth St.; cost, $10,000.
J. McKinney, three-st'y flats, 319 West Jackson St.; cost, $5,000.
H. Wheeler, two-st'y barn, 2962 Michigan Ave.; cost, $5,000.
J. Madey, two-st'y dwell., 677 Dixon St.; cost, $2,700.
J. Krohn, three-st'y store and dwell., 457 West Chicago Ave.; cost, $8,000; architect, H. T. Kley.
J. Franks, three-st'y stores and dwell., 242 South Halsted St.; cost, $18,000.
Mrs. J. Bender, two-st'y dwell., 608 Twenty-first St.; cost, $3,800.
W. H. Morehouse, two-st'y dwell., 3741 Grand Boulevard; cost, $20,000.
E. T. Ewing, two-st'y store and dwell., 1082 Twelfth St.; cost, $4,000; architects, Treat & Foltz.
H. Looi, two-st'y store and dwell., 714–716 Lake St.; cost, $8,000; architect, H. R. Wilson; builders, Rogers & Cook.
W. P. Dyer, two-st'y dwell., 294 Loomis St.; cost, $6,500; architects, Furst & Rudolph.
J. Morh & Son, boiler shop, 32–42 Illinois St.; cost, $15,000; builders, J. N. Dunphy & Co.
Mrs. C. Dieden, three-st'y flats, 332 Wells St.; cost, $12,000; architect, T. Karls; builder, A. Replinger.
W. Johnson, three-st'y store and flats, 486–488 West Chicago Ave.; cost, $5,000; architect, F. Wolf; builders, Eich & Ott.

New York.

STRIKE. — The continuance of the bricklayers' strike has a very depressing influence on new work, and several improvements have been abandoned for this year.

SKATING-RINKS. — The plans for the Elite Roller Skating-Rink, 200′ x 275′, have been completed by Messrs. McElfatrick, Son & De Band. The building is to be three stories high, of brick and brown-stone, and will cost about $150,000.
On the s s of One Hundred and Twenty-fifth St., between Lexington and Third Aves., Mr. Wm. A. Martin will also build a rink, to cost $15,000.

BUILDING PERMITS. — *Twelfth St.*, s w cor. West St., running through to Bethune St., 4 five-st'y brick storehouses, gravel roofs; cost, each, $28,000; owner, John T. Johnson, 8 Fifth Ave.; architects, Renwick, Aspinwall & Russell; builders, Moran & Armstrong.
Avenue A, Nos. 1026 *and* 1028, 2 four-st'y brick tenements, tin roofs; cost, each, $10,000; owner, Thomas Fitzgerald; architects, A. B. Ogden & Son.
One Hundred and Fifth St., s s, 275′ w Tenth Ave., four-st'y tenement, tin roof; cost, $16,000; owner and architect, Wm. R. Powers, 508 West Fiftieth St.
Fifty-fifth St., Nos. 110-116, s s, 150′ w Sixth Ave., 6 four-st'y brick and brown-stone dwells., mansard fire-proof roofs; cost, each, $15,000; owner, A. H. Barney, 101 East Thirty-eighth St.; architect, J. B. Lord; builders, L. N. Crow, and F. C. Miller.
West Broadway, No. 127, being 112′ 6″ n White St., six-st'y brick warehouse, tin roof; cost, $19,000; owner, Simon Morris, 126 East One Hundred and Seventh St.; architect, A. Zucker.
Sixty-second St., n s, 75′ e Third Ave., five-st'y brick store and tenement, tin roof; cost, $9,000; owner, John L. Schofield, West Farms, N. Y.; architect, A. Spence.
One Hundred and Fifteenth St., n s, 100′ w Pleasant Ave., two-st'y brick and stone church, cement and gravel roof; cost, $75,000; owner, Rev. Emilieu Kirner, Pastor, Madison Ave., s w cor. Fifty-first St.; architect, L. J. O'Connor.
Morris Ave., w s, 53′ n One Hundred and Forty-eighth St., three-st'y frame dwell., and a one-st'y frame stable, tin roofs; cost, $3,000; owner, Carl Huelster, Morris Ave. and One Hundred and Forty-eighth St.; architect, Adolph Pfeiffer.
Division St., No. 170, five-st'y brick tenement, tin roof; cost, $16,500; owner, Geo. H. Benner, 55 East Third St.; architect, Adam Munch.
Division St., No. 174, six-st'y brick tenement, tin roof; cost, $13,000; owners, Sobel Bros., 160 Greenwich St.; architect, Henry Dudley.
East Tenth St., Nos. 469 *and* 471, one-st'y brick boiler-house, gravel roof; cost, $3,500; owner and builder, Wm. E. Uptegrove, 596 Greene St.; architects and masons, Berton & Nickel.
One Hundred and Thirteenth St., n w cor. First Ave., 5 five-st'y brick tenements and stores, tin roofs; total cost, $70,000; owner, Matthew Coogan, 422 East One Hundred and Fifteenth St.; architects, Cleverdon & Putzel.
West Tenth St., No. 55, four-st'y brick dwell., tin roof; cost, $12,000; owner, John Taylor Johnston, 8 Fifth Ave.; architects, Renwick, Aspenwall & Russell.
Courtland Ave., e s, 47′ n One Hundred and Fifty-fourth St., two-st'y brick carriage-house, tin roof; cost, $4,600; owner, Adam Moebus, 709 East One Hundred and Fifty-fourth St.; architect, Henry Piering.

ALTERATIONS.—*Sixth Ave.*, n e cor. Twenty-third St., repair damage by fire; cost, abt. $40,000; owner, Board of Trustees in charge by F. Clarkson, President, 48 East Sixty-sixth St.; architect, R. F. Hatfield; builders, W. A. & F. E. Conover, and J. C. Wessels.
East Forty-second St., Nos. 213–221, west end altered for office and show room, front altered, etc.; cost, $5,000; owner, John N. Stearns, 10 West Fifty-eighth St.; architect, F. C. Merry; builders, J. T. Kennedy, and L. H. Williams.
West Forty-ninth St., No. 61, two-st'y brick extension, tin roof; cost, $5,000; owner, Agnes Neustadt, on premises; architects, Schwarzmann & Buchman.
Sixtieth St., s s, 84′ w Broadway, add one st'y; cost, $3,500; owner, B. Laurence, 41 East Thirty-third St.; architect, L. J. O'Connor.
Delancy St., s e cor. Cannon St., one-st'y brick extension, tin roof, interior alterations; cost, $3,500; owner, Martin Heldt, 179 East Houston St.; architect, J. Boekell.
East Fourth St., Nos. 339–343, one-st'y brick extension, interior alterations for offices in first story, etc.; cost, abt. $7,000; owner, Morris S. Thompson, 250 West Forty-fifth St.; architect, W. Howe; builder, E. D. Garnsey.
West Twenty-seventh St., No. 130, six-st'y brick extension, interior alterations, etc.; cost, $12,000; owner, Sarah A. Sanchez, 50 West Twenty-eighth St.; architect, M. C. Merritt.
West Fifty-seventh St., Nos. 518 *and* 520, raise one st'y; cost, $10,000; owner, Conrad Stein, 521 West Fifty-seventh St.; architect, Julius Kastner.
Lexington Ave., w s, from Forty-first to Forty-second St., internal alterations; cost, $3,500; owner, Manhattan Storage and Warehouse Co., on premises; architect, James E. Ware.
Railroad Ave., w s, 500′ n One Hundred and Thirty-eighth St., four-st'y brick extension, tin roof; cost, $4,000; owner, David Rousseau, 310 Mott Ave.; architects and builders, John C. Donnelly's Sons.
East Twenty-fifth St., No. 116, raise one story; cost, $5,000; owner and builder, John Smith, 114 East Twenty-fifth St.

Philadelphia.

BUILDING-PERMITS. — *Fifteenth St.*, s of Federal St., three-st'y dwell., 18′ x 50′; Jas. E. Miller, owner.
Point Breeze, 4 two-st'y oil-works buildings, 25′ x 35′, 43′ x 97′, and 90′ x 90′; Atlantic Refining Co., owners.
Nice Ave., near Blue Bell Hill, two-st'y dwell., 22′ x 29′; Thos. Evans, owner.
Belview St., bet. Twenty-first and Twenty-second Sts., two-st'y dwell., 26′ x 30′; J. S. Tomlinson, contractor.
Mansion St., s of Jefferson St., three-st'y dwell., 17′ x 45′; C. J. Wallace, contractor.
Reed St., bet. Barlow and Manley Sts., 6 three-st'y dwells., 16′ 4″ x 37′; A. M. Green, owner.
Eighth St., bet. McKean and Dudley Sts., 8 two-st'y dwells., 16′ x 32′; J. C. D. Smith, owner.
Fifth St., w of Orkney St., 4 three-st'y dwells., 15′ x 44′; Mark Devlin, owner.
Market St., No. 1027, six-st'y store, 26′ x 200′; Jacob Myers, contractor.
Allegheny Ave., w of Frankford Road, two-st'y house, 20′ x 58′; Wm. Johnson, owner.
Lehigh Ave., n s, Somerset St., s s, Eighth St, w s, and on a new street not yet named, w from Eighth St., 48 two-st'y dwells., and 12 three-st'y dwells., 16′ 5″ x 57′ 6″ and 43′ 9″; S. Horner, Jr., owner.
Sedgeley Ave., w of Thirtieth St., two-st'y dwell., 20′ x 48′; Jno. Howden, contractor.
Franklin St., above Cumberland St., 7 two-st'y dwells., 14′ x 42′; Amos D. Kennedy, owner.
Second St., n of Cambria St., two-st'y stable, 16′ x 31′; Amos H. Hall, contractor.
Jasper St., n of Somerset St., two-st'y dwell., 16′ x 40′; Duryea & Childs, contractors.
Neff St., cor. Mercer St., 23 two-st'y dwells., 14′ x 28′ and 15′ x 40′; Chas. Judge, owner.
Main St., No. 4610, three-st'y dwell., 15′ x 32′; A. H. Taylor, contractor.
Wayne St., cor. Berkley St., two-st'y dwell., 18′ x 40′; Samuel Clawson.
Lancaster Ave., Nos. 3515 *and* 3517, 2 three-st'y dwells., 20′ x 55′; F. Arnold, owner.
Broad St., s of Dickinson St., 8 three-st'y dwells., 16′ x 50′; W. R. Matchett, owner.
Thirteenth St., between Morris and Tasker Sts., 21 three-st'y dwells., 16′ x 50′; W. R. Matchett, owner.
Fourth St., cor. Willow St., four-st'y factory, 16′ 6″ x 30′; B. P. Evans, contractor.
Clay St., between Frelinghuysen and Centre Sts., 2 two-st'y dwells., 17′ x 32′; S. S. Keely, owner.
Christian St., w of Miller St., 2 two-st'y dwells., 16′ x 28′; Jas. Dooke, owner.
York St., n of Angle St., 2 two-st'y dwells., 15′ x 40′; Benj. Walker, contractor.

St. Louis.

BUILDING PERMITS. — Seventy-one permits have been issued since our last report, nineteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —
Ferd. Hosmer, two-st'y brick dwell.; cost, $4,500; A. Beimke, architect; sub-let.
Mrs. Lipphart, 2 adjacent two-st'y tenements; cost, $4,700; A. Whrl, contractor.
Heymann Eppstein, one-st'y brick dwell.; cost, $2,500; F. Voepel, contractor.
St. Louis Mutual House Building Co., two-st'y brick dwell.; cost, $3,000; Ed. Mortimer, architect; J. H. Dunlap, contractor.
Jno. J. Ganahl Lumber Co., interior alteration to Union Capitol Hall; cost, $2,500; G. Neumister, contractor.
Dr. W. C. Richardson, two-st'y brick tenement-house; cost, $5,000; E. Reed, contractor.
J. B. Glanoil, two-st'y brick dwell.; cost, $2,500; J. E. Truitt, contractor.
Farer Shindler, one-st'y brick hall; cost, $4,500; H. Waneschaffe, contractor.
Huetteman Bros., one-st'y soap factory; cost, $2,800; W. Hemingtons, contractor.
E. Schulte, 2 adjacent dwells.; cost, $8,500; Alphen & Pranel, contractor.

Washington, D. C.

Mass. Ave., intersection Sixth and C Sts., n e, 2 three-st'y brick dwells., for Chas. White; cost, $12,000; Jas. H. McGill, architect.
K St., bet. North Capitol and First Sts., n w, two-st'y brick dwell., for Jno. Newman; cost, $3,200; Peter McCartney, builder.
Seventh St., bet. D and E Sts., n w, four-st'y brick store for Jno. L. Vogt; cost, $9,000; Cluss & Shultz, architects; Henry Conrades.
North Capitol St., cor. P St., n w, two-st'y brick dwell., for W. H. Mohler; cost $3,500.
N St., bet. Thirty-first and Thirty-second Sts., n w, two-st'y brick dwell., for M. Plater; cost, $7,000; Frey Bros., builders.
T St., bet. Thirteenth and Fourteenth Sts., n w, 2 three-st'y brick dwells., for Geo. W. Cochran; cost, $9,400; W. C. Morrison, builder.
Vt. Ave., near Iowa Circle; three-st'y brick dwell., for Wm. B. Morgan; cost, $12,000; W. C. Morrison, builder; Robt. Stead.
Sixteenth St., cor. H St., n w, three-st'y brick dwell., for Henry Adams; cost, $35,000; H. H. Richardson, architect; Chas. Edmonston, builder.
Sixteenth St., cor. H. St., n w, three-st'y brick dwell., for John Hay; cost, $70,000; H. H. Richardson, architect; Chas. Edmonston, builder.
Q St., bet. Twentieth and Twenty-first Sts., n w, three-st'y brick dwell., for Mrs. Sarah J. Foster; cost, $7,000; T. F. Schneider; architect; C. C. Martin, builder.
K St., bet. Ninth and Tenth Sts., n w, two-st'y brick dwell., for Geo. T. Dearing; cost, $3,000.
N St., bet. Nineteenth and Twentieth Sts., n w, three-st'y brick dwell., for B. F. Tilley; cost, $6,000; J. G. Myers, architect; A. G. Stevens, builder.
Fifteenth St., bet. P and Q Sts., n w, two-st'y brick dwell., for Mrs. J. A. Powell; cost, $4,300; R. W. Darby, builder.

PROPOSALS.

CEMENT, LUMBER, ETC.
[At Rock Island, Ill.]
ROCK ISLAND ARSENAL, July 28, 1884.
Sealed proposals are invited to furnish, delivered on cars or wagons at the arsenal, the lime, hydraulic cement, coke, coal (bituminous, anthracite and blacksmith) and lumber that may be required at this arsenal from date of contract to June 30, 1885.
Bills of the materials with approximate quantities, specifications as to the quality, and other requirements can be obtained from the undersigned.
The successful bidder will be required to enter into contract and give good and sufficient bond for the faithful performance of the same.
Bids for bituminous coal delivered on cars in the city of Rock Island will be considered.
The Government reserves the right to reject any or all bids.
The quantities of material required can be given only approximately, and after contracts are awarded only such materials will be furnished as may be required and are ordered from time to time by the commanding officer of the arsenal.
Proposals should be in triplicate, sealed and indorsed "Proposals for Materials."
Bids will be opened **at 10 A. M., September 2, 1884.**
Bidders are invited to be present at the opening.
D. W. FLAGLER,
452 Lieut.-Col. of Ordnance Commanding.

IRON BEAMS.
[At Rock Island, Ill.]
ROCK ISLAND ARSENAL, July 26, 1884.
Sealed proposals, to be opened **at 10 A. M., August 30, 1884,** are invited to furnish for this arsenal about 500,000 pounds of wrought-iron beams, tees, and angles.
Full bills and specifications can be obtained from the undersigned.
The Government reserves the right to reject all bids not deemed satisfactory.
Bids from manufacturers who have not already made successfully the sizes of beams required will not be considered.
The successful bidder must enter into contract and give satisfactory bonds for the faithful performance of the same. D. W. FLAGLER,
452 Lieut.-Col. of Ordnance Commanding.

HYDRAULIC ELEVATOR.
[At Washington, D. C.]
GOVERNMENT BUILDING, CORNER SEVENTEENTH AND F STREETS,
WASHINGTON, D. C., August 7, 1884.
Sealed proposals for furnishing and putting in place in this building a hydraulic passenger elevator, of high speed and of the long cylinder type, will be received at this office **until 12 M., on August 25, 1884,** and opened immediately thereafter in presence of bidders.
The proposed locality of the elevator and general plan and specifications for its construction may be seen, and blank forms of proposals obtained, on application at Room 26 of the building.
Proposals should be endorsed "Proposals for Elevator" and addressed to the undersigned.
The right to reject any bid not deemed to be for the best interest of the United States is reserved.
451 JAS. EVELETH, Superintendent.

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CONTENTS.

THE most serious effect of the earthquake of last week seems to have been the disturbance of the foundations of the New Jersey State Capitol at Trenton. Some time ago, according to the New York *Mail and Express*, the structure was observed to have settled, but the movement was a slow one, and attracted little notice. Since the earthquake, however, new indications of impending disaster have been seen, the ceilings have begun to crack, and the occupants of the building, very naturally, are becoming nervous. We trust that no harm will befall them, but cannot help remarking upon the fatality which seems to attach to American State Capitols. To say nothing of the one which collapsed altogether a little while ago, or of that other, which took fire, and burned up so fast that the legislators had to climb out of the windows for their lives, it is remarkable that the costliest and most beautiful of any is regarded by some of those for whose use it was erected as a kind of trap, into which they enter at their peril, while this its near neighbor is said to be in immediate danger from the effect of an earthquake so feeble that not one person in a hundred knew of its occurrence.

ALREADY there is a good deal of talk, both here and in the foreign journals, about the proposed American Exhibition, which is to be opened in London in May, 1886. The Fisheries Exhibition and Health Exhibition have met with so much success as to indicate plainly the advantage of showing special collections, rather than a vast mass of objects from all parts of the world, which confuse the visitor as much as they interest him. Such comparatively small collections can be more effectively arranged and more easily studied than large ones, and leave on the mind a connected and vivid impression, which the large ones rarely do. There can be no doubt about the interest, not only to foreigners but to Americans, of such an exhibition as an experienced manager of such affairs, with a little imagination, and a talent for arrangement, could easily prepare; and if, as we think, the curiosity as well as kind feeling with which English, French and Germans alike regard everything which relates to the United States would alone almost insure success, this would be rendered still more certain by the patriotic pride which would induce thousands of Americans to cross the ocean in the wake of their contributions, or those of their friends, to see that they received due appreciation.

VERY little is yet known of the details of the Exhibition, but it seems probable that the great railroads, with, perhaps, the public authorities of the States which make more effort to attract immigration, will occupy a considerable portion of the space with the maps and collections of mineral and vegetable products which the Australian Governments have set the example of exhibiting in London. Next to these, the manufacturers of certain varieties of goods will probably be represented, although the feeling of aversion to any movement by which their foreign rivals might be put in possession of their processes or patterns, which kept American manufacturers generally from exhibiting at Vienna, is likely to militate against the success of this part of the enterprise. To make up for this, however, the picturesque features of American life are to be shown with as much fidelity as possible. According to the programme, an American theatre is to be constructed, where performances will be given by American actors and negro minstrels; a roller-skating rink will be provided, and a California wine-shop, a Florida fruit-store, a Wall-Street broker's office, and a Nevada camp-fire will be among the attractions. We should imagine that the managers might find it worth while to make terms with the Buffalo Bill company, which would present in a most attractive manner the kind of American life which appeals best to the preconceived notions of the average foreigner.

THE officers of the Workingmen's Institute connected with the Wells Memorial Association in Boston have sent out their fifth annual report, which has a singular interest. Nothing could be less flowery or sentimental than the text of the report, but the picture which it presents of the admirable management and influence of the Institute is full of encouragement for those who desire to promote by such means the usefulness and happiness of their fellow-citizens. The Wells Memorial, it may be observed, has had the advantage of a moderate invested fund for sustaining its early efforts, but it owes its success much less to this than to the zeal and ability with which its affairs have been conducted. Few associations of the kind could hope to begin their work under conditions quite so favorable, and it is fortunate that the Boston Institute has been able to lead the way in a path which will be followed by many others.

IN general, the Wells Memorial, like other workingmen's clubs or institutes, is intended to furnish instruction and amusement for the younger men in that part of the city who happen to be without acquaintance, or who wish to enjoy the varied recreations which the Association offers. To say that its advantages are intended for workingmen is rather meaningless, since that term applies to every man in the United States whose society is worth cultivating, but the name serves to indicate the distinction existing between it and the local Christian Associations, whose object is primarily the extension of religious influences over young men, while the one of which we speak cares rather for the development in them of the qualities which lead to happiness and success in secular affairs. With this intention, a deserved prominence is given to the provision of opportunities for economizing and investing money under skilful direction, and with a clear understanding of the processes involved. The members of the Association already carry on three coöperative banks, whose united assets amount to more than three hundred thousand dollars. These banks are under the supervision of the State Savings-Bank Commissioners, but pay to their stockholders, nearly two thousand in number, a much larger return than most savings-banks, amounting, in the case of the only one of which a full report is given, to about seven per cent for the past year.

ANOTHER excellent feature of the association is an arrangement by which coal, flour, groceries and provisions, clothing, boots and shoes, hats and caps, crockery, house-furnishing goods, furniture and hardware, are supplied to members at a reduction of about ten per cent from the retail prices. To our mind no detail of the management shows more wisdom than this, which serves not only as a direct benefit to the members, amounting to a gift of from fifty to two or three hundred dollars a year, according to the mode of life of each, but gives the younger ones a lesson and example in the duty of care in spending money, which they are never likely to forget. For men who have once formed the habit of saving needless expense, and of investing their savings judiciously, the future is as secure as anything can be in this world, and those who have learned the economic lessons which the Association is ready to teach them can afford to indulge in the relaxations which it offers for their leisure hours. Among these are entertainments of various kinds, lectures, concerts, and evening parties, besides a debating club, a gymnasium, a game-room, and a reading-room, with which is connected a library. This last deserves to be a large one, and might well take the form of a technical collection rather than one of popular books, which can be had only too freely from the public libraries.

A NEW light has been brought into use in England, apparently involving the principle of flameless combustion to which Mr. Fletcher's experiments have given so much interest. As now employed on a large scale at the Euston station in London, the lighting apparatus consists of a burner supplied with a mixture of coal-gas and common air, in the proportions necessary for perfect combustion, these being, we suppose, about eight parts of air to one of gas. The mixed gases are delivered under pressure, as with the usual gas service, and over each burner is placed a cap of platinum-wire gauze. The gas, when once lighted, burns without flame around the platinum gauze, which is raised to a brilliant white heat by the combustion. As there is no flame, the lights are perfectly steady, and although not protected by globes or shades of any kind, are affected neither by wind nor rain, while more than twice as much light is obtained with a given consumption of gas as under the old system. The burners at present in use are arranged for a supply of eighteen feet of gas each per hour, but they actually consume only twelve and one-half feet, and twenty of the burners light in a satisfactory manner a platform nine hundred feet long, replacing fifty lamps of the old kind.

EVERY journal, however limited its scope, ought to do its part to make public the fact of the recent establishment in New York, Connecticut and Ohio of Agricultural Experiment Stations, founded and maintained by the State, and devoted entirely to the collection of facts which will be of service in the agriculture of the neighboring country. In that of Connecticut, which has been in existence two years, tests have been made of more than four hundred kinds of seed within twelve months, and fifty analyses have been made of fertilizers and other substances used in agriculture. Besides experiments upon the effect and comparative value of manures, natural and artificial, investigations are carried on in regard to the causes of mildew, rust, and other diseases of plants, with the best means of cure; and cattle and horses are also studied and treated scientifically. The bulletins which show the results of these inquiries are sent to all who wish for them, and letters of inquiry from those who wish for information on agricultural matters are promptly answered. One of the main reasons why the bulletins of a State establishment of this kind are, or ought to be, so much more useful than any other sort of technical literature is that they deal with the same climate, weather and circumstances as those under which their readers are or have been working, and the farmer in Litchfield who is troubled with a new sort of caterpillar, or the florist in New Haven whose rose-plants mildew persistently, are sure to find from the next bulletins that their neighbors have suffered in the same way, and have asked, generally with success, for information to help them in overcoming the troubles which afflict them. It is becoming every year more evident to those who watch the stock-markets, the great index of general prosperity or distress, that by far the most important factor in the life of the country is the agricultural interest. With good crops trade and manufactures flourish; without them all business languishes; and he who can show how to secure fruit-trees from insects or grain from parasites, or can point out the way to satisfy that universal need, a cheap mode of fertilizing exhausted fields, will deserve and receive the gratitude of the whole community.

A READY way of estimating distances in military operations, is described in the *Scientific American*, which translates it from the pages of *La Nature*. The only instrument required is a small piece of cardboard, out of which is to be cut a figure of a man, standing erect, the whole figure being, we will say, an inch in height. An extra piece of cardboard must be left below the figure to serve as a handle, with a pronounced horizontal line to represent the ground on which the figure stands. To test the instrument, a man is to be stationed upon a given point, holding the pasteboard figure in his hand. Six hundred and sixty feet behind him is to be placed another man. The observer then takes his place ten feet in front of his fixed point, and compares the little figure held in the hand of his assistant with the appearance of the man far off behind him. If the distant man is of the average height, five feet seven inches, his outline should coincide exactly in size with that of the pasteboard figure. After the instrument is found to be correct, it is only necessary in using it for ascertaining the distance of a man from the observer to hold or set up the figure at a convenient point, and then move backwards or forwards, keeping the figure in range with the remote man, until the two are found to correspond in size. Measure then the distance from the eye to the figure, and multiply by sixty-seven. The product will be the distance in feet from the observer to the distant object. If the observations are taken with care, the margin of probable error is quite small. The man whose distance is to be calculated may be above or below the average height, and this will affect the result, but only to the amount of one-tenth or one-twelfth of the whole. In practical service, however, the greatest advantage gained by using the instrument is the practice which it affords in observing closely the appearance of persons at various distances. After the actual distance of men whose image presents certain characteristics of size and detail has been repeatedly ascertained, the eye forms a series of standards for itself, and a person accustomed to using the instrument can soon dispense with it in emergencies, and form without it an estimate of distances which usually approximate very closely to the truth.

THE city of Paris was recently made the recipient of a bequest from a M. Forney, amounting to forty thousand dollars, and has taken an admirable way of using the money, by establishing with it a technical and professional library, which will be known as the Forney Library, and is to be open to all who wish to avail themselves of the advantages which it offers. In order to render it as generally useful as possible, the library is to be open from nine in the morning till five in the afternoon of every week day, and again from seven till ten in the evening, and on Sundays from noon to five o'clock; and students will be allowed to make tracings of drawings or engravings, and even to take such things home, to copy them at leisure. The library will open in October, and as soon as it is properly organized, courses of lectures are to be prepared for the benefit of those who wish to avail themselves of the privilege of listening to them. It will be seen that a library of this kind, to be so used, is a novelty among collections of books for public use. At present scientific or professional societies often possess libraries which their members are permitted to consult very freely, and many of them also provide lectures and discussions on the topics relating to their special work; but membership in such societies is generally beyond the reach of students, particularly the poorer ones, and the idea of establishing a general technical society, open to all who desire to profit by it, is a very happy one.

A CARPENTER writes to the *Scientific American* to say that in 1864 he had occasion to build a coal-bin in the yard of his house, and laid some old painted half-inch door panels on the ground to form the floor. Seven years afterward he took them up, and found them entirely free from decay. They were saturated with moisture, and so soft that, as he says, he could have bent one of them around a six-inch stove-pipe, but were as sound as if just cut from the tree. Unfortunately, the writer of the letter says nothing about the wood of which the panels were made, the character of the ground on which they were laid, or the color with which they were painted, so we cannot tell whether he has made a remarkable discovery or not. If the ground was springy, so that the boards under the coal bin were constantly wet, they would have remained sound for ages, painted or unpainted, and almost without regard to the sort of wood of which they were made. If this was not the case, and if the bin did not hold water which would serve to keep the boards moist, it would be worth while to inquire into the other circumstances. So far as we know, no one has investigated the effect of arsenical paints in preserving wood from decay, but it is not unusual for boards or sticks painted green, and half buried in garden soil, to resist decay for a surprising length of time, and a good coat of Paris green, or London purple, applied in such a way as to strike into the pores of the wood, might have antiseptic powers of great value. The carpenter who writes about the painted panels suggests that the treatment which preserved them might be applied to railway sleepers, and if it should prove that the life of these could be materially lengthened by dipping them in any sort of cheap paint, the discoverer of the proper pigment for the purpose would deserve well of his fellow-men.

SANITARY PLUMBING.[1] — XXVIII.

(*d*) *The Plain Screw-Joint.*

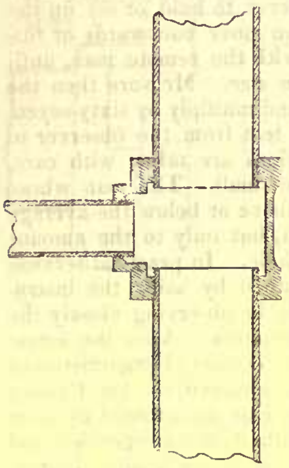


Fig. 180.
Ordinery Plain Screw-Joint.

FIGURE 180 represents the ordinary screw-joint as used by steam-fitters for connecting wrought-iron pipe. Figures 181 and 182[2] show an improved screw-joint formed with a view to forming a smoother connection between the pipes. It will be seen that, with the ordinary steam-fitter's screw-joint (Fig. 180), interior depressions are left when the pipe is screwed up which will collect sewage. In this system, however, the fittings are tapped with a shoulder so that when the pipe is screwed home its interior and that of the fitting form a practically continuous line. A small recess only is left between the end of the pipe and the shoulder, because all pipes do not screw up equally. These recesses are, however, very small and the amount of sewage which they can collect is too slight to be taken into account, and no more than is collected in the inevitable recesses left between the end of the spigot and the inner shoulder on the bell of an ordinary calked-joint.

In the best work the thread is cut slightly tapering, and about eight threads per inch on pipes from two to six inches in diameter. The threading is done on powerful tapping machines.

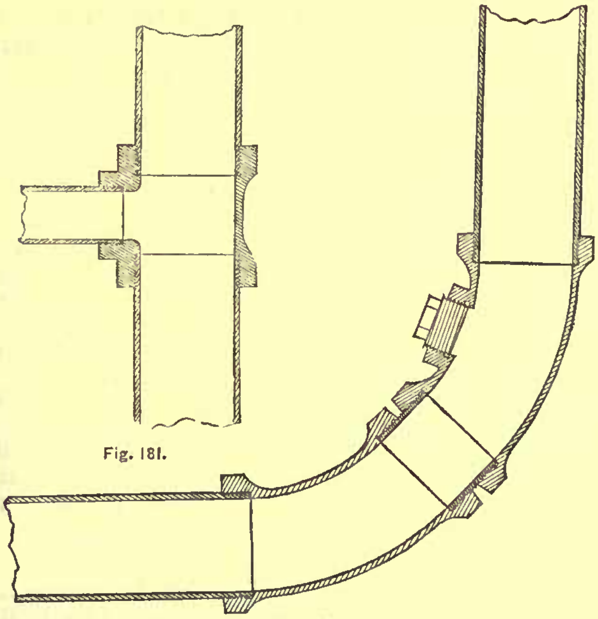


Fig. 181.

Fig. 182.
Improved Plain Screw-Joints.

There is considerable advantage in the tapered threading. In Figure 183 is shown on a large scale, somewhat exaggerated for clearer illustration, a threading gradually tapering until it vanishes at the exterior of the pipe. The strength of the pipe is maintained by this method of tapering, and all the threads have a bearing.

Fig. 183.
Tapering Tnread.

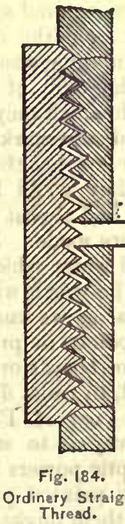


Fig. 184.
Ordinery Straight Thread.

Figure 184 shows the ordinary threading. The pipe here being weakened by the full depth of the threading, is liable to crack at the points shown in the drawing, and only a certain number of the threads do the work of the whole. The wrought-iron pipes are screwed into the couplings or fittings by means of chain-tongs, on which a man can exert a powerful leverage, thus securing, with the aid of a paste of white and red lead and oil, a perfectly tight joint. The pipes are cut and fitted at the factory, ready for rapid putting together at the building. The bends, branches, and other fittings used with the straight lengths of wrought-iron are constructed of cast-iron.

In cases where it is necessary to disjoint wrought-iron piping, one of the fittings has to be broken and the wrought-iron straight piece adjoining can then be unscrewed. There is less danger of accidentally cracking more than one piece of the pipe than is the case with cast-iron bell-and-spigot pipes. In the latter case a heavy knocking to break the pipe is liable to loosen or destroy a great many joints.

On the other hand, the cutting of the cast-iron pipe for alterations is easier than that of wrought-iron. Wrought-iron pipes require costly machinery for proper cutting and threading, and the lengths must be measured accurately and put together by skilled mechanics. Hence, where wrought-iron pipe is used in plumbing, it is desirable to employ those who make a specialty of this work.

IV. FLANGE-JOINTS.

Flange-joints are those which are made with flanges forming bearings for bolts or clamps, by which the pipes are secured together. Our first example is: —

(*a*) *The Spigot-and-Socket Flange-Joint*

represented in Figure 185. The pipes are here made with circular flanges, one having an annular groove on one end, and the other a corresponding annular projection or spigot, both being slightly bevelled. The flanges have four or more slots in their periphery, at uniform distances apart. A suitable packing-ring, preferably of lead, is placed in the groove and compressed by screwing up the bolts which pass through the slots. The ordinary steam-fitter's flanged-joint differs from this in having plain level surfaces without groove or spigot. The steam-fitter's packing consists of paper, leather, or rubber washers, with or without putty, red lead or other filling. Usually the surfaces of the flanges have to be planed off by machinery to give the proper tightness, and, instead of slots, holes are generally used to take the bolts. These kinds of joints are unsuitable for plumbing purposes, because they are not adjustable, or as has already been described, do not admit of slight variations in direction of the piping, as is absolutely necessary in plumbing work. The machine planing of the steam-fitter's flanged pipes, moreover, involves too great an expense to render the joint practicable for plumbing purposes.

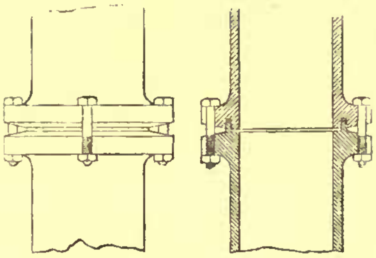


Fig. 185. — The Spigot-and Socket Flange-Joint.

Figures 186, 187 and 188, show a joint devised with a view to overcome the first of the above-mentioned objections to the ordinary flange-joint. On each side of the pipe are cast curved projections or collars extending only partially round its circumference. A flanged collar, recessed to correspond with the curved projections, is slipped over the end of each pipe and turned partly round behind the projections. The flanges are thus held securely on the pipe, which may be adjusted in a variety of positions. An annular connecting piece,

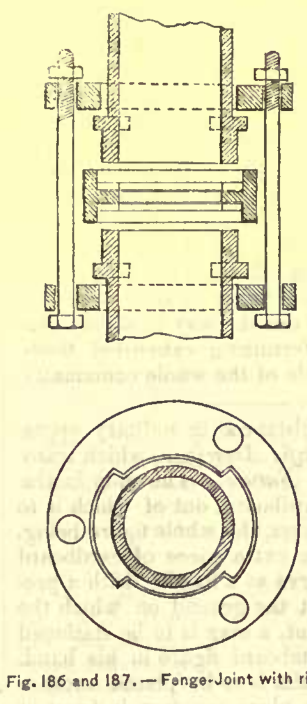


Fig. 186 and 187. — Fenge-Joint with ring.

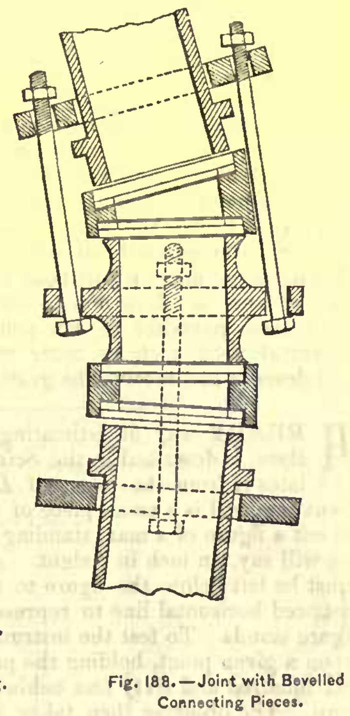


Fig. 188. — Joint with Bevelled Connecting Pieces.

recessed to receive packing-rings, is placed between the pipes to be joined. These connecting pieces are made with one or both faces at any desired angle to the bore of the pipes. A short portion at each end of the pipe is made somewhat thicker than the main length, so

[1] Continued from page 44, No. 448.
[2] We are indebted to Mr. William Paul Gerhard, Chief Engineer of the Durham House Drainage Co., for these drawings, which were made for us at our request, to illustrate the system of jointing adopted by this Company.

that at the extreme ends a wider surface of metal is obtained for the packing-ring to rest against.

Figure 188 shows the same joint with the bevelled connecting pieces to give a change of direction to the piping. There are several objections to this form of joint. The slotted collars occupy too much space and are liable to be easily broken in screwing the pipes together. Moreover, the arrangement, though allowing of a certain amount of play of the pipes in adjusting them, still limits their movement and would cause considerable annoyance in handling. The very long bolts are expensive and awkward; the heads and nuts do not rest square on their bearings when the bevelled connecting rings are used. The bolts would therefore be very easily broken in screwing up unless bevelled washers were used, which would still further increase the cost.

Figure 189 gives another form of flange-joint devised with the same end in view. At one end of each length of pipe is a cone-shaped socket, having at opposite sides two lateral projecting lugs with bolt-holes. On the other end of the pipe, which is plain, is placed a loose flanged collar, which has bolt-holes to coincide with the holes in the lugs of the socket, into which the end or neck of the collar is free to enter. A packing-ring of India-rubber, hemp, or other suitably elastic, compressible substance, is placed on the end. The neck of the collar is then slid forward into the socket, and it is brought to bear upon the packing by means of bolts, which are passed through the bolt-holes. This joint is neither permanent nor tight under pressure. Moreover, it offers no resistance to longitudinal strain, by which the two pipes might be drawn apart.

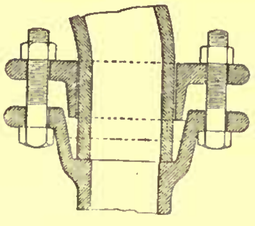
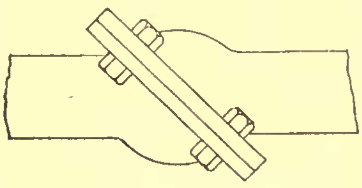


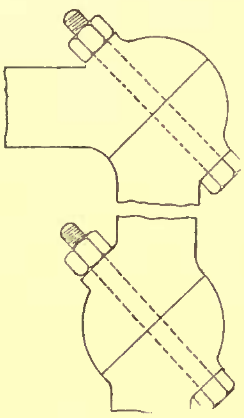
Fig. 189.

(b) The Spherical Flange-Joint.

Figures 190, 191 and 192 show another device designed for variable adjustment of the pipes. The parts at the points of junction are of spherical form, and the parts of the spheres where the junction takes place are inclined, by preference, to an angle of 45°, with the axis of the pipes, and are fitted with suitable packing and bolted as shown. This form of joint is evidently unsuitable for plumbing purposes. Should the bolt be made to pass through the centre of the pipes, as shown in the second and third figures, it would form an obstruction to the flow of the sewage. If, on the other hand, the bolts are made to pass through the flanges, the amount of possible variation of adjustment would be limited to the number of holes made in the flanges, and the piercing of these holes would not only add to the expense in proportion to their number, but also weaken the flanges.

Fig. 190.





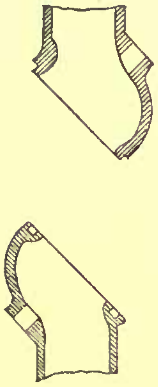


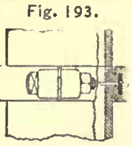
Fig. 192. Fig. 191.

The Spherical Flange-Joint.

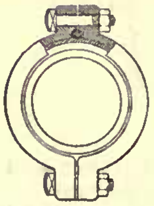
(c) The Loose-Ring Flange-Joint.

Around each end of the pipes to be jointed is formed a projecting annular flange or rib of rectangular section. A band of rubber is placed over the joint, and upon this band a cast-iron collar or belt in two halves. the edges of the iron band turn inwards so as to form shoulders on each side of the rubber band to protect them. The joint is perishable and unreliable under pressure. Figures 195 and 196 represent another form of the same kind of joint. The pipes are formed with a bevelled flange. A rubber ring is used, as before, as packing, but the ring is placed between the ends of the pipes instead of around the joint. The metallic ring which holds the pipes together is double-wedge shaped in section, and slotted so as to allow it to be passed over the flanges. A bolt with a wedge-shaped head is used to hold the whole in place.

Fig. 193.



Second Form.



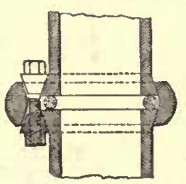


Fig. 194. Fig. 195. Fig. 196.

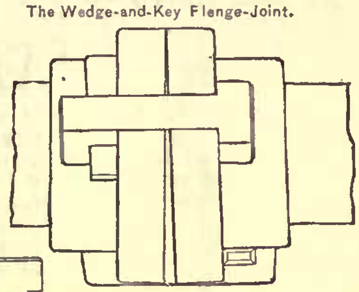
The Loose-Ring Flange-Joint.

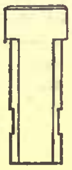
(d) The Wedge-and-Key Flange-Joint.

The flanges are here connected by means of dovetailed wedges or cotters and keys, instead of the ordinary bolts and nuts. Instead of the ordinary slotted openings, which are usually formed in the flange at each end of the pipe for the connecting bolts, the openings have a dovetail form as shown in plan, Figure 199. When the faces of the flanges, with their intermediate packing, are placed in position to be connected, dovetailed cotters or wedges are passed through the dovetail openings in the flanges, in the direction of the length of the pipes, and drawn up tight by keys driven through slotted holes in their ends.

Fig. 197.

The Wedge-and-Key Flange-Joint.





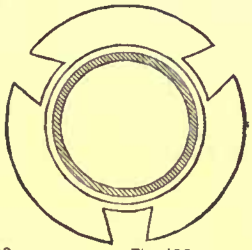


Fig. 198. Wedge. Fig. 199. Plan.

(e) The Plain Non-Adjustable Flange-Joint.

The flanges of the joint used for illustration have on their meeting surfaces annular grooves, circular or otherwise, to receive a packing-ring, similar in form and composed of vulcanized India-rubber, hemp, or other suitable elastic material. The grooves in the flanges must be of corresponding size, so that one-half portion of a packing-ring may lie and be compressed in each when the flanges are drawn together. The object of the grooves is to prevent lateral derangement of the packing-ring under the influence of steam or water pressure in the pipes. The flanges of this joint are sometimes square with rounded corners, instead of round, and in the corners are the holes for the connecting bolts.

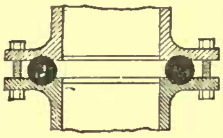
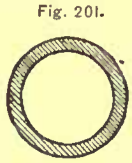


Fig. 200.—The Plain Non-Adjustable Flange-Joint.

Figures 201 and 202[1] represent a turned rust-joint. It is made by turning the inside of the hub and the outside of the spigot to fit each other. In order to allow for a little deviation from right lines, the spigot-ends of some of the pipes are turned spherical, so that they will still fit, though not in an absolutely straight line with the length of pipe in which they are inserted. The pipes and fittings may be adjusted accurately at the factory to the position they are to occupy in the building, or a special turning apparatus may be used at the building to do the whole or any part of the cutting and turning. "With accurate turning," says Col. Waring, "the joint is absolutely tight at the outset. Experiment has shown that very considerable leakage, much more than would be caused by any ordinary inequality of the work, very soon closes itself completely by rusting."

Fig. 201.



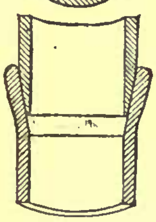


Fig. 202. Turned Rust-Joint.

The Great Imambara, Lucknow. — But, whatever of architectural fame Lucknow has is embodied in the great Imambara. Even this is of brick plastered over, but one quite forgets that in the first burst of superficial admiration. The entrance to the tomb — for it is a tomb, like many of India's grandest palaces — is marked by the usual richly decorated double gateways, within which is a large tablet inscribed with the British lion and unicorn and the universal "*Dieu et mon Droit.*" The real Imambara stands upon an elevated terrace at the rear of a spacious court filled with fountains and flowers. It was built by Nawab Asafud-Daulah, at an inestimable cost. He was anxious to perpetuate his memory, and required the architects to submit their plans to a competition, each one vouching that his building should be a copy of no existing structure, and that it should surpass everything of the kind ever built in architectural beauty. Kaifiat-ullah, the successful competitor, builded well, and I humbly bow before this graceful monument of the art of antiquity. The dimensions of the grand hall are 52′ 6″ x 167′, and at each end are octagonal apartments fifty-three feet in diameter. The interior is filled with the same exquisitely useless insignia that I noticed in the Shah Nazzuf. Around about the Imambara are various magnificent foundations and incomplete structures, left by this same Nawab. There is an insipid musjid intended to surpass the famous Jumma Musjid of Delhi, but at his death it failed to materialize further. There are also four stories of a gigantic watch-tower which he started, that he might look down from its top upon "the great Babylon that he had built," also falling into decay. — *Correspondence of Philadelphia Press.*

[1] This figure was drawn for us by Col. Waring, by whom the joint was devised. It is called the "Dececo" joint.

THE ESSENTIAL DIFFERENCE BETWEEN THE WORK OF THE MEDIÆVAL AND THE MODERN CRAFTSMAN.[1]

WE, of this Society at least, know the beauty of the weathered and time-worn surface of an ancient building, and have, all of us, felt the grief of seeing this surface disappear under the hand of the "restorer;" but though we all feel this deeply enough, some of us perhaps may be puzzled to explain to the outside world the full value of this ancient surface. It is not merely that it is itself picturesque and beautiful, though this is a great deal. Neither is it only that there is a sentiment attaching to the very surface which the original builders gave their work, but dimly conscious of the many generations which should gaze on it. It is only a part of its value that the stones are felt to be, as Ruskin beautifully puts it in speaking of some historic French building (now probably changed into an academical model of its real self), that they are "the very stones which the eyes of St. Louis saw lifted into their places." That sentiment is much, but it is not all; it is but a part of the especial value of the old surface, which is briefly that it bears witness to the development of man's ideas, to the continuity of history, and in so doing affords never-ceasing instruction, nay, education to the passing generation, not only telling us what were the aspirations of men passed away, but also what we may hope for in time to come.

A different spirit has animated history in these latter days from that which used to be thought enough to give it interest to thinking men. Time was, not so long ago, when the clever essay writer made his history, surrounded by books whose value he weighed by the degree to which they conformed to an arbitrary standard of literary excellence rather than by any indications they might give of being able to afford a glimpse into the past. These historians were not fitted for their task, for the world of history which they pictured to themselves was an unreal one. To them there were two periods of continuous order and organized life: the period of Greek and Roman classical history was one; the time from the development of the retrospection into that period till their own days was the other; all else to them was accidental confusion, strange tribes and clans with whom they had no relation jostling against one another to no purpose. The mists of pedantry slowly lifted and showed a different picture — inchoate order in the remotest times, varying, indeed, among different races and countries, but swayed always by the same laws, moving ever forward toward something that seemed the very opposite of that from which it started; yet the earlier orders, never dead, but living in the new, and slowly moulding it to a recreation of its former self.

The instruments of this new knowledge of history were chiefly two; study of language and study of archæology, the expression of men's ideas by means of speech and of handiwork, and it is of the latter I am bound to speak, and it is of the function of this Society to keep before people's eyes its importance as an instrument of the study of history. So far, I am sure I have carried you with me.

You cannot doubt that in one way or other the surface of an ancient building, the "handling" of the old handicraftsmen is most valuable and worthy of preservation, and you also instinctively feel that it cannot be reproduced at the present day; that the attempt at reproduction not only deprives us of a monument of history, but also of a work of art. I shall now attempt to show you that this impossibility of reproduction is not accidental, but is essential to the condition of life at the present day; that it is caused by the results of all past history, and not by a passing taste or fashion of the time, and that, consequently, no man, and no body of men, however learned they may be in ancient art, whatever skill in design or love of beauty they may possess, can persuade, or bribe, or force on workmen of to-day to do their work in the same way as the workmen of King Edward I's time did theirs.

Wake up Theodoric the Goth from his sleep of centuries, and place him on the throne of Italy; turn our modern House of Commons into the Witenagemote of Alfred the Great — no less a feat is the restoration of an ancient building. In order to show you that this is necessary and inevitable, I must touch upon the conditions under which handicraft has been produced from Classical times onward, and in doing so I cannot avoid certain social problems, in the solution of some of which you may differ from me. It must be admitted that every architectural work is a work of coöperation. The very designer, be he never so original, pays his debt to this necessity in being, in some form or other, under the influence of tradition. Dead men guide his hands even when he forgets that they ever existed. Furthermore, he must get his ideas carried out by other men. No man can erect a building with his own hands. Every one of these men depends for the possibility of ever beginning his work on some one else. Each is but part of a machine; the parts may be but machines themselves, or they may be intelligent; but in either case they must work in subordination to the general body. Men so working must be influenced in their work by the conditions of life, and the man who organizes the labor must make up his mind that he can only get labor of a kind which those conditions have bred. To expect enthusiasm for good workmanship from men who for two generations have been accustomed to work slovenly would be absurd: to expect consciousness of beauty from men who for ten generations have not been allowed to produce beauty, more absurd still. The workmanship of every piece of coöperative work must belong to its period, and be characteristic of it. Thus, all architectural work must be coöperative; in all coöperative work the finished wares can be no better in quality than the lowest, simplest, or widest grade, which is also the most essential, will allow them to be, and the kind and quality of that work, the work of the ordinary handicraftsman, is determined by the social conditions under which he lives which differ most from age to age.

Let us try to see how they have differed, and glance at the results of that difference, during which inquiry we shall have much more to do with the developed Middle Ages, with the work of which our society is chiefly concerned, than with any other period.

In the Classical period industrial production was chiefly carried on by slaves, whose person and work alike belonged to their employers, and who were sustained at just such standard of life as suited the interests of the said employers. It was natural that under such circumstances industrialism should be despised: but under Greek civilization, at least, ordinary life for the free citizens, the aristocracy, in fact, was simple; the climate was not exacting of elaborate work for the purposes of clothing and shelter; the race was yet young, vigorous, and physically beautiful. The aristocracy, therefore, freed from the necessity of rough and exhausting work by their possession of chattel slaves, and little oppressed with anxieties for their livelihood, had, in spite of the constant brawling and piracy both inclination and leisure to cultivate the higher intellectual arts, within the limits which their natural love of the matter-of-fact and hatred of romance prescribed to them; the lesser arts meanwhile being kept in rigid, and indeed, slavish, subordination to them, as was natural. Had any Athenian gentleman attempted to build a Gothic cathedral in the days of Pericles, what sort of help would he have had from slave laborers of the day, and what kind of Gothic would they have produced for him? The ideal of art established by the intellect of the Greek, with such splendid and overwhelming success, lasted throughout the whole Roman period also, in spite of the invention and use of the arch in architecture, or rather in building; and side by side with it chattel slavery, under somewhat changed conditions, produced the ordinary wants of life. The intellectual arts of Classical times had, even in Pliny's days, long fallen from their zenith, and had to wade through weary centuries of academicalism, from which they were at last redeemed by no recurrence of individual genius to the earlier and human period, but by the break-up of Classical society itself, which involved the change of chattel slavery into serfdom or villeinage, on which the feudal system was based. In place of the system of aristocratic citizen and chattel without rights, dominated by the worship of the city, which was the ideal of Classic society, was formed a system of personal duties and rights, personal service and protection in subordination to *à priori* ideas of mankind's duties to and claims from the unseen powers of the universe. The serf was in a very different condition from the chattel slave; for, certain definite duties being performed for his lord, he was, in theory at least, at liberty to earn his living as he best could within the limits of his manor. This chattel, as an individual, had the hope of manumission, but collectively there was no hope for him but in the overthrow of the society founded on his subjection. The serf, on the other hand, was by the conditions of his labor forced to strive to better himself as an individual, and collectively soon began to acquire rights amidst the clashing rights of king, lord, and burgher. Also, quite early in the Middle Ages, a new and mighty force began to germinate for the help of labor, the first signs of secular combination among free men, producers and distributors.

The guilds, whose first beginning in England dates from before the Norman Conquest, although they fully recognized the hierarchical conditions of society, and were indeed often in early times mainly religious in their aims, did not spring from ecclesiasticism. England and Denmark were the foremost countries in the development of the guilds, which took root latest and most feebly in the Latinized countries. The spirit of combination spread; the guilds, which at first had been rather benefit-societies or clubs, soon developed into bodies for the protection and freedom of commerce, and rapidly became powerful merchant guilds. In the height of their power there formed under them another set of guilds, whose object was the regulation and practice of crafts in freedom from feudal exactions. The older merchant guild resisted these newer institutions, so much so that in Germany there were bloody and desperate wars between them. In England the merchants' guilds changed in a peaceable manner, and became in the main the corporations of the town, and the craft guilds took their deputed place as regulators and protectors

[1] By William Morris, M. A. A paper read before the Society for the Protection of Ancient Buildings on Tuesday, July 1st.

of all handicrafts. By the beginning of the fourteenth century, the supremacy of the craft guilds was complete, and at that period their constitution was thoroughly democratic. Mere journeymen there were none, for the apprentices were sure, as a matter of course, to take their places as masters of their craft, when they had learned it.

Let us now look at the conditions of the life of the craftsman. He lived, however roughly, more easily than his successor does now. He worked for no master save the public; he made his wares from beginning to end himself, and sold them himself to the man who was going to use them. This was the case with nearly all the goods made in England, all the more so as the materials of any country were chiefly wrought into goods close to their birthplace. It followed, from the direct intercourse between the maker and the consumer of goods, that the public in general were good judges of manufactured wares, and that the art of adulteration was scarcely known. Now, as to the manner of work. There was little or no division of labor in each craft, which was some mitigation of the evil of a man being bound down to one craft life-long — some mitigation because there was plenty of variety in the work of a man who made the whole of a piece of goods himself, instead of making one little piece of a piece. The English craftsman of the fourteenth century was not the priest-ridden, down-trodden savage of whom pedant historians have written, but a thoughtful and vigorous man, and in some sense free. He worked, not for the profit of a master, but for his own livelihood, which he did not find it difficult to earn, so that he had a good deal of leisure. Being master of his tools and his material, he was not bound to turn out his work shabbily, but could afford to amuse himself by giving artistic finish. Such finish was not venal; it was given freely to the public, who paid for it by interest in and sympathy for the work itself. For all that, what are now called "the wages of genius" were much neglected by the builders of our ancient buildings; for all that, craftsmanship, as Mr. Thorold Rogers says, was widespread; the possession of some skill in it was the rule, and not the exception. Those who could afford to pay for a building were able to do the necessary planning and designing, obviously because they could naturally find help and harmonious intelligence among the men they had to employ. It followed from this widespread skill in the arts, that those poor wretches who had skill and taste beyond their fellow workmen, and who consequently had pleasanter work than they, had to put up with a very moderate additional wage, or with nothing additional. They could not make good the claim now preferred for that much sinned against and that much sinning company, men of genius, that the conformation of their stomachs and the make of their skin is different from other men, and that consequently they want more to eat and drink, and different raiment from their fellows.

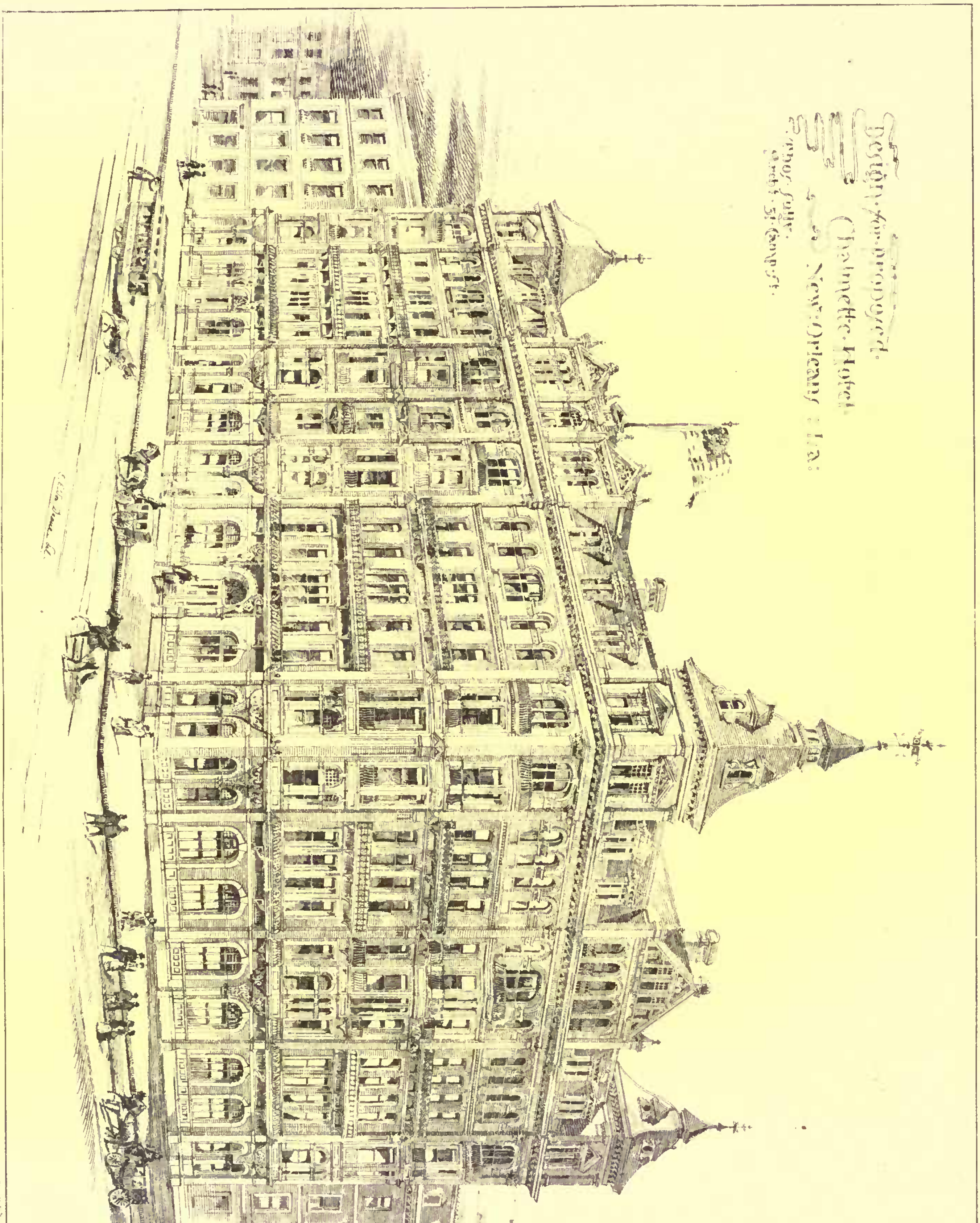
When we hear that extra money payment is necessary under all circumstances to produce great works of art, we can appeal to the witness of those lovely works still left to us, whose unknown, unnamed creators were content to give them to the world with little more wages than their pleasure in their work and their sense of usefulness in it might give them. A body of artificers so living and so working with simple instruments, of which they were complete masters, had very great advantages for the production of architectural art, using that term in its widest sense, and that one would expect to find in their work that thoughtfulness and fertility of resource, that blended freedom and harmonious coöperation, which we actually find in that work. Nevertheless, the mediæval workman was still compelled to work only as tradition would allow him to do. If it could ever have occurred to any man to build some new Parthenon or Erectheum by the banks of Thames, Wharfe, or Wensum, in the fourteenth century, how far do you think his fellow workman's skill would have been able to second his folly?

Hurrying on from this fourteenth century, we see that, although the constitution of the craft's guild was at first thoroughly democratic or fraternal, it did not long remain so. As the towns grew bigger the old craftsmen began to form a separate and privileged class in the guilds, with their acknowledged apprentices, and the journeyman made his appearance. After a while the journeymen attempted to form guilds under the master crafts, as the latter had done under the merchant guilds; but the economic condition of the time beat them, and they failed. Still, the conditions of work did not change much; the masters were checked by laws in favor of the journeymen, and wages rather rose than fell all through the fifteenth century, nor did division of labor begin till much later. Everywhere the artisan was still an artist. The beginning of the great change came with the Tudors in the first quarter of the sixteenth century, during which England, from being a country of tillage cultivated for livelihood, became a grazing country farmed for profit. He who runs may read the tale of this change, and its miseries, in the writings of Moore and Latimer. It had a very direct influence on the conditions of life and manner of work of the artisans, for the crafts were now flooded by the crowds of landless men who had nothing but the force of their bodies to live on, and were obliged to sell that force day by day, for what those would give them who certainly would not buy labor unless they could make a profit by it. The brutal rapine with which the change of religion in England was carried out, the wanton destruction of our public buildings which accompanied the stealing of our public lands, doubtless played its part in degrading what art was still possible under the new conditions of labor. But the Reformation itself was only one of the aspects of the new spirit of the time produced by great economic changes, and which dealt with art and its creator, labor, far more completely than any series of accidents could do, however momentous they might be. The change in the condition of labor went on speedily, though there was still a good deal of domestic manufacture; the workmen in the towns got to be more dependent on their employers, more and more mere journeymen, and a great change was coming over the manner of their work. The mere collection of them into big workshops under one master in itself gave economy of space, rent, fuel, lighting, and the rest; but it was the prelude to a much greater change. Division of labor now began and rapidly gained head under the old mediæval conditions; the unit of labor was a master craftsman who knew his business from beginning to end. Such help as he had was from mere apprentices who were learning the business and were not doomed to life-long service.

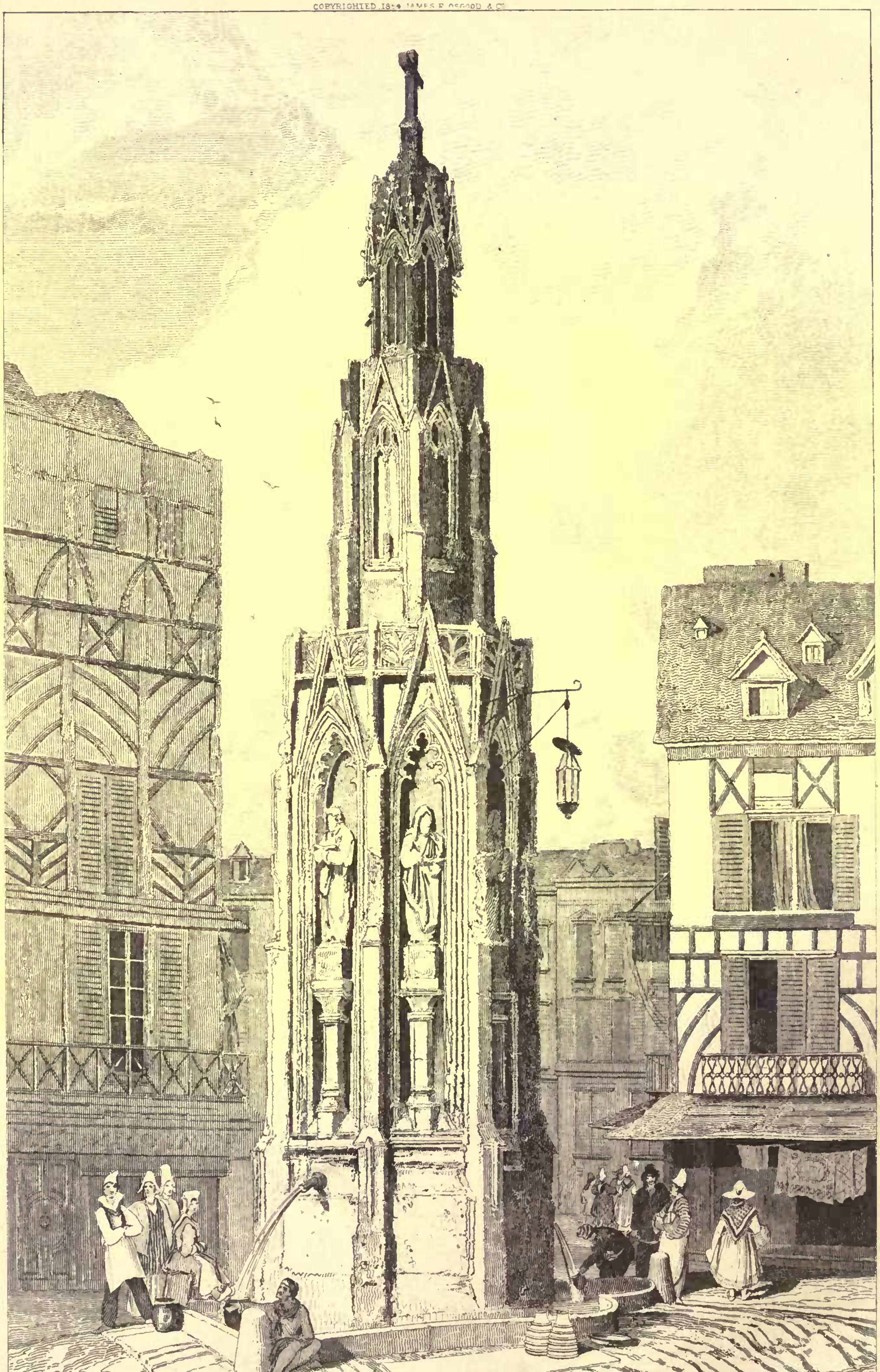
With the new system of master and men came the change that the unit of production was a group, each member of which depended on every one of the others and was helpless without them. Under the division-of-labor system a man is very often condemned for the whole of his life to make the insignificant portion of an insignificant article of the market. The birth and growth of this division-of-labor system was no mere accident, was not the result and mean of some passing and inexplicable fashion which caused men to desire that kind of work which could be done by such means. It was caused by economical changes which forced men to produce no longer for a livelihood as they used to do, but for a profit. Almost all goods — all except those made in the most domestic way — had now to go through the market before they reached the user's hands. They were in fact made for sale, and not primarily for use; the art in them, as well as their mere obvious utility, was now become a marketable article, doled out according to the necessities of the capitalist, who employed both machine, workman and designer, fettered by the needs of profit. For by this time, instead of all workmen being artists as they once were, they were divided into workmen who were not artists and artists who were not workmen. This change was complete or nearly so by the middle of the eighteenth century. The gradual degradation of the arts from the fifteenth century to this point was steady and certain. Only among men who were more or less outside the great stream of civilization, where life was rude and production wholly domestic, did the article produced retain any signs of human pleasure; elsewhere pedantry reigned supreme. The picture-painters who were wont to show us, as through windows opened by them, the longings and lives of the saints and heroes, nay, the very heavens and city of God hanging over the earthly city of their love, "were turned" — what few of them were aught else than pretentious daubers — "into courtly flatterers of ill-favored fine ladies and stupid, supercilious lords."

As for the architectural arts, what could you expect to get of them from a set of human machines, co-operating, indeed, but only for speed and precision at reproduction, and designed for at best by pedants who despised the lives of men, and, at worst, by mechanical drudges, little better in any way than the luckless workmen! Whatever might be expected, nothing was got but that mass of foolish toys and costly ministrations to luxury and ostentation, which has since those days been most worthily continued under the name of upholstery

Is that the end of the story of the degradation of the arts? No; there is another act to the drama, worse or better, according to whether you are contented to accept it as final, or have been stimulated to discontent, that is, hope for something better. From being reduced to a machine, the workman was pushed down from even that giddy eminence of self-respect. At the close of the eighteenth century England was a country that manufactured among other countries that manufactured. Her manufactures were still secondary to her merely country life, and were mixed up with it. In fifty years all that was changed, and England was the manufacturing country of the world, the workshop of the world. This strange and most momentous revolution was brought about by the machinery which the chances and changes of the world forced on our population. Whereas under the eighteenth-century division of the labor system, a man was compelled to labor forever at a trifling piece of work in a base, mechanical way, under the system of the factory and almost automatic machines under which we now live, he may change his work often enough, he may be shifted from machine to machine, and scarcely know that he is producing anything at all. Under the eighteenth-century system he was reduced to a machine; under that of the present day he is the slave to a machine. It is the machine which bids him what to do on pain of death by starvation; if it please to hurry, it can make him walk thirty miles a day instead of twenty miles, and send him to the workhouse if he refuses. If you inquire which is the worse off, the machine workman of the eighteenth century or the slave-to-the-machine of the nineteenth century, I am bound to say that I think the former is; but the question as to which produced the better work is different and less complicated. The machine workman had to be well skilled in his contemptible task at least; the slave to the machine needs but little skill, and, as a matter of fact, his place has been taken by women and children, and what skill is needed in the work goes in the overlooking of the labors of the latter. In short, the present system of the factory and its dominating machine tends to doing away with skilled labor altogether. Hence there is a strange contrast between the craftsman of the Middle Ages and him of to-day. The mediæval



The Heliotype Printing Co. 211 Tremont St. Boston



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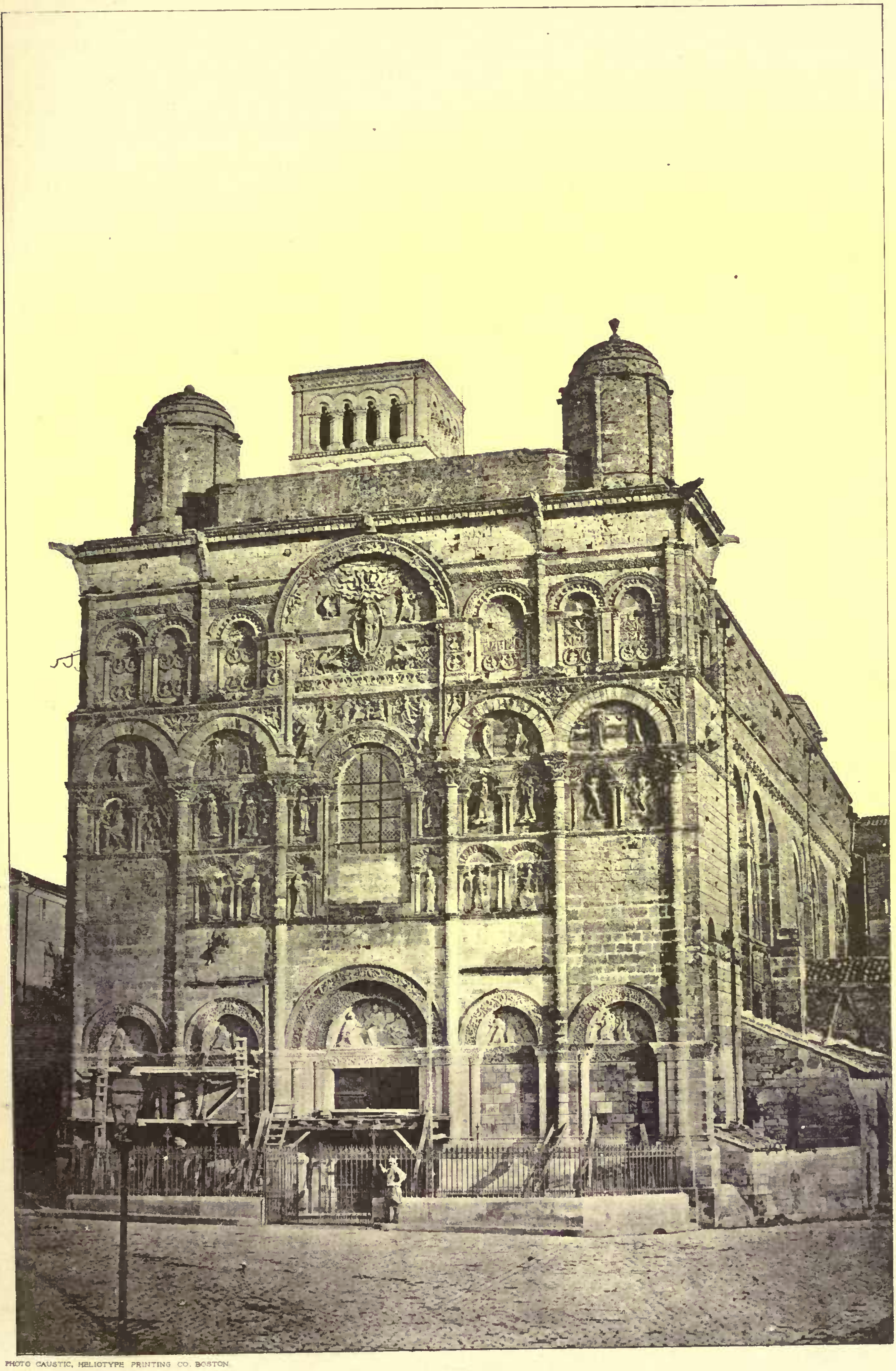
FOUNTAIN OF THE STONE CROSS AT ROUEN.



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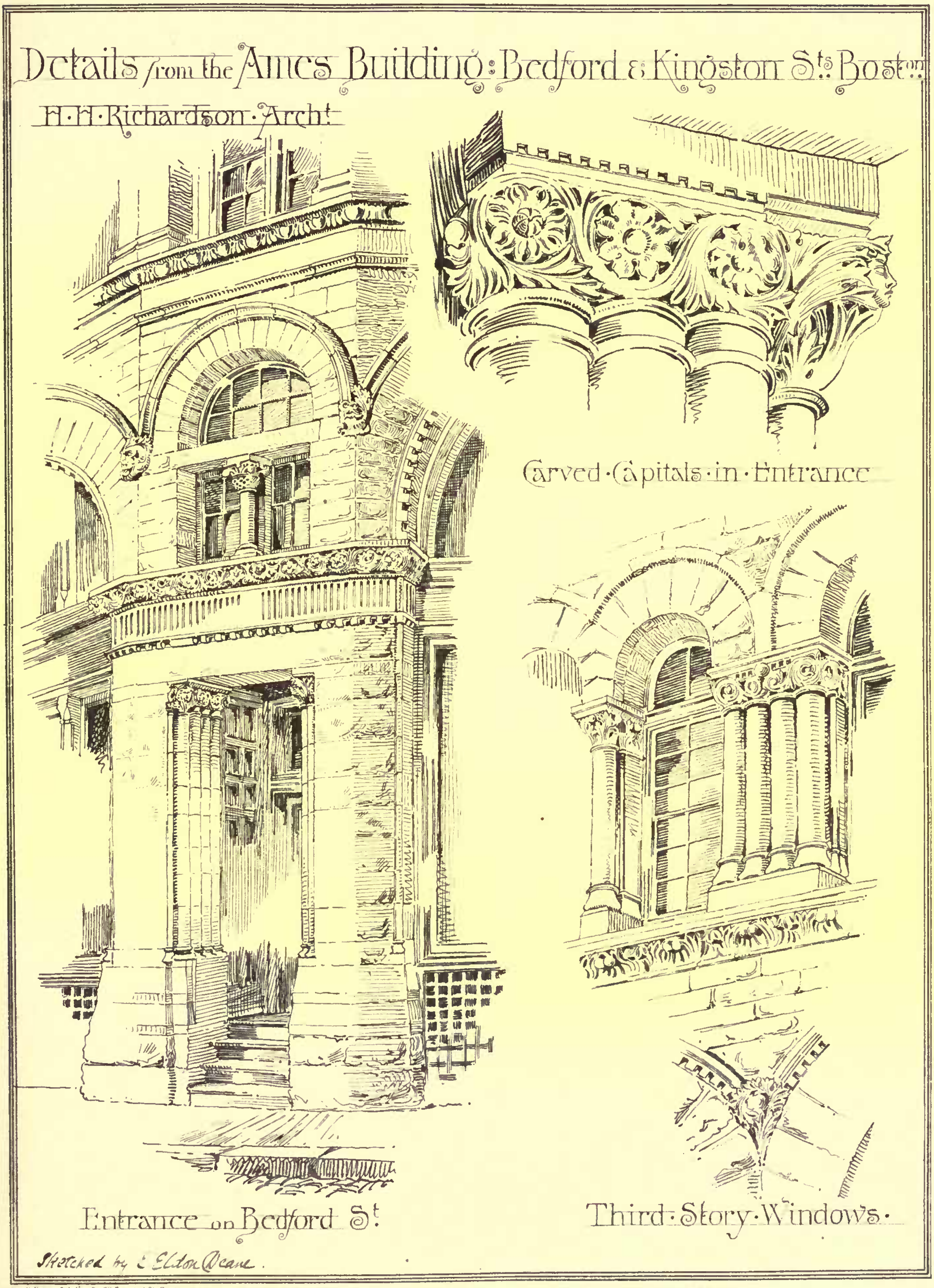
Eglise de S. Pierre: Angoulême: France.



The Heliotype Printing Co. 211 Tremont St. Boston.

man set to work in his own time, in his own house; probably made his tool, instrument, or simple machine himself, even before he began with his web or bundle of clay; what ornament there should be on the finished work he himself determined, and his mind and hand designed it and carried it out. Tradition in the concrete form of the custom of his craft guided and helped him, but otherwise he was free, and even if he lived in a town, the field and sweet country came close up to his house, and at times he occupied himself in working in them.

But how does he who has taken his place work and live? He has to be at the factory gates by the time the bell rings, or he is fined or sent to grass — nay, not always with the factory gate open to him. There before his machine, up and down he has to follow it, day in and day out, and what thought he has must be given to something else than his work. It is as much as he can do to know what the machine is doing; design and ornament, what has he to do with either? He may be tending a machine which is making a decent piece of work, or he may be a very small accomplice in turning out a blatant piece of knavery and imposture; for the one or the other he will get as much wages. He is lodged in a sweltering dog-hole, with miles and miles of similar dog-holes between him and the fair fields of the country, which in grim mockery is called "his." Sometimes, on holidays, he is bundled out by train to have a look at it, to be bundled into his grimy hell again in the evening.

At what period of a workingman's life, then, will you pick him up and set him to imitating the work of the free craft-guildsman of the fourteenth century, and expect him to turn out work like his in quality? Not to weaken my argument by exaggeration, I admit that though a huge quantity of would-be artistic work is done by this slave of the machine at the bidding of some market or other, the crafts relating to building have not reached that point in the industrial revolution. They are an example of my assertion that the eighteenth-century division-of-labor system still existed and worked side by side with the great factory and machine system. Yet here, too, the progress of the degradation is obvious enough, since the similar craftsmen of the eighteenth century still had lingering among them scraps of tradition from the times of art now lost; while now in those crafts the division-of-labor system has eaten deep, from the architect to the hodman, and moreover, the standard of excellence, so far from its bearing any relation to that of the free workman of the guilds, has sunk far below that of the man enslaved by division of labor in the eighteenth century, and is not a whit better than that of the shoddy maker of the great industries.

Surely it is a curious thing that while we are ready to laugh at the idea of the possibility of the Greek workman turning out a Gothic building, or a Gothic workman turning out a Greek one, we see nothing preposterous in the Victorian workman producing a Gothic one. And this, although we have any amount of specimens of work of the Renaissance period, whose workmen, under the pedantic and retrospective direction of the times, were theoretically supposed to be able to imitate the ancient classical work, but which imitation turned out obstinately characterized of their own period, and derived all the merit it had from those characteristics — perhaps of all the signs of the weakness of art at the present day the most discouraging. I may be told that the very historical knowledge of which I have already spoken, and which the pedantry of the Renaissance lacked, has enabled us to perform that miracle of raising the dead centuries to life again; but this is a strange view to take of historical knowledge and insight, that it should set us on the adventure of trying to retrace our steps towards the past, rather than give us some glimmer of insight into the future — a strange view of the continuity of history, that it should make us ignore the very changes which are the essence of that continuity.

The art of the past cycle of the Renaissance, which fluttered out in the feeble twaddle of the dilettantism of the later Georges, had about it a supercilious confidence which entirely forbade it to accept any institution of style but one as desirable, which one was that which it regarded as part of itself. It could make no more choice in style than could Greek or Gothic; it fully, if tacitly, admitted the evolution of history, accepted the division-of-labor workman, and so, indeed, did its best and had a kind of life about it, dreary as that life was, and expressive enough of the stupid but fearless middle-class domination which was the essence of the period. We, however, refuse to admit the evolution of history; we set our slave to the machine to do the work of the free mediæval workman, or of the man of the transition period, indifferently. We have learned the trick of masquerading in other men's left-off clothes, and carry on an hypocritical theatrical performance rather with timid stolidity than with haughty confidence, determined to shut our eyes to everything seriously disagreeable, nor heeding the silent movement of the history which is still going on around and underneath our raree show. Surely such a state of things is a token of change — of change, speedy perhaps, complete certainly — of the visible end of one cycle and the beginning of another. For, strange to say, here is a society which, on its cultivated surface, has no distinct characteristics of its own, but floats hither and thither; this set of winds drifting towards the beauty of the past, that towards the logic of the future. All the while underneath this cultivated surface works the great mediæval system which the cultivated look on as the servant and the bond of society, but which really is their master and the breaker-up of society; for it is in its essence a war, and can only change its character with its death; man against man, class against class, with this motive, "What I gain you lose," it must go on till the great change comes, whose end is peace, and not war.

In conclusion, Mr. Morris asked: What are we, we who are met together after seven years of humble striving for existence, for leave to do something? Mere straws on the ocean of half-conscious hypocrisy which is called "cultivated society?" I hope not. At least, we do not turn round on history and declare this is bad and that is good; I like this and I don't like that. Rather, we say: This was life, and these the works of our fathers are material signs of it. That life lives in you, though you have forgotten it; those material signs of it, though you do not heed them, will one day be sought for, and that necessity which is even now forming the society of the time to be, and shall one day make it manifest, has, amongst other things, forced us to do our best to treasure them, these tokens of life past and present. The society of to-day, anarchical as it is, is nevertheless forming a new order, which we, in common with all those who have the courage to accept the realities and reject shams, are and must be a part. In the long run our work, loveless as it must sometimes seem to us, will not be utterly lost.

After all, what is it that we are contending for? The reality of art: that is to say of the pleasure of the human race. The tendency of the commercial or competitive society, which has been developing for more than three centuries, has been toward the destruction of the pleasure of life; but that competitive society has at last developed itself so far that its own change and death is approaching, and as one token of the change, the destruction of the pleasure of life is beginning to seem to many no longer a necessity, but a thing to be striven against. On the genuineness and reality of that hope, the reason for existence of this Society depends. It will not be possible for a small knot of cultivated people to keep alive an interest in the art and records of the past amidst the present conditions of a sordid and heart-breaking struggle for existence for the many, and a languid sauntering through life for the few. But when society is so reconstructed that all citizens will have a chance of leading a life made up of due leisure and reasonable, then will all society, and not "our" Society only, resolve to protect ancient buildings from all damage, wanton and accidental, for then at last they will begin to understand that they are part of their present lives, a part of themselves. That will come when the time is ripe for it. At present, even if they knew of their loss they could not prevent it, since they are living in a state of war, *i. e.*, of blind waste. Surely we of this Society have had this truth driven home practically often enough; have often had to confess that if the destruction or "beautification" of an ancient monument of art or history was a matter of money, it was hopeless stirring. Let us admit that we are living in the time of barbarism betwixt two periods of order — the order of the past and the order of the future. Then, though there may be some of us who think (as I do) that the end of that barbarism is drawing near, and others that it is far distant, yet we can both of us work together to preserve what relics of the old order are yet left to us for the instruction, the pleasure, and the hope of the new. So may the times of present change prove less disastrous, if but a little, the times of coming be more fruitful.

THE ILLUSTRATIONS.

FOUNTAIN OF THE STONE CROSS AT ROUEN.[1]

ROUEN has long boasted a pre-eminence over the greater part of the cities of France with respect to its public fountains. The chalk hills, with which it is surrounded, furnish an abundant supply of excellent springs, and the waters of these, led into different parts of the town, contribute in no less a degree to the embellishment of the city than to the comfort of the inhabitants. The form of some, and the ornaments of others are well deserving of attention, notwithstanding the injuries that have inevitably occurred from time to time, or the more cruel ones that have been caused by wanton mutilation. It is upon the historical record that there were several fountains at Rouen as early as the twelfth century, but their number which now exceeds thirty, received its principal increase towards the beginning of the sixteenth century, and it was then also that the idea seems to have been conceived of making what was originally designed only for convenience subservient to beauty. For this new supply of ornamental fountains Rouen is indebted to its great benefactor, the Cardinal Georges d'Amboise, who, uniting the Norman archiepiscopal mitre to the office of prime minister, under Louis XII, was no less able than he was willing to render the most essential services to the seat of his spiritual jurisdiction. It was under the auspices of this archbishop that the fountain here figured, one of the earliest of that period, was erected. He caused it to be built in the year 1500. The spot which it occupies is the cross-way formed by the union of the streets called St. Vivien, St. Hilaire and Coqueraumont, a spot which, previously to the reign of St. Louis, was not included within the walls of the town, and which even at the distance of one hundred years after that time had not begun to be inhabited. So ancient is the habit of placing stone crosses at the junction of roads in the vicinity of cities that it would be difficult to assign any probable time for the erection of that which was replaced by the fountain that still bears its name. The waters of this fountain have their origin in a spring which flows at the foot of a hill near the village of St. Léger, at some distance from Rouen. The execution of the structure unites a happy mixture of boldness in outline, and delicacy in details; its pyramidal

[1] From Cotman's "*Architectural Antiquities of Normandy.*"

form is graceful. It consists of three stories, gradually diminishing in height and diameter as they rise, and terminating in a cross, whose clumsy shape only renders the destruction of that which it replaces the more to be regretted. The form is octagonal throughout, and upon every compartment in each of the stories is carved, at a short distance from its base, a narrow cinquefoil-headed arch, surmounted by a triangular crocketted canopy; but the crockets and finials have been in most instances destroyed. The water issues from four pipes in the basement. Each of the arches in the lower tier serves as a tabernacle for a wooden statue of a Madonna or saint, of wretched execution, a poor substitute for those that occupied the same niches previously to the troubles of 1792, at which time the religious character of the fountain marked it out as an object of popular vengeance. It was suffered to continue in its mutilated and degraded state from that period till the year 1816, when the inhabitants of this part of the town undertook to restore it at their own expense. Their labors have hitherto proceeded no farther than filling the niches afresh with images, and doing such repairs as were absolutely necessary to keep the whole structure from falling into ruin. Even by this, however, they secured for themselves the good will of the archbishop, who consecrated the fountain with great pomp anew on the 24th of August, 1816. The resemblance between the Fountain of the Stone Cross at Rouen and the monumental crosses erected in England by Edward I, to perpetuate the memory of his consort, Eleanor of Castille, will not fail to strike the British antiquary. It is more than probable the idea of the former was borrowed from the latter, to which, however, it is very inferior in point of richness of ornament, or beauty of execution.

DESIGN FOR THE CHALMETTE HOTEL, NEW ORLEANS, LA. MR. THOMAS SULLY, ARCHITECT, NEW ORLEANS, LA.

DETAILS FROM THE AMES BUILDING, BOSTON, MASS. MR. H. H. RICHARDSON, ARCHITECT, BROOKLINE, MASS.

This is one of the most noteworthy buildings devoted to mercantile purposes that have been built in any part of the country, and it is a great misfortune that it is placed at the junction of two of the narrowest streets in the city, where it is impossible to get a satisfactory view of it as a whole. Nevertheless, visitors to Boston should not fail to hunt it up.

EGLISE DE ST. PIERRE, ANGOULEME, FRANCE.

The cathedral church of St. Pierre is considered one of the latest examples of Romanesque in the southwest of France, dating from the last part of the eleventh and the first part of the twelfth centuries. The striking peculiarity of the building is that the nave is, like some other churches in the south of France, covered by stone domes. We are not sure whether these domes are visible from the outside or whether they are covered, as at Perigueux in the case of St. Front, by a wooden roof. Another peculiarity is the shortening of the transepts so as to give room for but one shallow bay on each side, the exterior effect being preserved by the erection of a tower at the end of each transept.

THE MANUFACTORY OF PORCELAIN AT SÈVRES.

From the OLD HOTEL DE VILLE. PARIS:

The birth of the porcelain factory, now so grandly located at Sèvres, just inside the park gates, may be said to have been very humble, and took place at Vincennes. From the commencement of the eighteenth century works had existed at St. Cloud, and other places; but a great deal of porcelain was imported from Meissen, near Dresden, in Germany, and it was in rivalry to this that the desire arose to extend the manufacture in France. Accordingly, in 1745, a sort of company was established at Vincennes, nominally under Charles Adam, which obtained from the government the exclusive privilege of production for thirty years. It consisted of some eight or ten members, all workmen: one Gravant made the clay; the sieur Caillat supplied the colors; and Hippolyte, of S. Martin des Champs, the gold. In 1746, their numbers were added to, and the services of the celebrated chemist Hellot helped to add to the success of the undertaking. A curious document in the Archives shows the importance of the affair in 1750, giving as the staff of the establishment, a director, Boileau Duplessis, goldsmith to the king, designer; Bachelier, director of the art department; three modelling sculptors; two throwers; three designers; five turners; two chemists; eighteen painters; five burnishers; and twenty-six *répareurs.* Certain privileges were accorded them, but on the other hand they were bound not to divulge their secrets elsewhere. This, however, did not prevent the manufacture of spurious specimens, and various means were adopted to put an end to the fraudulent productions; but to so little effect that in 1752, the authorities being tired of the inability of Adam to manage the affair, revoked his charter, and gave the direction to Eloy Brichard, obliging him to mark all the objects turned out of the factory, with a double L interlaced thus (The first known marked specimen is dated 1753).

The next year, 1753, Louis XV began to interest himself in the matter, and the factory took the name of "Manufacture Royale de Porcelaine de France:" an initial letter being adopted to fix the date of the year. In 1754, the Empress of Russia ordered the celebrated service imitated from antique camei, which led to so much correspondence between the ministers of the two countries. It is ludicrous to find an empress haggling over the price of 360,000*f.*, which Bertier on his side assures her, is a most moderate sum for such a wondrous work of art.

At this time so great was the number of orders, that the old premises were found to be quite inadequate for the work, and a piece of ground was obtained at Sèvres, where formerly stood Sully's house. Here an enormous structure was erected, which was thought to be large enough for all time; but some years ago, this in its turn was found to be too small, and the new buildings at the lower part of the park of St. Cloud, close to Sèvres, were constructed. The situation of the old *fabric* was very picturesque. Upon a hill to the left of the route de Versailles, dominating the town, and approached by an embanked road, passing over what once was a stream, but is now converted into market-gardens, the old buildings with its high-pitched roof has the appearance of an eighteenth century château. Within the court-yard is a fine old well built into the wall, and overgrown with ivy and wild flowers.

The new director was no more fortunate than his predecessor. Spurious Sèvres continued to be produced, and unable to combat with the fraud, he was ruined, like Charles Adam: so in 1759, the whole affair was reorganized. It was put under the administration of the king; Barbirie de Courteille, Councillor of State, being at the head of it, but Boileau remaining the director. At the same time more vigorous measures were taken to prevent forgery, and heavy fines were levied upon the offenders; in fact, so rigorous were the new laws that they practically revoked the charters of the factories already established, such as Mennecy, Chantilly, and Sceaux, and prevented any new ones from being founded. Naturally the outcry was great, and a modification of the laws had to be arranged, allowing persons to continue the productions at their factories, provided they marked them, and abstained from using gold and other colors than blue; and from making statuettes or flowers in biscuit, in relief upon vases. Forgeries of the Sèvres mark were made punishable by a fine of 3000*fs.*

All the productions of this period had been in the "*pâte tendre*" or soft paste, and no doubt this is by far the most beautiful porcelain ever produced; but in 1753, a native of Strasburg named Paul Hannong, intimated to Boileau that he had discovered a clay that would make "*pâte dure*" as well as that of Meissen. This offer came very opportunely; for some time past, the ministers had desired to rival Germany in this product, and so prevent the importation of "Porcelaine de Saxe;" but upon investigation of the matter, no faith was placed in the discovery, and Hannong entered into an agreement with the Elector Palatine to found the manufactory of Frankenthal. In 1761, we find the affair again being discussed, and communications addressed to the second son of Hannong, Pierre Antoine, who was director of one of the Lorraine factories; and an agreement was made between him and M. Bertier for the acquisition of the "*pâte dure.*" Again failure ensued, the principal substance was wanting, and all parties were content in 1765 to cancel the agreement, Hannong receiving compensation and a pension. In the same year, a paper was read to the Academy of Sciences by one Guettard upon the subject, in which he asserted that a kaolin similar to that of China, had been discovered in France, in the neighborhood of Alençon. This statement was verified, but disputes ensuing nothing was definitely arranged until 1768, when a surgeon of St. Yrieis la Perche, named Daruet really found the requisite earth, and in 1769, the manufacture of the hard paste was regularly established, from which date the two kinds of porcelain were manufactured simultaneously. This was the best period of production (1770–78) when Reynier was director, and amongst the artists were Falconnet, Clodion, La Rue, Boizot, Bachelier, and Duplessis. This is proved by the vases bearing the names of "*Le Falconnet,*" "*Le Milieu du Roi,*" "*L'Ecritoire,*" "*La Fontaine Dubarry,*" and "*La Rue.*" which were all of exquisite design. The last named was surmounted by a narrow neck, and held up by two Tritons forming a foot: while the vases of Clodion were all a marvel of elaborate design and color, embellished with gold.

Louis XVI endeavored to simplify the taste of the day, as for example, in his vase called "*l'œuf garni,*" which is nothing but a medallion portrait of the king, surmounted by a garland, which is attached to the bottom of the handle, in the "*Urnes Grecques pures,*" and in the "*Vase Medicis,*" with its antique Bacchanal and acanthus-leaf decorations.

The gradual development of the national taste in France, can be studied in the Museum from the various exhibited specimens. Beginning with a close imitation of the German, pastoral subjects by Boucher and his school became the fashion — "Fishing," "Flute Players," "Breakfast," "Toilette," "The Nurse," — all such domestic events treated in the sentimental style prevalent at the end of the last century; fine ladies personifying shepherdesses, and courtly gentlemen simple peasants, "Chloe and Daphne," etc. Illustrations from La Fontaine's fables, and Don Quixote also became popular.

To this succeeded a grander style. Falconnet, whose "*Baigneuse*" opened the doors of the Academy to him, made a reduced copy of it, and a pendant, "*Baigneuse aux Roseaux.*" His "*Garde à vous*" served as the principal motive of a splendid vase — a pedestal supporting a medallion, surrounded with garlands, and crowned by the base of a column on which reposes a child. This is a worthy introduction to the "*surtouts*" — half vases and half sculptured groups, such as the "Bacchus," and others. Animals also were much in vogue, wolves, boars, dogs, etc.

Amongst the child-subjects modelled by La Rue, some were original, some were from drawings by Boucher. It is difficult to give any idea in writing of the exquisite modelling of the flowers on these vases, but a few specimens of those originally made at Vincennes, and afterwards at Sèvres, can be studied in the Museum. Double anemones, ranunculuses, orange flowers, and others, remain from the crash which took place at the end of the last century. During the Revolutionary period a false simplicity was forced upon the factory, partly by the withdrawal of State aid, and partly to pander to the mad taste of the day. Thus we find designs in which red, white and blue stripes figure with or round Phrygian caps; "Equality Triangles," and "*Couteaux niveleurs,*" and the most wonderful conceit of all, the Balloon-Ascent series. A large collection of these latter, by the way, can be seen at the Hôtel Carnavalet, where there is an exhibition of various curious things appertaining to the great Revolution.

With the nineteenth century began what is called at Sèvres, the "Reign of the Architects." Percier and Brongniart introduced vases in the Egyptian and Greek style; furniture was decorated with innumerable medallions; busts the size of life were made as a *tour de force* to show what could be done with the "*pâte dure,*" and later on (1820), Chenavard introduced an ornamental style borrowed from the Renaissance.

Previous to this, at the end of the eighteenth century, the manufacture was discontinued for a time, suffering the usual fate of all peaceful arts when a nation has the fever of war upon it; but it was owing to this cause, that so many fine specimens of the "*pâte tendre*" found their way into England. At first, being a very costly product, it was only made for Royalty, or sold (by permission) at very high prices; the cost of good specimens at that period being little less than they are purchased for now, allowing for the change in the value of money. The general panic which succeeded the great Revolution and the turmoil of the early years of the First Empire, so reduced the value in France, that exportation began to be practised. English noblemen debarred from travelling, and so collecting treasures from all parts of Europe, bought up all they could find at home; while the exiled nobility of France were only to glad to find purchasers for their valuables — furniture, porcelain, etc. — for by these means they were able for a time to tide over their financial difficulties. Moreover the personal tastes of the Prince Regent of England (George IV), favored this development of taste for *objets d'art*, he was not only an artist in millinery and tailoring, but had a genuine love of art, and the formation of the magnificent collection now belonging to Queen Victoria is due to him. Smuggling also took place to a great extent, one Benoit managing to voyage to and fro between France and England, in spite of the dangers consequent upon war; running the blockade and eluding custom-house officers, with a shipful of treasures which he sold to London dealers. From them George IV and his friends purchased, knowing little and caring less about the circumstances under which the things were acquired; and it is doubtless owing to these facts that the pseudo-classical style of decoration was introduced into England; for, in spite of the hatred of Napoleon and the French nation in general, the English adopted their taste in matters of art, though they opposed them in those of dress and fashion.

The manufacture of the old soft paste was a much more difficult process than that of the hard; greater risk was incurred in the firing, and therefore the old specimens were of comparatively small dimensions. It is an artificial substance of purely chemical composition, differing in this respect from the Sèvres and Oriental hard pastes, which are composed of natural minerals. Being very soft and vitreous, it can be entirely melted in the fire at a very high temperature, which is impossible with the "*pâte dure.*" Again the super-added glaze is also softer and richer than that which covers the hard body, it melts into the paste to a certain extent, forming a most beautiful surface; and when the colors are laid upon it, there is a general blending of the tones which gives a most lustrous and brilliant effect to it, indeed the decoration of old Sèvres is not unlike the impasto of a rich oil painting in its depth and warmth of tone.

The more modern hard-paste porcelain is easily distinguished from the old soft paste. It has a crude and thin effect; the colors, instead of being "*empaté et gouaché,*" i. e., laid on thickly, and like a tempera painting, are painted on like a miniature, washed and stippled, and the whites left. Even the ware itself has a cold blueish tinge, while the hardness of the glaze prevents any mingling of the colors, so that they rest upon the surface, in some parts appearing rough and dull, while in others they present a highly varnished appearance. The process of fabricating the "*Bleu du Roi,*" or turquoise blue (*pâte tendre*), was in this fashion: the color was made into a paste, and laid on the biscuit with a steel spatula; put into the oven it came out wavy and mottled; it was then rubbed down with pumice-stone, a second coat of paint was laid on, and it was re-fired and re-polished; if the color was considered good, it was fired a third time. Violet was treated in the same way, and this process is carried out at the present day; violet specimens of the old period are, however, very rare, and two at the Museum were bought for, and considered for a long time to be Chinese. The colors employed were violet (*pensée*), which rivalled the Oriental in velvety quality, and depth of tone; light yellow (*jonquille*), apple-green; and red (*rouge de fer*), which looks well in mountings of ormoulu. But the most beautiful are the *bleu du Roi* (turquoise) and *rose du Barry.*

With regard to designs the old Sèvres differs from Saxe (or Dresden) as a picture by Boucher or Watteau differs from a Cranach or Abraham Mignon. A plaque in the museum, made in 1750, of a subject after Desportes, is perfect in detail, and yet the harmony and softness are as remarkable as in the original picture. Boucher's "*Diane au Bain*" in the Louvre was a favorite subject; we find it on a plaque belonging to the Baroness James de Rothschild, and upon many vases. Dodin's "*Triomphe de la Beauté*" was made in 1777; Pithou's "*Toilette de la Sultane*" in 1783. The smaller objects of this period (1760–80) had projecting borders festooned in a sort of tooth ornament, painted blue or purplish-red. Later the colors were multiplied, and the dental border was replaced by various colored ribands surrounding a garland or band of arabesques. Amongst the most beautiful specimens are those of the *rose de Barry* color, a beautiful warm yellowish pink, named after Madame de Pompadour, whose favorite color it was, and who took a great interest in the factory, and perhaps from the fact of her having a palace on the adjacent hill of Bellevue.

The "*pâte dure*" was not much developed until the revolutionary period, when economic reasons weighed with the difficulties of producing the "*pâtre tendre.*" With the advent of M. Alexandre Brongniart to the directorship of the factory an entire change took place. took place. Being exclusively a scientific man he paid more attention to the technical excellence of the paste than to its artistic beauty, consequently all his energies were directed to the perfecting of what he considered the only true porcelain—the "*pâte dure.*" Again the decorative taste of the day favored his views, for the hard, dry classicalism of the Empire had given place to the Boucher style, which, as we have said, lent itself so completely and harmonized so well with the "*pâte tendre.*"

The largest vases produced under the directorship of M. Brongniart are those in one of the old rooms of the Louvre (facing St. Germain l'Auxerrois) of a tortoise-shell ground, and one at Sèvres representing the arrival of the loot from the Italian campaign by Napoleon Bonaparte, which was only finished in 1815. It was painted by Béranger, and being to the "*Gloire de la France,*" Louis XVIII exhibited it publicly, and gave M. Brongniart the *croix d'honneur.* M. Brongniart remained at the head of the factory until some years ago, and it is only since his death that any revival of the soft paste has taken place; indeed, for some years it was almost a lost art.

As to the marks. In 1753, as we have said, it became compulsory to put the double L and a numerical letter. Thus each year from 1753–77 is dated by a letter of the alphabet — 1753 A, 1754 B, and so on. In 1778 double letters (1778 AA, 1779 BB) were used, which continued up to 1792 (OO). From that year until 1800 the date of the year is always wanting. With 1801 began a new system, as follows: —

An IX	(1801)	T9
X	(1802)	X
XI	(1803)	ll
XII	(1804)	-ll-
XIII	(1805)	↑
XIV	(1806)	⇌
	1807	7
	1808	8
	1809	9
	1810	10
	1811	oz
	1812	d 3
	1813	t 3
	1814	qz
	1815	qn
	1816	fn (s 3)
	1817	ds
	1818	18

This system is continued at the present day.

The monogram changed in 1792 from the LL to RF or RF or R. F. placed above Sèvres. This lasted until 1799, when Sèvres remained alone. About 1803 "*Manufucture Nationale*" was introduced, thus:

M. N$^{\underline{\underline{le}}}$
Sèvres
-ll-

This giving place from 1804–9, to: M. Imp$^{\underline{\underline{le}}}$; de Sèvres ⇌

and after that date to the Imperial Eagle. In 1814 the interlaced Ls reappeared with a *fleur-de-lys* in the middle and Sèvres at the bottom. Charles X (1824–27) introduced two C's crossed with an X in the centre, and a *fleur-de-lys* below. These in their turn disappeared, and the *fleur-de-lys* alone took their place, Sèvres always being at the bottom with the date. 1830–34 a stamp with a circular riband bearing a star was introduced; from 1834–48 we find L P with a crown above; then we arrive at another R F succeeded by the eagle and N with a crown above it.

Since An. IX (1801) white pieces have been dated thus, Jan. 1, Feb. 2, and so on. Since 1833 a green line with the letter S and the letters of the year have been substituted. Collectors should beware of false Sèvres, which is sometimes fraudulently marked; but the connoisseur can easily discover it, as the mark of a landscape painter is frequently put under a figure subject, and that of a flower painter under a landscape. Every artist entering the workshops has a mark assigned to him, and sometimes the Director, in very bad taste and questionable wit apportions an "appropriate" one, as, for example, Pouillot, a confirmed drunkard, received the mark of a pot; Aubert (an old wigmaker) a pigtail; the musician Chulot, two quavers; Evans (from the army) a sword; the gilder, Vincent, 2000; Dieu, a triangle (the emblem of Jehovah).

And now a few words as to the Museum. The arrangement followed is that planned by Brongniart in his "*Description Méthodique du Musée céramique de Sèvres*," an illustrated catalogue of the year 1845. The classification is terra-cotta; antique lustrous vases; glazed Middle Age wares; enamelled ware of the Renaissance and modern porcelain. These classes are all subdivided into nationalities and epochs, and the whole affords a methodical encyclopedia of ceramic art, which can be read by the simplest minds, for each object is labelled with full details. The actual arrangement was carried out by M. Champfleury.

The first cases contain Egyptian, Phœnecian and Archaïc Greek; unglazed potteries, which are little superior to the Peruvian of modern times. Then comes the Greek period, about 300 B. C, which, however, can be better studied at the Louvre. A strange series of vases from Gnatia (Apulia) follows: black grounds, garlands of flowers, and marks in yellowish-white and orange-red. The succeeding cases contain Celtic, Gallic and Gallo-Roman glazed or unglazed wares; Roman ditto; unglazed pottery from seventh to sixteenth centuries found in France, being mostly black with geometrical patterns during the Merovingian and Carlovingian times and red later on. Peruvian, Mexican, Polynesian and Indian pottery are also represented. At the end of these cases we come to some large specimens of faïence; a Virgin and child by Andrea della Robbia, white-glazed; a large green-glazed German stove, and another made by Ollivier in the Fauberg St. Antoine during the Convention—a brown-enamelled model of the Bastille. The Italian process of encrusting one color upon another producing a rich glazed surface was adopted by the French for paving-tiles, but the only examples which remain are some fragments of the twelfth, thirteenth and fourteenth centuries. The former are black *fleur-de-lys* upon a red ground. The fashion which came in during the Middle Ages of making vessels for table use of metals contributed much to prevent the advance in the making of pottery, which might otherwise have taken place. A curious "*broc*" (drinking-mug), with a human face (fifteenth-century), is supposed to be a caricature of an Englishman — a protest by some Parisian *modeleur* against the English occupation.

The following cases contain specimens of glazed pottery, sixteenth and eighteenth centuries, those in relief from Manerbe and Beauvais; the products of Chapelle-de-Pots, Saintonge and Palissey; Italian, German and Spanish wares. The "*Vase électuaire*," with the arms of the town of Milan and the Medici, is a specimen of decoration engraved by the "slip" (*engobe*) process. This is called "sgraffiato" ware, and it is made as follows: A white earth of the nature of pipe-clay is milled with water, and passed over the coarser ware, dried and fired, when a design is scratched upon the surface — the picture thus being dark upon a white ground — after which it is again fired. One case is filled with fragments found in the Cour de Carrousel, a plaque ("Baptism of Christ") found in the garden of the Tuileries, and a plaster mould from the *atelier* of the Tuileries, where Bernard Palissey worked. Amongst French wares are Nevers, Rouen, Marseilles, Moustier, Clermont, Ferraud, Paris, St. Cloud, Bourg-la-Reine, Sceaux, Lille, St. Clément, Aprey, Strasbourg, Niederwiller and a number of secondary fabrications. Foreign wares are represented by Delft, Bruxelles, Marienberg, Rostrand and other manufactories in Germany, Spain and Portugal. Amongst the soft-paste examples are those of Capo di Monte, Chelsea, Worcester, Derby, Talavera, Vincennes and Sèvres. Hard-paste examples from China and Japan are numerous, as also from Meissen, Switzerland, Belgium and Sweden. Specimens also of Persian ware and biscuit.

The museum also contains the earths employed in different countries; specimens in different stages of fabrication; defective specimens and suggestions as to remedies. The excessive thinness of the egg-shell porcelain is obtained by putting the paste into thick plaster moulds, which absorb all the water from the clay.

A large collection of works reproduced from celebrated pictures can also be seen in the Museum, amongst which are the "School of Athens," "Deliverance of St. Peter," "La Maitresse de Titian," etc., but these and later productions (they all date since 1813) are wanting in the taste displayed in the works of the last century.

Sèvres possesses all varieties of colors (*au grand feu*) except orange-red and deep yellow. The blue used is oxide of cobalt, which, when calcined with oxide of zinc, verges towards violet, and likewise oxide of manganese turns to green; *oxide d'urane* gives yellow (and black according as the baking is oxidizing or not); red is a combination of tin and chrome — stannate oxide of chrome — or aluminate of chrome, which is an artificial ruby. Black is iridium oxide or "ruthéneum;" gray, platina in powder.

Let me advise all persons visiting Sèvres, to take sufficient time thoroughly to see the Museum, and not be content with passing through the factory, where little is shown but "throwing" and "firing." A few hours can also be spent delightfully in the woods hard by, where visitors can wander for miles, gathering wild flowers and listening to singing birds — little heeding that they are only four miles from the great city, — one hour by boat. S. BEALE.

SOOT-PREVENTING.

EL PASO, TEX., August 4, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Is there any remedy against "soot" being formed, caused from burning coal? It seems to me that I saw a remedy in your paper once to prevent it, but I cannot now find it. It was some metal, I believe. By giving an answer in your paper you will oblige,

Yours respectfully, TEXAS.

[THE formation of soot can be avoided by using a smoke-preventing stove, furnace or fireplace. Of smoke-consuming furnaces several kinds are now in use here, particularly in Cincinnati and Chicago, and with care are said to work well. Smoke-consuming fireplaces are as yet, we believe, only to be had in England, where they are just now quite in fashion. If this is what "Texas" wishes, we will find the addresses of the principal manufacturers. There is no difficulty in importing English goods of the kind directly.—EDS. AMERICAN ARCHITECT.]

PARTY-WALLS.

ALBANY, N. Y., August 11, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you please inform me what works there are in relation to the rights and liabilities of owners of *party-walls*, and oblige, Yours very truly, F.

[WE know of no American work on the subject. The best way to get the information "F" wants would be to look over the reports of cases, which he can find in any law-library, remembering, however, that what is law for New York is not necessarily good law in Pennsylvania, and *vice versa*. There are not many cases of the kind, party-walls being in this country almost always built under a private agreement, the parties to which restrict themselves in any way they may see fit, and invoke the assistance of the courts only to explain doubtful points or supply omissions. — EDS. AMERICAN ARCHITECT.]

A FRENCH ARCHITECTURAL JOURNAL.

DES MOINES, IO., August 16, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,—Your inquirer "H," of Hartford, will find "*Le Recueil d'Architecture*" what he desires from France. It is from the press of the great *Ecole Centrale*, prepared that the co-working corps may understand the architecture they are to come in contact with in actual service. It is, therefore, devoted entirely to the present. Such works should be found in every state library, at least, throughout this country. C. T.

THE EQUILIBRIUM OF AN ARCH.

BOSTON, July 30, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — As I am required to determine the equilibrium of an arch I have referred to my volume of the *American Architect*, and find in Vol. X, No. 288, July 2, 1881, a diagram and its process in print. At the end of the nineteenth line it says, "Multiply the weight at v_1 by the distance $c_1 v_1$, and divide the product by the sum of the two weights; the quotient will be the distance $c_1 C_1$." It does not state whether the quotient will be in feet, inches or in feet and decimals. Please explain in your next issue these points referred to, and state what scale that "Diagram" was drawn.

Very respectfully yours, STUDENT.

[1. The quotient will, of course, be of the same denomination as the distance $c_1 v_1$. It may be feet and inches, feet and decimals, inches only and fractions thereof, or metres, etc.

2. The diagram is reduced from a drawing considerably larger, and is, I suppose, to no particular scale. The radius is ten feet.—C. B.]

FURRING ON BRICK WALLS.

SARATOGA SPRINGS, N. Y., August 14, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly give me space in the columns of your valuable journal for the answer to the following: —

Would an isolated brick house be made any warmer by being furred off for inside plastering with three-inch strips instead of one-inch strips? By answering in your next issue (if possible) you will oblige,

SUBSCRIBER.

[THE three-inch furring would be, if anything, less effective in keeping the house warm than one-inch furring, as it would allow more circulation in the air enclosed between the brick wall and the plastering, and consequently a more rapid transfer, by convection, of warmth from the inside to the outside of the air-space. If it is desired to make any furring as effective as possible, a good deal may be done by filling in the air-space, between the laths and the wall, with some light substance, which will entangle the air, and prevent it from moving freely. Cotton-wool which is very light, and elastic enough to keep its place, would be the best substance if it were not for the risk of fire. Mineral wool does reasonably well, but is heavy, and settles very much, unless kept up by wires or cross pieces of wood. Sawdust or tan bark are objectionable, as they settle to the bottom, absorb the moisture condensed on the inner surface of the brick wall and rot. Next to such filling as this, the best resource is the cutting off of the air-spaces between the furring strips by horizontal barriers at intervals. For this wooden strips may be used, but much the best material is mortar, which should be put on in horizontal bands, four or five inches wide, behind the places where the base-boards or wainscot will come, so that there may be no danger of the plastered walls being stained by dampness conducted across the air-space by them. The mortar should be put on just before lathing, the thickness of the furring, and the laths can be laid directly on it. When the inside plastering is put on these, it will be pressed through and unite with the mortar strip. The belts of mortar should be continued all around the house, and there may with advantage be one in each story.—EDS. AMERICAN ARCHITECT.]

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

303,276. FIXING COLORS OR DESIGNS IN WOOD, MARBLE, ETC. — Geo. Hand Smith, London, County of Middlesex, Eng.

303,277. APPARATUS FOR THE MANUFACTURE OF WHITE LEAD. — George Hand Smith, London, County of Middlesex, Eng.

303,278. MANUFACTURE OF WHITE LEAD.—George Hand Smith, Rochester, N. Y.

303,288. COMBINED CHIMNEY AND VENTILATOR. — Allen Stamper Jackson, Kokomo, Ind.

303,299. BENCH-VISE. — Mortimer G. Lewis, Lowville, N. Y.

303,303. COUNTERSINKING DEVICE.—Edwin Laselle Mansfield, Boston, Mass.

303,320. MITER-BOX.—William J. Powell, Marshfield, Mass.

303,324. HYDRAULIC ELEVATOR.—Jacob Schinneller, Pittsburg, Pa.

303,330. PAINT.—John A Shephard, Wooster, O.

303,334. REMOVABLE FLOORING FOR STALLS.—Myron Southwick, Peshtigo, Wis.

303,336. HEATING-STOVE.—Benjamin F. Stockford, Sturgis, Mich.

303,337. FIRE-ESCAPE.—Josh. C. Stoddard, Springfield, Mass.

303,338. BENCH-PLANE. — John F. Taber and William F. Gibbs, Clarion, Io.

303,339-340. PUMP. — Morris D. Temple, Chicago, Ill.

303,345. VISE ATTACHMENT.—William Vanderman, Willimantic, Conn.

303,356. MOLDING OR OTHER IRREGULAR SURFACE. —Frederick Beck, New York, N. Y.

303,359. MOSAIC OF GLASS AND LEAD GLAZING. — Henry F. Belcher, Irvington, N. J.

303,367. FIRE-ALARM. — Robert Durr, Milwaukee, Wis.

303,368. DRILL-GAGE.—Abel G. Goldthwait, Troy, N. Y.

303,388. ELEVATOR SAFETY-GATE.—Adam L. Heck, Indianapolis, Ind.

303,409. SELF-CLOSING HATCHWAY. — James G. Wilson, New York, N. Y., and Walter A. Holbrook, Milwaukee, Wis.

303,410. REAMER.—John C. W. Wilson, East Portland, Oreg.

303,414. SASH-FASTENER,—John Y. Bassell, Cincinnati, O.

303,423. WELL-TUBING.—Joseph M. Duncan, and Eben O. McNair, Warsaw, N. Y.

303,426. FIRE-ESCAPE. — Eli Frazier, North Lawrence, Kans.

303,430. SEWER-TRAP. —John W. Griffin, Buffalo, N. Y.

303,435. DOOR-KNOB. — Edwin Alfred Johnson, Allegheny City, Pa.

303,438. FIRE-PROOF HANGING CEILING. — Louis Lafond, New York, N. Y.

303,451. SHUTTER-FASTENER.—Patrick K. O'Lally, Boston, Mass.

303,467. FASTENER FOR KNOB-SPINDLES. — Le Grand Terry, Horseheads, N. Y.

303,468. COMBINED BURGLAR-ALARM AND DOOR-BELL.—Eugene B. Travis, Peekskill, N. Y.

303,478. TOOL-HANDLE. — Granville W. Wright, New Haven, Conn.

303,498. LOCK. — Bernard Deming, Cleveland, O.

303,506. PROCESS OF AND DEVICE FOR THE CONSTRUCTION AND REPAIR OF TUNNELS AND SHAFTS. — John C. Goodridge, Jr., New York, N. Y.

303,566. PORTABLE STEAM-GENERATOR.— John A. Forbes, Dover, Del.

303,568. COMPOSITION FOR PAVING, ROOFING, ETC. — Henry W. Gould, St. Louis, Mo.

303,591. LIGHTNING-ROD. — Geo. S. Prescott, Merrimac, Mass.

303,592. WINDOW. — John H. Press, Olney, Ill.

303,594. BUSH-HAMMER. — John Schwarzmann, Washington, D. C.

303,599. WATER-CLOSET. — George E. Waring, Jr., Newport, R. I.

SUMMARY OF THE WEEK.

Baltimore.

COTTAGE. — W. Claude Frederic, architect, has just completed plans for a frame cottage for L. H. Robinson, Esq., to be built on Beach Ave., Highland Park, to cost, $5,000.

STORE AND DWELLING. — Henry M. Tiralla, Esq., is to have erected a four-st'y store and dwell., 221 North Gay St., of enamelled brick and terra-cotta, 17' x 75', to cost about $6,430; from designs by W. Claude Frederic, architect.

STORE AND OFFICE-BUILDING. — Messrs. Wyatt & Sperry, architects, have prepared plans for J. G. Valiant, Esq., for a three-st'y brick building, with stone finish, 30' x 70', on Madison Ave., near Orchard St., day's work; Henry Smith & Sons, contractors.

BUILDING PERMITS. — Since our last report thirty permits have been granted, the more important of which are the following: —

Mary R. Scott, 2 three-st'y brick buildings, w s Fulton St., n of Patterson Ave.

P. J. King, 5 three-st'y brick buildings, w s Canton Ave., com. s w cor. Hudson St.

Wm. Carback, 2 two-st'y brick buildings (square), w s Chappell St., bet. Eager and Chew Sts.

D. L. Bangert, 2 three-st'y brick buildings, s s Chew St., w of Broadway.

J. B. Irvine, 8 three-st'y brick buildings, com. n e cor. Mount and Franklin Sts., ft. n e s Mount St, and 2 three-st'y brick buildings, w s Vincent Alley, in rear.

W. B. Turner & Son, 11 three-st'y brick buildings, s s Mulberry St., bet. Mount St. and Vincent Alley.

Binion & Andoun, 3 two-st'y brick buildings, w s Choptank St., n of Pratt St.

J. S. Smuck, 8 two-st'y brick buildings, n s Irvin St., bet. Pratt St. and Norris Alley.

Dr. W. A. Moale, three-st'y brick buildings, w s Charles St., n of Chase St.

Henry M. Tiralla, three-st'y and mansard brick buildings, e s Gay St., bet. Forrest and East St.

Boston.

BUILDING PERMITS. — *Brick.—State St.*, cor. Change Ave., Ward 6, for Mass. Hospital Life Ins. Co., office-building, 27' 10" and 68' 9" x 138', eight-st'y flat; T. J. Whidden & Co., builders.

Cedar St., No. 165, rear, Ward 21, for H. J. Pfaff, boiler-house, 30' x 46', one-st'y flat; E. B. Studley, builder.

Dale St., Nos. 14 *and* 16, cor. Shedman St., Nos. 20 and 22, Ward 21, for Philip Carrahar, dwell. and store, 33' x 60', three-st'y flat; John Potton, builder.

Rockland St., No. 11, cor. Rockland Pl., Ward 21, for F. W. Watkins, 2 dwells., 16' x 18' and 22' 6' x 35', three-st'y pitch; Dewing & McClure, builders.

Shawmut Ave., Nos. 10-16, Ward 12, for J. H. Dwyer, dwell. and store, 50' and 65' x 67', two-st'y flat.

Albany St., cor. Bristol St., Ward 16, for City of Boston, repair-shop, 70' x 100', three-st'y flat; Gouch & Pray, builders.

Wood. — Blue Hill Ave., Ward 20, for R. S. McIntosh, dwell., 23' and 32' x 50', three-st'y pitch.

East Sixth St., rear, near G St., Ward 14, for Joaquin H. Souther, stable, 24' x 40', one-st'y mansard; D. A. Berry, builder.

Mercer St., rear, near East Eighth St., Ward 15, for Sarah Barry, stable, 30' x 30', two-st'y pitch; Lyman Locke, builder.

Vaughan Ave., off Geneva Ave., Ward 24, for Joseph Sullivan, dwell., 22' x 30', two-st'y pitch.

Dorchester Ave., opposite Charles St., Ward 24, for Elizabeth C. Felker, dwell., 23' and 29' x 42', two-st'y pitch; Edw. Merrill, Jr., builder.

Cambridge St., near Western Ave., Ward 25, for Forrest Hall, dwell., 23' and 33' x 33', two-st'y pitch; Pierce Quirk, builder.

Market St., cor. Lincoln St., Ward 25, for F. M. Roddy, 2 dwells. and stores, 37' x 34' and 41', and 22' and 26' x 41', three-st'y flat; Jos. McCormick, builder.

Maverick St., No. 191, Ward 2, for F. L. Smith, bottling-building, 30' x 50', two-st'y flat; A. & J. McLaren, builders.

Champney St., No. 58, Ward 15, for James Harding, dwell., 18' x 30', two-st'y flat.

Enfield St., Ward 23, for W. J. Stokes, mechanical, 20' x 40', one-st'y pitch; W. J. Stokes, builder.

Greenwich St., near Fenton Pl., Ward 24, for Michael Birmingham, dwell., 24' x 34' 8", two-st'y pitch; F. C. Reid, builder.

Highland St., rear of, Ward 25, for Alex. Glover, dwell., 25' x 43', two-st'y pitch; Arthur H. Pierce, builder.

Temple St., near Ivory St., Ward 23, for Mrs. Emeline Osgood, dwell., 26' x 28', two-st'y pitch; N. F. Morrison, builder.

Bodwell St., near Bird St., Ward 20, for Franklin King, dwell., 29' x 34', two-st'y pitch; Edward McKechnie, builder.

Dove St., No. 8, Ward 20, for Wm. Mulhearn, wagon-shed, 20' x 22', one-st'y flat; —— Gabel.

Clifton St., near Cottage St., Ward 20, for A. C. Case, 2 dwells., 16' x 21' 6", two-st'y pitch; A. McDonald, builder.

H St., between Eighth and Ninth Sts., Ward 14, for Wm. H. Hart, stable, 30' x 46', two-st'y flat; Holbrook & Harlow, builders.

Washington St., near La Grange St., Ward 23, for Lawrence McQueeney, dwell., 20' x 28', two-st'y pitch; R. J. Wild, builder.

Middle St., No. 42, Ward 15, for John Foster, dwell., 22' x 34', two-st'y flat; C. E. Snow, builder.

River St., rear, near Cedar St., Ward 24, for John Mooney, greenhouse, 10' x 70', one-st'y pitch; John Mooney, builder.

Wheatland Ave., rear, near Washington St., Ward 24, for John Galvin, builder and owner, greenhouse, 12' x 100', one-st'y pitch; John Galvin, builder.

Farrington St., near Oak St., Ward 23, for Otis H. Weal, dwell., 22' x 30', one-st'y pitch; Alfred Johnson, builder.

East Second St., cor. Q St., Ward 14, for South Boston R. R. Co., storage, 75' x 150', two-st'y flat.

Brooklyn.

BUILDING PERMITS.—*Hewes St.*, s s, 100' w Broadway, two-st'y brick factory, gravel roof, brick cornice; cost, $6,000; owner, H. B. Scholes, 111 Bedford Ave.; architect, E. G. Gaylor; builder, Jas. Haughian.

Fifty-second St., n s, 100' 6" e Third Ave., two-st'y frame dwell. (brick filled) tin roof; cost, $3,000; owner, Mrs. G. L. Martin, Forty-third St., near Third Ave.; architect, F. Ryan; builder, D. Ryan.

Greene Ave., s s, 200' w Marcy Ave., 5 two-st'y brick dwell., tin roofs, wooden cornices; cost, each, $4,500; owner, E. W. Phillips, 543 Greene Ave.; architect and builder, D. Welld.

Devoe St., No. 322, s s, 25' w Catharine St., three-st'y frame tenement (brick filled) tin roof; cost, $3,800; owner, Peter Beilman, on premises; architect, Th. Engelhardt; builders, C. Dahnken and J. Schneider.

Lawton St., s s, 200' w Bushwick Ave., 3 three-st'y frame (brick filled) tenements, tin roofs; cost, $3,300 each, owner, Henry Mills, 14 Jefferson St.; architect, John Platte; builder, Henry Loeffler.

Park Ave., s s, 240' e Nostrand Ave., three-st'y frame (brick filled) store and tenement, tin roof; cost, $3,000; owner, Henry Diemer, 36 Hopkins St.; architect, John Platte.

McDougal St., n s, 175' w Howard Ave., three-st'y frame tenement (brick filled) tin roof; cost, $3,500; owner, Adolph C. Wenzel, 345 Navy St.; architect, A. V. Porter; builder, E. Porter.

Park Ave., n w cor. Throop Ave., three-st'y frame store and tenement, tin roof; cost, $4,800; owner, Charles Goets, cor. Park and Throop Aves.; architect, H. Vollweiler.

Tompkins Ave., No. 78, three-st'y frame store and tenement; cost, $4,000; owner, W. F. Rappold, Tompkins Ave., near Ellery St.; architect, H. Vollweiler.

Broadway, w s, 114' s McDougal St., 2 three-st'y frame (brick filled) tenements, tin roofs; cost, $3,300; owner, Bryan Fagan, cor. Broadway and McDougal St.; architect, H. Vollweiler.

Manhattan Ave., n e cor. Norman Ave., 4 four-st'y brick stores and tenements, slate and gravel roofs; cost, each, $6,000; owners, architects, etc., Randell & Miller, 497 Fourth St.; masons, J. & J. Van Riper.

Gates Ave., No. 916, s s, 20' w Patchen Ave., three-st'y brick store and tenement, gravel roof; cost, $5,000; owner and builder, J. P. Mullen, cor. Sumner and Gates Ave.; architect, J. G. Glover.

Washington Ave., e s, 125' n Gates Ave., three-st'y brick dwell., tin roof; cost, $11,000; owner, F. J. Randall, 8 Cambridge Pl.; architect, A. Hill; builder, D. H. Fowler.

Union St., s s, 248' e Seventh Ave., 4 three-st'y brown-stone dwells., tin roofs; cost, each, $11,000; owner, E. B. Sturges, 135 De Kalb Ave.

Lafayette Pl., s s, 140' w Bushwick Ave., two-st'y frame dwell., tin roof; cost, $4,000; owner, S. A. Snyder, 933 Greene Ave.; architect, I. D. Reynolds; builder, J. Lambert, and J. J. Quinn.

Whipple St., s s, 150' e Throop Ave., four-st'y brick tin factory; cost, $12,000; owner, M. C. Chambers; architect, J. Platte.

Macon St., s s, abt. 325' e Lewis Ave., 2 two-st'y brick dwells., tin roofs; cost, each, $4,000; owner and builder, J. A. White, 435 Gates Ave.; architect, Amzi Hill.

Seventh St., s s, 151' 4" w Fifth Ave., two-st'y brick dwell., tin roof, wooden cornice; cost, $6,000; owner, Edward Sloggart, 12 Garfield Pl.; architect, Stanley S. Covert; builders, Perkins & Green.

Eighth Ave., n w. cor. Seventeenth St., 10 (8 on ave. and 2 on st.) two-st'y brick dwells., tin roofs; cost, each, abt. $3,000; owner, architect, and carpenter, Jas. H. Darrow, 30 Braxton St.; mason, not selected.

Fulton St., s w cor. New York Ave., four-st'y brick store and flats, tin roof; cost, $12,000; owner, Mrs. Julia Diefendorf; architect, George P. Chappell; builders, Cornelius King, and Morris & Selover.

St. Marks Ave., s e cor. Albany Ave., four-st'y brick orphan asylum, slate roof; cost, $55,000; owners, R. C. Orphan Asylum Soc., on premises; architect, Wm. Schickel; builders, Carlin & Son, and Morris & Selover.

Cheever Pl., *Nos.* 30, 32, *and* 34, 2 four-st'y brick flats, gravel roofs, wooden cornices; cost, each, $24,000; owner, Thomas Moran, 157 Columbia St.; architect, M. J. Morrill; builders, P. J. Carlin, and Long & Barnes.

ALTERATIONS. — *Java St.*, s s, 200' w Union Ave., three-st'y brick extension, tin roof; cost, $12,000; owner, Board of Education; architect, J. W. Naughton; builder, James Rooney.

Leonard St., e s, 25' s Scholes St., add one st'y; also, three-st'y frame extension, tin roof; cost, $4,000; owner, Mrs. J. Baumgartner; architect, John Platte; builders, John Auer, and John Rueger.

Chicago.

BUILDING PERMITS. — E. Morehn, two-st'y dwell., 270 Dayton St.; cost, $2,500.

P. Cosgrove, two-st'y dwell., 79 Miller St.; cost, $2,500.

E. W. Murphy, two-st'y dwell., 316 Loomis St.; cost, $4,000; architect, Ruehl.

Thos. Moran, 3 three-st'y flats, 3453-59 State St.; cost, $60,000; architect, W. W. Boyington; builder, E. F. Gobel.

G. Brand, two-st'y dwell., 635 Superior St.; cost, $3,200.

W. Gallagher, two-st'y flats, 17 Walnut St.; cost, $4,000.

W. Hafner, two-st'y dwell., 195 Hoyne Ave.; cost, $4,000.

D. Mullaney, three-st'y flats, 1466 Indiana Ave.: cost, $4,500.

R. W. Crumb, two-st'y flats, 750-752 Van Buren St.; cost, $4,000.

Mrs. E. Benton, two-st'y dwell., Twenty-second St.; cost, $2,800.

Mrs. C. King, two-st'y flats, 448 Belden Ave., cost, $5,500; architect, L. G. Halberg.

J. L. Campbell, 5 two-st'y dwells., 95-105 De Kalb St.; cost, $23,000; architects, Edbrooke & Burnham.

A. H. Troyke, two-st'y dwell., 1150 North Oakley St.; cost, $2,500.

W. W. Niemann, two-st'y dwell., 120 Larrabee St.; cost, $6,000.

C. F. Wolff, two-st'y dwell.; cost, $3,500.

Geo. Edwards, two-st'y dwell., 404 Maxwell St.; cost, $11,000.

H. Biroth, 5 three st'y stores and dwells., 3807-15 State St.: cost, $35,000; architect, J. C. Doerr.

Saehn Bros., two-st'y dwell., 523 Hurlbut St.; cost, $6,000; architect, C. H. Gottig.

F. Echebrecht, two-st'y dwell., 166 Willow St.; cost, $3,600; architect, F. Thompson.

J. C. McGrath, 2 two-st'y dwells., 3654-56 Dearborn St.; cost, $5,000.

Mrs. L. E. Merrian, two-st'y dwell., 794 Washington Boulevard: cost, $6,000; architect, L. V. Shipman; builder, N. Cameron.

D. & J. Hardin, three-st'y store and dwell., 217 Thirty-first St.; cost, $7,000; architect, G. H. Edbrooke.

J. Shaw, 3 two-st'y dwells., 396-400 Congress St.; cost, $10,000; architect, S. M. Randolph.

W. D. Messinger, two-st'y dwell., 548 Jackson St.; cost, $7,000; architect, Albert Smith.

L. Coyne, dwell., 38 Moore St.; cost, $2,500.

A. A. Sprague, barn, 2708 Prairie Ave.; cost, $4,000.

E. Roos, two-st'y flats, 534 Ashland Ave.; cost, $5,000; architect, A. Bessler; builders, Kreig & Dermuth.

J. Stein, two-st'y dwell., 583 Dixon St.; cost, $2,500.
A. Senger, two-st'y dwell., 683 Dixon St.; cost, $2,500.
J. Szumansky, two-st'y dwell., 685 Dixon St.; cost, $2,500.
J. Senger, two-st'y dwell., 687 Dixon St.; cost, $2,500.
G. T. Stoneham, three-st'y store and flats, 388 Ogden Ave ; cost, $6,350.
N. B. Rappley, two-st'y warehouse, 16 Fourth Ave.; cost, $8,000.
M. McMahon, two-st'y store and dwell., 3157 Archer Ave.; cost, $3,700; builder, O. S. Kelso.

Cincinnati.

STORE. — Morris White, Esq., is to build a four-st'y brick store on Court St., near Vine St.; Samuel Hannaford, architect.

BUILDING PERMITS.—Jerry Delaney, three-st'y frame dwell., cor. McMillian and Forest Aves.; cost, $2,500.
F. Otte, three-st'y brick dwell., Poplar St. and Western Ave.; cost, $5,000.
Church, cor. of Ashler and Freeman Sts.; cost, $23,000.
Andrew Helf, two-st'y brick dwell., cor. Mohawk and Vernon Sts.; cost, $2,000.
Church of the Advent, addition, Hemper Lane and Curtis Sts.; cost, $7,000.
C. E. Iliff, five-st'y brick dwell., cor. Fifth and John Sts.; cost, $10,000.
Mrs. Wampock, two-st'y brick dwell., cor. Barton and Wade Sts.; cost, $4,000.
Louis Denning, three-st'y brick, 186 Bank St.; cost, $3,000.
M. Warth, three-and-one-half-st'y brick dwell., cor. Rittenhaus and Court Sts.; cost, $5,000.
John Schooth, two-st'y brick dwell., cor. James St. and Fifth Ave.; cost, $6,000.
H. W. Hopp, two st'y brick dwell., cor. Bogen and Harrison Ave.; cost, $2,400.
Mrs. Von Lemden, two-and-one-half-st'y brick dwell., 151 Bank St.; cost, $2,000.
David Hummel, two-and-one-half-st'y brick dwell., cor. Straight and Addison Sts.; cost, $7,000.
Aron Nathan, four-st'y brick dwell., 333 West Sixth St.; cost, $5,000.
R. S. Woddell, two-st'y frame dwell., Columbia St.; cost, $2,000.
John Holscher, three-st'y brick dwell., cor. Werner and Ravine Sts., cost, $2,600.
Henry Hensing, two-st'y brick dwell., cor. Findley St. and Western Ave.; cost, $6,000.
J. B. Campbell, three-st'y brick dwell., 108 Western Ave.; cost, $3,000.
Christ Westfall, three-st'y brick dwell., 88 Gibbert Ave.; cost, $4,000.
John Ware, two-and-one-half-st'y brick dwell., cor. Purcel and Warsaw Pike; cost, $4,000.
Paul Gratzy, three-st'y brick dwell., 94 Buckeye St.; cost, $3,500.
J. R. Powell, two-st'y frame dwell., cor. Front and Collard Sts.; cost, $2,600.
Henry Bresser, three-st'y brick dwell., cor. Woodward and Hunt Sts.; cost, $4,000.
Mrs. Schwartzott, two-and-one-half-st'y brick dwell., Wheeler St., near Calhoun St.; cost, $3,500.
Geo. Opitz, two-st'y brick dwell., cor. Clifton and Cliff Aves.; cost, $4,000.
Geo. Geizer, three-st'y brick dwell., cor. McMicken and Dunlap Sts.; cost, $4,000.
Schmit Bros., one-st'y brick dwell., 41 McMicken St.; cost, $6,000.
Geo. Buirk, three-st'y brick dwell., cor. Coleman and Bank Sts.; cost, $3,000.
A. C. Williams, two-st'y brick dwell., cor. Beek and Locust Sts.; cost, $2,600.
Cost, $138,700.
Repairs, $16,030.
Total, 154,730.
Total number permits to date, 572.
Total cost to date, $2,273,555.

Milwaukee, Wis.

BUILDING PERMITS.—Chris. Templin, store for Frank Tœpper, on National Ave., Eighth Ward; cost, $2,500.
F. Piepenhagen, frame dwell., for C. Fanning, on Farwell Ave., First Ward; cost, $3,400.
C. Schuckneeb, frame dwell., for M Sweet, Farwell Ave., First Ward; cost, $6,000.
C. Templemann, church, cor. Brown and Fond du Lac Aves., Ninth Ward; cost, $5,000.

Minneapolis, Minn.

BUILDING PERMITS. — Baker, Potter & Co., five-st'y brick warehouse, First St., between Fifth and Sixth Aves., North; cost, $15,000.
Baker, Potter & Co., grain elevator, First St., between Fifth and Sixth Aves., North; cost, $75,000.
Miss A. Wetherbee, two-st'y double dwell., n s Fourteenth St., between Third and Fourth Aves., South; cost, $6,000.
J. H. James, two-st'y frame dwell., Nicolet Ave., between Thirty-first and Thirty-second Sts.; cost, $3,800.
John Graber, two-st'y brick veneered store and dwell., cor. Tenth Ave. and Sixth St.; cost, $3,000.
Roberts & Lenhart, brick carriage-shop, n s of Main St., between Central Ave. and First Ave., North; cost, $4,000.
Holy Rosary School Society, three-st'y brick school-house, Sixth St., between Cedar and Nineteenth Aves., South; cost, $20,000.
J. D. Hutchins, two-st'y wooden dwell. and barn, e s Third Ave., South, between Twenty-first and Twenty-second Sts.; cost, $6,450.
P. G. Lamoreaux, two-st'y wooden dwell., First Ave., South, between Thirty-second and Thirty-third Sts.; cost, $5,000.
E. P. Sweet, two-st'y wooden dwell., n w e Hillside Pl.; cost, $5,000.
Gen. L. A. Grant, two-st'y frame dwell., 43' x 56', Prospect St.; cost, $10,000.

New York.

BUSINESS is duller than it has been for many years, even at this season of the year, when work necessarily drags.

ASYLUM. — An addition, 62' 6" x 80', is to be made to the St. Vincent de Paul Orphan Asylum, on Thirty-ninth St. and Seventh Ave. It will be four stories high, with basement of Philadelphia brick with stone finish. Mr. W. H. Hume is the architect.

BUILDING PERMITS. — *One Hundred and Forty-fourth St.*, s s, 300' e Eighth Ave., one-and-a-half-st'y frame stable, shingle roof; cost, $2,500; owner, Michael H. Cashman, 308 Fifth Ave.; architect, A. Spence.
One Hundred and Forty-third St., s s, 175 e Willis Ave., 4 three-st'y frame dwells., tin roofs; cost, each, $3,000; owners, Thomas Phillips, One Hundred and Forty-first St., near Brook Ave., Edward Harvey, 139 East Fifty-third St., Chas. Miller, 209 East Fifty-fourth St., and Robert Letoche, 319 East Seventieth St.; architect, C. Miller; carpenter, M. Munch.
Washington Ave., *No.* 1242, e s, 175' n One Hundred and Sixty-eighth St., three-st'y frame dwell., slate and tin roof; cost, $4,000; owner, Samuel E. Tyler, One Hundred and Forty-third St., near Third Ave.; architect, H. S. Baker; carpenter, B. F. Frisbie.
One Hundred and Forty-third St., s s, 100' e Sixth Ave., 2 four-st'y brick and Belleville stone dwells., slate and tin roofs; cost, $7,500; owner, Jos. Thompson, 56 West Fifty-second St.; architect, J. E. Terhune.
Second St., *No.* 246, five-st'y brick tenement, tin roof; cost, $9,000; owner, Michael Fay, 417 East Twentieth St.; architects, A. B. Ogden & Son.
One Hundred and Fifty-third St., s s, 295' 3" e Morris Ave., three-st'y frame tenement, tin roof; cost, $4,800; owner, Christopher Eder, 532 East One Hundred and Fifty-third St.; architect, E. Stichler.
Hudson St., n w cor. Harrison St., five-st'y brick and stone building, copper and slate roof; cost, $175,000; owner, The New York Mercantile Exchange, Wm. H. Duckworth, chairman building committee, 322 West Nineteenth St.; architect, Thomas R. Jackson; builder, S. Lowden.
West Seventy-third St., *No.* 428, four-st'y brick and stone dwell., tin and slate roof: cost, $30,000; owner, Henry W. Struss, 335 West Fifteenth St.; architect, W. Wheeler Smith.
East One Hundred and Twenty-sixth St., *No.* 227, five-st'y brick teoement, tin roof; cost, $12,000; owner, I. E. Wright, 1983 Broadway; architects, Cleverdon & Putzel.
Second Ave., w s, 75' n s Sixty-fourth St., two-st'y brick workshop and stable, gravel roof; cost, $3,000; lessee and builder, John J. Brierly, 113 East Forty-eighth St.; architect, John J. Friend.
One Hundred and Sixty-seventh St., n s, 200' w Tenth Ave., 3 two-st'y frame dwells., tin roofs; cost, each, $1,600; owner, Martin Bauer, 55 Pitt St., builders, R. Terwilliger and Geo. Sauter.
One Hundred and Twenty-second St., n s, 72' e Eighth Ave., 2 three-st'y brown-stone front dwells., tin roofs; cost, each, $9,000; owner, Lorenz Weiher, New Rochelle; architect, J. F. Burrows.
One Hundred and Fourth St., s s, 100' w Tenth Ave., 2 five-st'y brown-stone front flats, tin roofs; cost, total, $37,000; owner, Wm. Curry, 329 West Fourteenth St.; architect, M. Louis Ungrich.
Twenty-sixth St., s s, 75' e First Ave., five-st'y brick laboratory, tin roof; cost, $50,000; owner, Frederick S. Dennis, M. D., 21 East Twenty-first St.; builder, Jos. Richardson.
First Ave., n e cor. Thirty-second St., 6 five-st'y brick tenements, and stores, tin roofs; cost, each, $18,000; owner, Leopold Kaufmann, 129 East Sixtieth St.; architects, Schwarzmann & Buchmann.
First Ave., s e cor. Thirty-third St., six-st'y brick factory, tin roof; cost, $70,000; owner and architects same as last.
Thirty-third St., s s, 125' e First Ave., five-st'y brick tenement, tin roof; cost, $18,000; owner and architects, same as last.
Second Ave., w s, 22' 10" s One Hundred and Fifth St., five-st'y brown-stone front tenement and store, tin roof; cost, $10,000; owner, Mrs. Theresa Schappert, 503 East Eighty-eighth St.; architect, John C. Burne; builder, John A. Schappert.
Second Ave., w s, 48' 11" s One Hundred and Fifth St., 2 five-st'y brown-stone tenements and stores, tin roofs; cost, each, $10,000; owner, architect, and builder, same as last.
Ninetieth St., s s, 100' e Third Ave., 5 five-st'y brick and stone flats, tin roofs; cost, each, $20,000; owner, Michael Giblin, 125 East Ninety-second St.; architects, Babcock & McAvoy.

Philadelphia.

BUILDING PERMITS. — *Norris St.*, e of Fifteenth St., 3 three-st'y dwells., 16' x 56'; A. Miller, contractor.
Norris St., s of Fifteenth St., store and dwells., 35' x 45'; A. Miller, contractor.
Jefferson St., w of Ridge Ave., two-st'y dwell., 17' x 45'; A. P. Righter, owner.
Sharre St., *No.* 506, two-st'y dwell., 15' x 30'; Jno. G. Long, owner.
East Thompson St., *No.* 633, three-st'y dwell., 17' x 52'; J. S. Baldt & Son, contractors.
Seventh St., cor. Marriott St., two-st'y warehouse, 32' x 57'; Thos. McManemy.
North Fortieth St., *No.* 51, three-st'y dwell., 18' x 58'; T. C. Sloan, owner.
Bowman St., e of Thirty-fifth St., 4 two-st'y dwells., 14' x 32'; Wm. Kindon, owner.
Germantown Ave., *No.* 4765, three-st'y dwell., 13' x 30'; A. Reiber, owner.
Fifth St., n of Butler St., 2 two-st'y dwells., 15' x 44'; Anthony Weise, owner.
Sansom St., *No.* 834, stationary engine-house, C. R. R., 105' x 107'; Philadelphia Traction Co., owner.
Thirty-fourth St., cor. Huntingdon St., two-st'y dwell., 18' x 47'; Chas. Bartle, contractor.
New St., between Thirty-fourth and Thirty-fifth Sts., two-st'y dwell., 15' x 32'; Chas. Bartle, contractor.
Cedar St., n of Terrace St., 2 two st'y dwells., 16' x 32'; Jas. Harper, contractor.
Jefferson St., n of Hamilton St., two-st'y dwell., 16' x 42'; Harry Rowland, owner.
Manayunk Ave., s of Penn St., two-st'y dwell., 18' x 45'; Wm. Eddiemar, contractor.
Columbia Ave., *No.* 1304, three-st'y drying-room, 20' x 40'; F. Koening.
Williams St., *Nos.* 510–518, 5 two-st'y dwells., 14' x 40'; Christian Dear, contractor.
Edmund St., e of Margaretta St., two-st'y dwell., 16' x 35'; Thomas Waters, contractor.
High St., bet. Morton and Chew Sts., 6 three-st'y dwells., 18' x 53'; D. S. McNabb, contractor.
Fifth St., n of York St., 3 three-st'y dwells., 16' x 40'; F. Striebig, contractor.
Howard St., *No.* 1515, three-st'y dwell., 18' x 50'; S. R. Stewart, contractor.
Ridge Ave., *No.* 3707, two-st'y store and dwell., 16' x 50'; J. N. Esher, contractor.
Wyoming St., w of New Second St., two-st'y stable, 18' x 40'; Jno. Davis, Jr.

St. Louis.

BUILDING PERMITS. — Eighty-eight permits have been issued since our last report, seventeen of which are for unimportant frame houses. Those worth $2,500 and over are as follows: —
E. P. Dickson, 2 adjacent two-st'y dwells.; cost, $3,000; E. P. Dickson, contractor.
Domioo Signiago, two-st'y brick dwell.; cost, $7,000; P. F. Magher & Son, architects; sub-let.
Hugh L. White, two-st'y brick dwell.; cost, $10,000; Isaacs, architect.
Jno. Ritter, two-st'y dwell.; cost, $4,000; Wm. C. Shaper, architect; H. Heitmann, contractor.
J. W. Mueller, two-st'y dwell.; cost, $4,000; Wm. Gahl, contractor.
Jos. Baumgarten, two-st'y dwell.; cost, $4,000; Wm. Gahl, contractor.
Mathias Obrecht, 3 adjacent two-st'y tenements; cost, $5,900; A. Dietz, contractor.
Nicholson Bros., two-st'y dwell.; cost, $3,200; Hunt, architect; H. Redmond, contractor.
Presbyterian Church Co., two-st'y dwell.; cost, $3,600; J. Smiley, contractor.
Wm. Maschmidt, two-st'y dwell.; cost, $4,000; L. Jueger, contractor.

St. Paul, Minn.

BUILDING PERMITS. — John Jessrang, two-st'y brick venecred store and dwell., w s of Rice St., between Inglehart and Tilton Sts.; cost, $3,000.
Monroe Sheire, one-and-one-half-st'y frame double dwell., on the e s of Benny St., between Lee and Tuscarora Sts.; cost, $2,300.
Albert Spangenberg, two-st'y brick-veneered dwell., e s of Fort St., between Ninth and Rice Sts.; cost, $3,000.
Charles Horst, three-st'y brick store and dwell., s s of Tenth St., between St. Peter and Fort Sts.; cost, $10,000.
St. Paul Union Depot Company, two-st'y brick warehouse, facing side of depot grounds, between Rosabel and Wacouta Sts.; cost, $20,000.
I. N. Snow, two-st'y brick block of three dwells., s s of Pleasant Ave., between Third and Sixth Sts.; cost, $8,000.
D. R. Noyes, two-st'y stone residence, s s of Summit Ave., between Virginia and Western Aves.; cost, $20,000.
Union Depot Company, rebuilding union depot, e s of Sibley St., between Third St. and Railway; cost, $75,000.
Frederick Driscoll, two-st'y brick dwell., s s of Summit Ave., between Walnut and Western Aves.; cost, $10,000.
Board of Education, two-st'y brick addition to the Adams school-house, w s of Eaton Ave., between Colorado and Wood Ave.; cost, $14,143.
Board of Education, two-st'y brick school-house, e s of Agate St., between Cayuga and Granite Sts.; cost, $21,356.
John Schiller, two-st'y brick and brick-veneered double store and dwell., e s of Park Ave., between Viola and Sherburne Sts.; cost, $3,600.

Bids and Contracts.

PENSACOLA, FLA. — The following is an abstract of the bids received for stone-work of basement and superstructure of the custom-house and post-office:—
Gill & Beard, brownstone, total $107,653; estimate for stone-work in dormers and tower, $20,000. Bowling green, total, $97,074; for dormers and tower, $18,135. Bedford, total, $93,250; dormers and tower, $17,693.
A. V. Clubbs, Buena Vista freestone, total, $72,000; for dormers and tower, $13,000.
Belknap & Dumesnil Stone Co., Bowling Green stone, total, $66,950 (*accepted*); dormers and tower, $12,850.
M. A. McGowan, Bowling Green or Buena Vista freestone, total, $89,000; dormers and tower, $16,896. Brown-stone, total, $104,000; tower and dormers, $19,710.
John R. Smith, Connecticut brown-stone, total, $83,950; dormers and towers, $18,000.
The following is a synopsis of the bids received for furnishing bricks, cement, sand, and terra-cotta flue-lining for the same building:—
Figh & Williams, bricks, $12.50; cement, $2.10 per barrel.
B. R. Pitt, bricks, $13.
Gasper Shank, sand, per cubic yard, 95 c.
R. H. Turner, bricks, $13.
M. S. Belknap, bricks, $10.25.
A. V. Clubbs, bricks, $12.40; cement, $1.90; sand, 80 c.; terra-cotta, per lineal foot, 75 c.
J. M. Wheatley, sand, per barrel, $1.93.

KANSAS CITY, MO. — The following is a synopsis of bids for plastering for the custom-house and post-office: —
Smith & Crimp, $4,376 (*accepted*).
Joseph Eastman, $5,732.
David W. Lloyd, $7,200.
Sheppard & Bags, $8,890.
J. S. Lewis, $9,500.
William Harris, $9,875.
Charles R. Field, $15,500.

WASHINGTON, D. C. — In pursuance to advertisement, the following bids have been received for the nine sections of terrace at the Capitol: —
Hallowell Granite Co., $41,700.
Douglass Bros., $37,354.78.
Richard Rothwell, $34,323.
Acker & Co., $32,800.
Edwards & Son, $32,000.
Robert McLeod, $31,801.23.
M. C. Flannery, $30,000.
Lane & Malnati, $28,279 (*accepted*).

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

THE *Inland Architect and Builder* announces a call for a convention of Western architects, to meet at Chicago on the second Wednesday in November next. The invitation is addressed to all members of the profession in the country, but is more particularly intended for those of the South and West, who find it difficult to avail themselves of the advantages of the meetings of the American Institute of Architects, and yet need, and know that they need, the help of association with others of the profession. Within a few years, under the federal constitution of the Institute, a considerable number of local societies and chapters have been formed west of the Alleghanies, but it is a long distance from Indianapolis or St. Paul to Albany or Newport, and the benefits resulting from the mutual acquaintance and support of a large body of the profession must almost necessarily be sought in such conventions as that which is now proposed. We trust that the response to the invitation will be general, and are sure that the Western convention will have the best wishes of all architects in the East, and, unless the invitation should be made less general, some of them are not unlikely to make an effort to express in person their fraternal sentiments.

WE believe we have not often been tempted to enter into a discussion or controversy with another journal, but we feel that circumstances justified us in "naming," as it were, the *Sanitary Engineer* for its treatment of Mr. Putnam. And as the matter of trap-ventilation is one of great importance to the public we feel there is reason for continuing the discussion. There is an unwritten law that the parties to a journalistic controversy shall confine their replies to their respective journals, but as the one-sidedness of this kind of discussion is, to say the least, obviously unfair to the readers of such journals, we reproduce in another column the reply the *Sanitary Engineer* makes to the remarks which appeared in our issue for August 16.

WE do not like to be regarded as traducers of any of our fellow-citizens, and least of all do we wish the plumbers, for many of whom we have a sincere personal regard, to think that we have any desire to oppose their interests or to criticise any of their acts merely for the sake of criticism. We therefore venture, at the risk of being tedious to our readers, to return once more to the subject of what plumbers call "trade protection," that is, an agreement by which the dealers in plumbing materials sell their goods to plumbers, who are their principal customers, at a lower rate than to the general public, in regard to which we have written some things which seem to have been sadly misunderstood. Every one who has taken the trouble to read what we have said about this matter knows that we find nothing whatever objectionable in such an agreement, which is simply that which generally exists between wholesale dealers and those who buy of them frequently and pay their bills promptly, and it is with amazement that we find ourselves held up to scorn in the columns of the *Hydraulic and Sanitary Plumber* as being "affrighted" at the prospect that plumbers will secure a "reasonable advance" as profit on the goods they sell, or accused, as in a letter written to the same excellent journal, of "presumptuous ignorance" of furnishing "threadbare and garbled statements" to our readers, and of being connected with a "ribald" and "degraded" press.

IF the writer of this letter, who is evidently sincere in his indignation, would refresh his memory by referring to the columns of the *American Architect*, he would see at once that we have never thought of denying to the plumber, any more than to other retailers, a fair profit on the merchandise which he handles, and that all our criticisms, — warnings, if he wishes to call them so, have been directed against what we think to be the useless and foolish endeavors of certain plumbers and certain dealers to conceal the trade discounts from the public, which knowing that they are in some cases very large, naturally, though unjustly, believes that they are equally exorbitant in all, and that plumbers by means of them make enormous profits in their business, in ways which honest men avoid. Of course plumbers, and architects who are admitted to share the trade secrets, know that this impression is an erroneous one, and the latter, as we believe, conscientiously endeavor to remove from the minds of their clients the prejudice which they always find there against a body of men whose worth they know and appreciate; but both plumbers and architects also know that under cover of concealment for which the trade is now clamoring so strenuously, bills for plumbing goods are often presented to unsuspecting employers and paid, in which an advance of one, or two or even three hundred per cent on the cost of the goods is charged. Now, under the relations which exist between a plumber working by the day and his employer, the charging of such profits as these is simply swindling. There is no way in which anything else can be made out of it, and we repeat, with undiminished confidence, our opinion, the only one which we have ever expressed in relation to the subject, that the maintenance of a system which, like the present one of large secret discounts, makes such dishonesty easily practicable, benefits no one except the cheats in the trade, and injures the reputation and the business of all those plumbers — the great majority, as we are happy to believe, who think it right to deal fairly and openly with their customers, and wish for similar treatment in return.

THE writer of the letter in the *Hydraulic and Sanitary Plumber*, like an honest man, as we are sure he is, says that "as a matter of fact the trade price-lists which the manufacturers furnish are looked upon as being as much of a nuisance to the plumber as they possibly can be, and are tolerated only because the manufacturers prefer to keep them in existence for their own convenience, and not for the plumbers;" and again a few lines below, "The price-lists in question, while having a value of their own to plumbers in estimating on new work or determining the first cost of an article, are by no means the standard adopted for making charges to customers, and that fact is very well known, too, to the great majority." "The *Architect's* experience," he goes on to say, "may have led him to a different conclusion, and if that is the case, we can only say that even in the plumbing business dishonesty may be found as in others, but that it is the rule I cannot admit." Nor do we, as we take pleasure in saying, and we assure him that, entertaining the same high opinion as himself of the character of plumbers in general, we marvel all the more at their apparent persistence in endeavoring to establish a system in which observers outside the trade can see no advantage whatever to plumbers like himself, while it offers many and obvious opportunities for fraud to the unscrupulous ones. We have before us a copy of the agreement (printed elsewhere in this issue) presented for signatures to the manufacturers and dealers in plumbing materials by the Executive Committee of the National Association of Master-Plumbers, and would like to have our critic compare one or two articles in it with what he tells us is the practice of honest plumbers in regard to trade price-lists and discounts. The first article of the agreement proposes that dealers and manufacturers shall sell goods to no one except plumbers licensed by the President and Secretary of their respective Associations, the license to be in the form of a certificate, to be renewed every three months. The fourth article proposes

"That any plumber who waives his discount in favor of his customer shall be dealt with as one not entitled to the regular trade discounts, and his certificate shall be revoked, and remain so until he be properly reinstated and receive a new certificate from his Association." It is true that this agreement was rejected by the manufacturers and dealers, but it was nevertheless the product of the deliberations of the Executive Committee of the Plumbers' Association, drawn up, as the report of that Committee says, under "careful advisement from various sources," and was certainly offered as representing the opinions and wishes of the trade. If it does not represent the wishes of sensible and honest plumbers, it is time for them to say so, and until they do they must be content to remain in the position of having acquiesced in the attempt to force the adoption of a scheme which, in the words of the reply addressed by the manufacturers to the Committee which presented it, "were it possible to carry it into effect, would not only, in our opinion, be ruinous to your business, and dishonourable to yourselves, but would place you in the very unenviable light of extortionists before the eyes of the public." The dealers have quite as much reason for wishing to be polite to the plumbers as we have, and understand this particular point in the plumbing business quite as well as we do, yet we have never denounced the "protection" movement with half the energy that they show, and we shall not do so until we are satisfied that the better feeling in the trade is too feeble to oppose it.

La Semaine des Constructeurs announces the death of M. Paul Abadie, the architect of the great church of the Sacred Heart, at Montmatre, the Hôtel-de-Ville at Angoulême, with other buildings of note, and a man of high distinction in the profession. M. Abadie was born in 1813, and studied under his father, an architect eminent in his day, and at the Ecole des Beaux-Arts. After completing his course, he was attached to the Commission of Historical Monuments, and learned thoroughly in its service the characteristics of the ancient national styles of building. His reputation for archæological knowledge of this kind led to his employment in the restoration of the Romanesque church of Saint Front at Perigueux, one of the most interesting architectural monuments in France, and he was afterwards appointed inspector-general of ecclesiastical edifices, succeeding Vaudoyer. He was also an honorary member of the Royal Institute of British Architects, an officer of the Legion of Honor, and a member of several scientific societies.

SOMETHING has been said recently in most of the papers about a process for protecting iron from corrosion, recently patented by Mr. F. Maxwell-Lyte of England. The theory of the process is said to be that as the rusting of iron is necessarily accompanied by the development of electrical currents of a certain kind, if such currents can be prevented from formation at the surface of the iron oxidation will not take place. It seems that it is easy to prevent the electrical action which occasions oxidation of the iron by coating it with the oxide of a metal electro-positive to it; that is, one which when placed in a battery with iron and a solution of an acid, or an acid salt in water, would attract bubbles of oxygen instead of hydrogen. Zinc, tin and the alkaline metals hold this relation to iron, and therefore the oxides of these metals, when in contact with iron, although a galvanic current may exist, draw to themselves any oxygen which may come from the decomposition of water accidentally present, and hold fast to that with which they are themselves combined, leaving the iron either inert, or developing hydrogen, which does not effect it, and iron coated with these substances will remain unaltered for a long time. Lead, on the contrary, is feebly electro-negative to iron, its oxides losing oxygen when brought into galvanic relation with it, and the oxygen which passes thus from the white or red oxide of lead spread on iron as paint rusts it beneath the coating of paint, so that a zinc or magnesia paint prevents the rusting of iron which it covers, while lead paints promote that rusting. This discovery appears to form the basis of Mr. Maxwell-Lyte's patent, and his process consists simply in priming iron-work with zinc-white or magnesia, which protects it from the effect of a subsequent coat of more corrosive pigments. Although the theory of this process is new, the practice is certainly old. Every architect and student, and most builders, know that white lead paint put directly on wrought-iron tends strongly to corrode it, and many of them are also familiar with the practice, long common in New York, of priming iron beams with lime whitewash before painting them with the white lead which was, in the early days of fire-proof building, considered indispensable for finishing exposed iron beams.

MANY architects and builders have used hardware which, although proving on examination to be made of iron, possessed a bright bronze color, sufficiently near that of the more costly metal to deceive casual observers, and durable for all works not exposed to the weather or to friction. This finish, sometimes known as the Tucker bronze, is said by a correspondent of the *Scientific American* to be produced by coating cast-iron, cleaned and brought to a smooth surface, either with linseed oil or a varnish containing linseed oil, and then heating it to a point varying from four hundred and twenty degrees Fahrenheit upward, according to the depth of color which it is desired to obtain. This heat oxidizes the iron, together with the oil, which forms a hard transparent coating over the brown film of iron-rust which spreads over the smooth surface of the metal. The lowest degree of heat gives a pale tint, and the color deepens as the temperature is increased, until, if a sufficiently thick coating of oil is given, a shining black Japan is obtained. This process was patented in 1863, but the patent has now, of course, expired.

THE project for utilizing the sewage of Paris, not consumed by the farms of Gennevilliers, upon the low-lying portions of the forest of Saint-Germain and the meadows adjoining, seems to be in process of execution, notwithstanding the protests of the neighboring proprietors. The tract to be taken contains about twenty-seven hundred acres, and includes two large farms, a number of smaller lots, and a part of the forest proper. The city of Paris acquires the property indirectly through the Government of the Republic, paying all expenses and costs of every kind, but binds itself to rebuild in proper places the police-stations removed to make way for the irrigation works, and to submit to the direction of the State Government in regard to the details of the system of utilization. As this is to a certain extent experimental, the city very wisely refrains from purchasing the land outright, but takes a twenty-year lease of it, at a rent of twenty-seven thousand dollars a year, with the privilege of buying it at any time before the expiration of the lease for nine hundred thousand dollars. The most surprising part of the transaction is the smallness of the rent to be paid for the territory. Considering its position in the suburbs of the city, and nearly on the bank of the Seine, one would suppose that a rent of a hundred dollars an acre, for good farming land, would be nearer the value than ten.

THE Reverend W. C. Winslow, of Boston, who has done much to secure aid in this country for the great work now being carried on at Tanis by the Egypt Exploration Fund, publishes a brief account of the results so far accomplished. We have already spoken of the gigantic statue of Rameses II, one hundred and fifteen feet high, which Mr. Petrie, the director of the excavations, brought to light early in the course of the work. Mr. Winslow's description seems to indicate that the statue, though now broken, was originally carved out of a single stone, a block of red granite brought from Syene, five hundred miles up the Nile. In its finished state the figure weighs twelve hundred tons, and it is quite probable that, to avoid transporting unnecessary weight, it was carved at the quarry, just as large granite statues are at this day, but the original block can hardly have been less than twice the size and weight of the figure formed from it. How such masses of stone were handled we cannot understand. There is a passage in Herodotus which explains that the obelisks, monoliths of similar character, were moved and set up in position by hauling them to the top of a low artificial mound, and then excavating under the heavier end until it tilted by its own weight into its place; but this gives little idea of the methods by which the block for a statue was turned and shifted for the workmen, and still less of the mode in which the completed figure was transported from the Arabian mountains to the Delta of the Nile. Besides this colossus, the excavation has brought to light many other interesting objects, large and small. Among the latter are many papyrus manuscripts, coins, bronzes, jewelry, amulets, dishes and statuettes, two or three dozen of which were brought in every day; while the list of the former sort comprises an enormous granite sarcophagus, fourteen feet long and eighty-eight feet high, an obelisk of black granite, and many tablets and tombs, besides several temples of different dates.

THE LION OF BRONZE ON THE COLUMN OF THE PIAZZETTA, VENICE.

PALAZZO DUCALE, VENEZIA.

ON the morning of the 18th of September, 1883, the grass was to be extirpated from the summit of the columns of the Piazzetta. Two ladders had been joined together in order to reach the capitals, whose height from the ground surpasses fifteen metres. I climbed up myself, and setting my foot upon the capital, the size of which is three metres square, I felt myself small, so colossal seemed the Lion, whose wings reach one and one-half times the height of a man. In order to accustom myself to the proportions of the Lion, I went all around it. It is composed of several pieces held together by an iron frame-work, the bolts of which, oxidizing, have moved or entirely forced off the copper sheets covering them. Two fragments of bronze, broken by the rusting of the iron, have fallen from under the stomach, showing that the cast is, more or less, one centimetre thick.

The pieces of which the Lion is composed belong to different epochs. The most ancient ones are fortunately the most numerous, and belong to the time when the Doge Ziani erected these columns (1176). The others belong to subsequent renewals and the Napoleonic restorations, recognizable from the classicism of the modelling.[1] The right fore-leg, half of the left one, half of the right hind-leg, and the foot of the left one are not original. It is a pity that not one of the original paws remains, because the present ones have not the sentiment of any epoch: they are of indifferent workmanship. Tufts of hair upon the head have been replaced. The book held under the fore-paws is of lead. The wings are not only detached from the other parts of the Lion, but they belong evidently to a recent period; however, there were wings before, of which some traces are left, which we will notice later. The tail has also been restored.

All the rest, that is to say the head, the mane and the body, is original. The modelling of some parts, where the ancient Venetian *aurifex* thought proper to take special care of it, is really perfect. In order to convince one's self of it, it would be sufficient to note the muscles, sinews and veins of the paws not wholly restored or renewed. There is not any ostentation or affectation of anatomical knowledge; the artist has only indicated what contributes to the majesty of a symbolic animal.

On seizing the jaws of the Lion and looking into his mouth, I perceived the whole internal cavity. The jaws are armed with canine and molar teeth of most accurate workmanship; the skin is drawn into ridges, and conveys the impression that it is covered with hair at the sides of the mouth, which, when seen closely, loses completely its grotesque grimace.

A pair of whiskers, grooved from single pieces, represents the long bristles of the feline species. The eye-sockets are strongly marked; the brows are muscular and rounded. The eyes seem of a glassy substance, which is white and cut into triangular facets; the right eye sends from the bottom reddish reflections; they are a restoration, and are said to be of rock crystal, but they have not its transparency. The old guide-books do not mention the color which they had before; certainly they were not white, because they would have given a strange expression to the head of the Lion, or, like the present ones, would have made him appear blind. The choroid of the feline, like the chrysolite in an Italian poem of the thirteenth century, "casts rays of the color of fire," or like the topaz: —

"*Ha color d'auro e splendiente lome.*"[2]

If the eyes were not inlaid with such jewels, there could be set either carnelian or chrysoprases, or any other quartz *gatteggiante.* The eyes could also be even more fiery, without detracting from the effect of the bronze, if composed of one or more red gems.

The tufts of the mane begin at the neck and ears, where they are short and hooked, then developing into long, symmetrical locks, a lower one between two upper, run down the breast and lose themselves at the middle of the back. Every lock is formed of five or six cords, half a centimetre thick, flowing in serpentine form to a point, leaving the last undulation detached and raised, so that the mane is all bristling. Where the mane goes down along the shoulders, it covers the feathers of the base of the ancient wings; feathers may also be seen along the right side. These feathers are crudely cut for the insertion of the new wings. The difference between the original wings and the restored ones is plain: while the feathers of the first are concaved and uncut, those of the restored wings are convex and cut, making them more realistic. The ancient wings were nearer to each other and closer to the neck, as the original feathers are found where the mane reaches them, while the restored wings commence farther down. As to the form, the ancient wings must have participated in that solemnity which, inspiring itself from sublimity, does not descend to despicable details; the severe line which the head forms with the mane and the body, may give an idea of their grand simplicity. Mr. Ruskin, with the intuition which is natural to him, arrived at the supposition that the ancient wings were far wider in their sweep than these, and "shred into plumage." (*St. Mark's Rest.* I, 22).

The custom of cutting the wings, so that light might be seen between the feathers, was introduced by the Byzantines in their mosaics, and Giotto adopted it for the wings of angels. He was imitated by the artists of the fifteenth century who painted Lions of St. Mark, like Jacobello del Fiore and the *Donatus Venetus*, who kept themselves to the symbolic form of the wings.

The Lion of Bronze must have had, for a stronger reason, the wing cut into plumes, — in order to be perceived against the sky. There remains to us a meagre record of them in the wood-engraving of Breydenbach (1486). In a picture of Bassano, in the great Council Hall, where is painted upon a grand scale the column of the Piazzetta, we perceive the Lion with the wings cut in strips, and although, being only an accessory, the painter cared not to give it special expression, the material fact has not escaped him that the plumes were detached one from the other.

The Lion was once gilded; I have found the traces of gold in the protected portions of the upper jaw. Under the stomach there is a little door, restored, through which one could pass his head, but it is now locked; I do not know why.

I was unable to find any inscription on the ancient cast, or anything referring to the restorations; there are some initials, but they are recent and of no importance. I left the two fragments of bronze as I found them, lying upon the top capital.

This Lion of St. Mark, the symbol of the Venetian Republic, is admirable in so far as it expresses fierceness and magnanimous power. It looks far away, and, pressing its paws firmly against the book, seems to send to the Orient a roaring of defiance. Mr. Ruskin could not fail to perceive the beauty of "one of the grandest things produced by mediæval art," and judged it a work of the thirteenth century. (*Stones of Venice*, III, 233.)

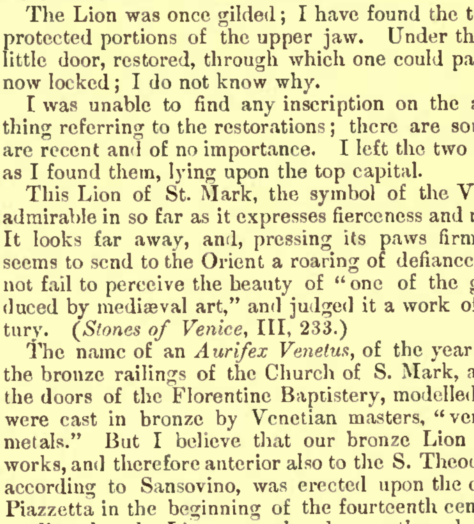
The name of an *Aurifex Venetus*, of the year 1300, is found upon the bronze railings of the Church of S. Mark, and Vasari tells that the doors of the Florentine Baptistery, modelled by Andrea Pisano, were cast in bronze by Venetian masters, "very skilful in casting metals." But I believe that our bronze Lion is anterior to these works, and therefore anterior also to the S. Theodore, of stone, which, according to Sansovino, was erected upon the other column of the Piazzetta in the beginning of the fourteenth century. Without pretending that the Lion was placed upon the column soon after it was erected by the Doge Ziani, we may grant that in the *thirteenth* century there were *magistri Veneti* capable of undertaking such a work, if, shortly after, a good reputation followed them into Tuscany.

GIACOMO BONI, Architect.

[1] The Lion was lying in pieces at the Arsenal, as it had came back from Paris in 1815. It was joined and restored by the sculptor Bartolomeo Ferrari, and replaced upon the column the morning of the 17th of April, 1816.

[2] "Has the color of gold and shining light." The poem I allude to is the celebrated one in praise of Intelligence, one of the earliest monuments of our language, where a description is given of the gems decorating her crown.

WHY AND HOW.



WE have the greatest respect for a book that grows, and just as little for one that is manufactured. The former class is small, and as a rule the units that compose it are of real use and service, and any new accession to its ranks should be cordially welcomed; and the one[3] before us should be received as heartily as any. It was begun by the author because he perceived there was a real need for it, and the seed once implanted in his mind was allowed to grow in a somewhat erratic fashion; but naturally withal, for when a mistake was perceived in the work of others, he set himself to discover the causes and reasons of the blunder, and to devise a means by which similar errors could be avoided. The work thus done was laid aside until the chance to correct another abuse was perceived. In this fashion in the course of years a pile of complete branches had been collected, so that it at length seemed worth while to attach them to a parent stem, and so cleverly has this been done that few would discover that this new tree of knowledge had not developed by natural process.

Any one who has had his sensibilities set on edge by the atrocities "executed" by the regulation architectural draughtsman, that, in spite of all editorial care, so often find their way into print, cannot

[3] "*Architectural Picture-Making, with Pen and Ink.*" "Old Ebor" Folios. First edition, No. 1. By Benjamin Linfoot, architect, with illustrations by the author. 719 Walnut St., Philadelphia, Pa., 1884.

but have regretted that the verb could not be applied to the draughtsman instead of to the drawing, and cannot but have repined that there was no way in which draughtsmen as a class could be brought to see the error of their ways. Books of instruction in drawing there are in abundance, both for architectural draughtsmen and for artists; but for the first, the instruction is entirely in the line of mechanical or scientific drawing, while those for artists are distinctly for artists—as far as they go—and are quite useless for the would-be artist-architect.

Mr. Linfoot's book is, so far as our own knowledge goes, the first book that is intended exclusively for the architectural draughtsman who has a "soul above buttons" (*architectonice* T-square), and is intended for no other person whatsoever; and best of all while it deals exclusively with the æsthetic side of the subject it is unqualifiedly practical. There is not a page of it that is not of every-day working value to the draughtsman actively employed in the routine of office work, not a page that could fail to have immediate effect on such draughtsman's work; for even if he could not understand or acknowledge the truth of the principles laid down, he could hardly fail to take immediate advantage of the many "dodges" of which the author's long experience had shown the advantage, and which he has with great good nature detailed for the benefit of others.

Turning to the book itself, we find it an oblong book of goodly size, made up of some two dozen pages of text, and half as many more plates; and here we perceive one of the great defects of the work, the dissociation of the text from the plate. Granted it was necessary that plates and text should be within the same pair of covers, it would have been much more convenient and less exasperating if the text had, as it easily might have, faced the plate to which it referred. It is particularly annoying in a book of this size to have to turn backwards and forwards, from text to plates and back to text again. The evil that Mr. Linfoot attempts to alleviate is the inartistic way — sometimes childish, sometimes brutal, but almost always inefficient — in which the regulation draughtsman renders a perspective drawing in pen and ink. It is so generally perfectly plain that the draughtsman had no clear idea of what he desired to do, and so apparent that he was equally in the dark as to what means to employ, that one cannot but wonder his employer should ever allow him to make a second attempt. The time that has been wasted by diligent, painstaking fellows just for want of a little "know how," either intuitive or acquired! The usual formula seems to be: Keep at work: put in more lines, lines running here, running there, but always lines. Don't leave a blank of white paper anywhere; even in the skies work over your clouds, knead them, churn them, give them mass, shade, and shadow, but don't fail to give them enough ink.

Turn over the pages of any architectural periodical, and you will find plenty of "horrid examples," and where you now and then come upon something of pleasing effect, a little further search will prove, like as not, that it is a fraud, a trick caught from some more able fellow, and not the result of original and foreseeing intention. Indeed the really skilful and original men would not make a very large assemblage.

The book deals exclusively with picture-making — the work that the public believes is the architect's sole and only occupation — and not at all with architecture, except so far as to impress that the pictorial accessories should enhance, and not detract from the architecture of the subject that is being embellished. The points that are discussed —in an admirably suggestive style with nothing didactic or egotistic to excite the dissent of the reader — are light, shade and balance, outlining, shading, skies, foliage, figures, methods and appliances, and a few other topics of broader application.

With some of the author's reasoning we cannot agree, but if we cannot assent to his "why," we seldom have cause for dissenting from his "how" the desired result is to be obtained. For instance, we cannot perceive any great value in his theory of making what he styles a "synoptical chart" of the proposed effect before work is begun, and though his theory is not particularly elaborate — much less so than the semi-mathematical formulas in which involve themselves all theoretical writers, and some practical ones as well, who seem to think that when they attempt to explain *how* they do a thing they must manufacture a pseudo-scientific *why* as well, when the matter is one of pure instinct, or, if you will, artistic feeling. Such *ex post facto* reasonings are apt to be as fallacious as those which derive all modern achievements from the measurements and proportions of the Egyptian pyramids, or which seek to prove that Shakespeare hid in his verses everything, from a complete system of Platonic philosophy, the latest "fad," to a prophecy of every future event.

So, too, many will not agree with what is said about "balance," and will, as we have, study over Plate 3, vainly trying to believe that the author has quite proved all that he states; or that some of the alterations he suggests for his "horrid examples," are really the most judicious means of correcting abuses which unquestionably exist in the original. They will probably, also, while agreeing that the rendering suggested in Plate 10 for a brick wall and for a board fence are sufficiently good, wonder what Ruskin would say to the rendering here suggested for a rubblework wall. But the very fact that the observer sometimes finds cause for questioning the author's "how" serves a good purpose, as it sets him to discovering his own "why" for the error into which the author has fallen, and the author can hardly complain, if others follow his example, and seek their own improvement through disagreeing with the reasoning or methods he employs.

Some very useful things have been accomplished: for instance, in furnishing distinct models of, as well as suggestions for, foregrounds, skies, foliage, and other accessories, and sufficient and well-reasoned advice regarding their application and amplification. The two plates exhibiting architectural foregrounds, divided into "rights" and "lefts," are as instructive as they are practically useful. We note with pleasure that Mr. Linfoot introduces several examples from our good old friend Samuel Prout; and it is not a little surprising how these time-honored samples shine out, even amidst the author's own excellent work. Useful hints, almost pithy enough for aphorism, are frequent in the text, and abundant good advice is scattered here and there; as, for instance, when in speaking of the wretched caricatures of humans introduced into drawings, he says: "Young students, never be above copying a good thing, and never copy a bad one; what is more, never take any heed of your egotistical, ignorant, and conceited fellow-student or students, and there are such in many offices, who strive to undervalue a good effort of any kind, and exclaim: 'Oh! yes, he copied that,' and when in return anyone has anything to say derogatory of their poor efforts, which may not have been copied, exclaim with a truly Pecksniffian air: 'Well, it is only a rough sketch!'" This is said apropos of his advice to make a collection of good figure-subjects from the illustrated papers and make open use of them when putting in figures in a perspective.

As to "dodges" the initial-cut shows one, the way in which the author holds his pen in putting in the outline, and heavy shadows of his foliage, as this position allows of a greater freedom of movement — from the elbow. It is interesting, too, to know that the author draws as often with the point of a fine red-sable brush — quite in Japanese style — as with a pen, and that it is usual with him in rendering a drawing to use three distinct kinds and qualities of writing-pen, sometimes using it in the ordinary way, sometimes on the side, and again on the back — which he finds especially a useful way as an even line is secured without the splitting and spattering which attend its use in the common way — and shifts the manner of holding his pen to suit the work he is doing.

We cannot but regret that Mr. Linfoot found it desirable to be his own publisher, as an experienced proof-reader could hardly have passed over the many errors, grammatical as well as typographical, which the few pages of text contain, and we trust that the next issue of the series will be free from such annoying blunders as false references, at least.

IRON ROOFS.

A House in Paris. H. Guillard, Architect.

A LARGE number of excellent drawings and details of various kinds of roofs, principally such as are used for the covering of railway stations, have been brought together by the author of the work [1] published under the above title. In the preface he states that "his object has not been to deal with methods adopted for the calculation of strains, which have already been well considered by many practical authors in standard works, but to provide a record of the style of design adopted in some of the best known roofs that have been erected." The task which the author set himself he has performed with great care and ability.

The book consists chiefly of plates, of which there are sixty-five, besides a large number of diagrams interspersed with the letter-press, illustrating the principles upon which various kinds of roofs are constructed. The letter-press does not contain any detailed description or explanation of the plates, which are left to tell their own tale; this they do with sufficient clearness for all the purposes of the experienced architect or engineer, but, for the benefit of students a somewhat fuller explanation of each plate would have made the work more valuable as a book of reference.

The employment of iron in the construction of the principals of roofs may be almost said to have been introduced by the present generation of engineers, many of whom can remember the time when it was scarcely ever used in those structures except in the form of bolts and straps to hold together the several timbers. It first began to take the place of wood in the parts that were in tension, such as king or queen posts and tie-beams, for which wrought-iron was used, while the heads of the kings or queens were made of cast-iron for the heads of the rafters to frame into. Later on we find cast-iron employed for the struts which were in compression, the same material being also used for shoes to receive the feet of beams. Afterwards, when iron came to be rolled of various sections, it was found convenient to have every part of the roof of wrought or rolled iron, although

[1] "*Iron Roofs.*" By A. T. Walmisley, Assoc.-Mem. Inst. C. E. London: E. & F. N. Spon. 1884.

even in the present day we find cast-iron sometimes used in parts subject to compression only.

The author remarks "that many of the early iron roofs closely resembled the form of construction adopted for ordinary timber trusses," and an illustration of this is given in the iron roof of the House of Lords, which is a combination of wrought and cast iron. It was, however, soon found that other arrangements of the parts were better suited to the material employed, and the tie-rod, instead of being horizontal throughout, was generally made to slope upwards towards the centre, so as to give a greater clear height to the interior of the building. A strut was placed at the middle of each rafter and at right angles thereto, a tie-rod being attached to each end of the rafter and the lower end of the strut, so as to form a kind of inverted king-truss, while a horizontal tie between the ends of the struts completed the truss. It is on this principle that most of the iron trussed roofs have been and still are constructed, the number of struts and braces being increased with the increase of span. As an example of a large roof of this description the author gives the details of that over the Exeter station, erected about twenty years ago, the span of which is 132 feet; the struts in this case are of cast-iron. The cost of this roof is stated to have been about £16 10*s.* per square, while that of a similar roof of half the span was only £9 per square, it being generally found that the cost per square increases with the span.

In curb roofs, which have four instead of two principal rafters to each truss, the same method of stiffening the rafters is adopted, a strut being placed at the middle of each with tie-rods connecting it with the ends of the rafters, and cross-ties connecting the two sides together. An example of this form of roof is given by the author in drawings of that over the North-Eastern station at Leeds, of which the span is 89 feet.

In the illustrations of the Bristol-Station roof, we find an adaptation of the above-named principle to a roof having curved rafters. The span here is 125 feet, and the rafters are formed as lattice girders, 2 feet deep, with a curvature of which the versed-sine is 4 feet; there is only one strut, which is placed in the centre of each rafter with a tie at each end, and a suspension-rod in the middle holds up the centre of the tie-rod, which rises 10 feet above the springing. This roof was built on a curve, and the cost was £37 16*s.* per square, measured on plan. Where the span of a roof is very great it is found advantageous to have one continuous rafter in the form of a circular segment, which is stiffened by vertical struts attached at their lower ends to the tie-rod, and between these is fixed diagonal bracing to hold up the tie-rod, and keep the struts in compression. This form of roof is known by the name of the "bow-string" principle, and is seen in that over the New-Street Station at Birmingham, of which the span is 212 feet, erected in 1854 at a cost of £17 15*s.* per square. The Cannon-Street Station, in London, is another example given by the author, the span of which is 190 feet, built at a cost of £49 10*s.* per square. That over the Charing-Cross Station is also on the same principle, with a span of 166 feet, the cost of which was £40 per square.

The bow-string principle was also adopted in the construction of the Lime-Street Station at Liverpool, erected about ten years ago, of which Mr. Walmisley gives the details. In this roof the "boom" is a curved girder of ⌶ section 14½ inches deep, having a rise of 42 feet with a span of 212 feet. The depth at the centre to the tie-rod is 20 feet, and the boom is stiffened by twenty braces forming a series of W's, each brace consisting of four angle-irons with cast-iron distance-pieces to give them an outward swell in the middle; these are attached to the tie-rod by means of bolts. The cost of this roof was £30 per square.

A form of principal frequently adopted in station roofs consists of sloping rafters with a tie-rod across from foot to foot, with vertical struts and diagonal bracing between the rafters and tie. The roof of the Broad-Street Station of the North London Railway, erected in 1865, is an example of this type, the span being 95 feet. The station at Preston has a similar roof with a span of 77 feet. In the London-Bridge Station of the Brighton Railway, the same principle is employed with a continuous curved rafter, having a span of 88 feet.

A method which is sometimes employed in roofs of considerable span consists in placing horizontal lattice or Warren girders horizontally across from wall to wall, and covering them with a series of "ridge-and-furrow" roofs of small span. This plan was adopted in the Exhibition building at Hyde Park in 1851, and has also been employed for a roof of 114 foot span over the Bridge-Street Station at Glasgow, which is carried on nineteen Warren girders placed 31 feet 6 inches apart, and having a depth of 12 feet. The cost of this roof and the covering was £22 5*s.* per square. The roof of the Central Station at Glasgow is also on this system, being carried on seventeen lattice-girders spanning the whole width of 213 feet 6 inches, having a depth of twenty feet; these are braced longitudinally with diagonal braces attached to horizontal lattice-girders, which carry the gutters. The covering is formed of ten spans of ridge-and-furrow roofs; and the cost was £28 17*s.* 6*d.* per square. Another roof built in this way is that of the Citadel Station at Carlisle, which is carried on twenty-four girders of single-lattice pattern, 15 feet deep, and of various spans, the longest being 154 feet. In this case the ridge-and-furrow covering runs parallel with the supporting girders.

The class of roofs to which modern engineers appear to be most partial is that in which the principal consists of an arched rib of sufficient depth to carry the load of the covering, and formed either with a solid web or with open lattice-work. As all arches have a certain amount of horizontal thrust outwards at the springing, it is necessary to secure the feet of the curved rib from overturning the supports, either by placing the tie across, as in the bow-string principle, or by giving sufficient solidity to the abutments. Where the supporting walls or piers are carried up to a considerable height it is difficult to give them sufficient strength to resist the thrust of an arched roof of wide span, in which case it is usual to introduce a tie-rod across to secure the ends of the rib from thrusting on the walls. This tie-rod is held up to the rib by light suspension-rods, and no bracing or strutting is required, as the rib itself has sufficient strength to carry the load. An example of this kind of roof is seen in that over the Victoria Station of the London, Chatham and Dover railway, having a span of 129 feet. The arched rib in this case is formed as a lattice-girder, 4 feet deep, with a rise of 32 feet in the centre; the tie-rod being held up to it by fifteen suspension-rods, and its centre being 8 feet 6 inches above the springing-line. A similar form of roof is employed to cover the Central Station at Liverpool, where the main ribs are 160 feet span, with a rise of 40 feet, the tie rising 14 feet in the middle. The main ribs are 55 feet apart, and connected by lattice purlins, which support five intermediate ribs. Another roof of this type is that over the Queen-Street Station at Glasgow, having a span of 170 feet. The rise of the ribs is here 44 feet, and of the tie-rods 14 feet 9 inches, the latter being held up to the ribs by six suspension-rods. Each rib is latticed on the Warren principle, and is 4 feet in depth. The cost of the roof and covering was £21 per square.

Wherever a good abutment can be obtained for the arched rib, it is usual to dispense with the tie-rods as in the roof of the Metropolitan Railway Station at High-Street, Kensington, which has a clear span of 90 feet, the ribs being elliptical, and formed as solid plate-girders, 16 inches deep at the centre, and rising 29 feet above the springing. This station being in a cutting no extra expense was incurred in providing sufficient abutment to the arch.

The largest single-span roof on the arch principle that has been erected is that over the St. Pancras Station of the Midland Railway, which the author has illustrated by four plates. Each rib of this roof is in the form of a four-centered or Tudor arch, having a clear span of 240 feet, and a rise at the centre of 96 feet. It springs from the level of the platform, the thrust being chiefly taken by the heavy brick piers on which the feet are secured by means of anchor-plates and strong bolts carried down to the foundations. As an additional precaution to prevent any dangerous thrust on the walls, the main floor girders which carry the platform and rails are made to form a continuous tie between the feet of the rib. The construction of the rib is that of a lattice-girder, 6 feet in depth. There are twenty-five of these main ribs in the roof, placed 29 feet apart, with trussed purlins between them, which carry the intermediate ribs. The upper part is covered with ridge-and-furrow roofing, which runs parallel to the main ribs. One of the most remarkable features about the erection of this roof was the timber scaffolding employed to raise each rib into its place. This consisted of a travelling stage, dividing the span into three parts, the side stages having five and the centre six divisions each, and four divisions in each stage from back to front. The first staging travelled on 123 wheels, 2 feet 8 inches in diameter, running on a beam of timber 18 inches square. The cost of this roof was £31 10*s.* per square.

Another roof of similar type is that over the St. Enoch Station at Glasgow, in which the rib is elliptical, or nearly so, and has a span of 198 feet, with a rise of 80 feet. Each rib is 5 feet in depth, and is formed as a Warren girder, being secured at the feet to a base-plate which is carried under the platform for about 13 feet, and is anchored down with strong bolts. There is also a similar roof over the Central Station at Manchester, with a span of 210 feet and a rise of 85 feet. The roof of the Drill-Hall, Derby, is also made on this principle, the ribs, which are 2 feet deep, springing from the level of the ground, and having a span of 75 feet with a rise of 30 feet.

The station at York is 234 feet wide, and is built on a curve in plan. It is covered by four elliptically-arched roofs of unequal span, resting on three rows of iron columns 18 feet high. The outer walls have strong buttresses to resist the thrust of the arches, of which the widest has a span of 81 feet with a rise of 27 feet. The covering of the upper part is on the ridge-and-furrow system. Where the springing of an arched rib is raised to a considerable height above the ground, it is necessary to give it as much as possible the stiffness of a horizontal girder, so as to reduce to a minimum the outward thrust. In the roof of the Crystal Palace, at Sydenham, which has a span of 104 feet, this has been done by making the semicircular ribs 8 feet in depth, and forming them of double lattice-work; also any horizontal thrust that might arise is transmitted by means of a cast-iron framework to a system of columns connected by girders and braces, which renders the whole structure perfectly rigid. In the Agricultural Hall at Islington the roof is formed of latticed ribs, having a span of 125 feet, and rise of 51 feet, which rests on a double row of braced columns, forming a base of sufficient width to resist the thrust of the ribs, which is conveyed through the gallery girders to the outer walls. The roof of the Paddington Station of the Great Western Railway, which is 240 feet wide, is formed in three spans of segmental ribs, the centre one having a span of 102 feet with a rise of 33 feet 9 inches; the depth of the ribs increases from the centre towards the springing.

The Middlesbrough Station is covered by two unequal spans of curved ribs forming pointed arches, the larger one being struck with a radius of 42 feet, and having a depth of 2 feet; these ribs are formed of open lattice-work.

Iron is frequently employed in the construction of domed roofs over circular or elliptical areas. That over the British Museum reading-room, built in 1857, is circular on plan with a span of 140 feet and a rise of 106 feet; and consists of twenty circular iron ribs meeting at the top in a circular ring 40 feet in diameter. The ribs spring from the top of cast-iron stanchions, and the space between them is filled up with brickwork.

The Albert Hall at Kensington is covered with a domical roof of a different type. This building is elliptical on plan, the length being 219 feet and the width 185 feet. The roof is formed of thirty half principals springing from a continuous iron curb laid on the top of the wall, and meeting at the centre in an elliptical ring. Each rib is a girder with curved top and bottom flanges meeting at the end which rests on the wall, and having a depth of 17 feet 9 inches at the summit, the rise of the lower flange being 33 feet above the springing. Each half-principal is divided into seven bays by struts with cross-bracing between. There are seven rows of latticed purlins fixed all round the roof between the principals.

The largest dome that has ever been built is the wrought-iron roof of the Vienna Exhibition, designed by the late J. Scott Russell, and erected in 1873. This building is circular on plan, with a clear span of 343 feet, the height from the ground to the springing of the roof being 80 feet. The roof is conical, and slopes at an angle of 30° to the horizon. It is constructed of rolled plates riveted together, the lower edge being strengthened by a wrought-iron curb in the form of a continuous box-girder. At the top of the cone there is an opening 100 feet in diameter, on which is another curb surmounted by a drum 34 feet high, on which is another cone of plate-iron supporting a lantern. The entire cone is stiffened with lattice-girders running from curb to curb up the side of the cone, with ring-girders at intervals laid parallel to the curbs. These girders and rings are placed outside the cone. In this mode of construction there is no outward thrust upon the supports.

In the construction of iron roofs it is very important that great care should be taken in forming the joints of the various parts, as the fracture of a single bolt might endanger the whole structure. The author has given numerous examples, drawn to a large scale, of the modes of connecting the parts of roofs, which will be of great value to the designer of these structures; but we think that some further description of these matters might have added to the utility of his book. The common mode of fixing the ends of the tie-rod to the feet of the rafters is by means of a round bolt passed through both of them; thus in the roof of Bristol Station the tie of a roof, 125 feet span, depends entirely on the shearing strength of a single pin 3½ inches in diameter; and in that of Exeter Station having a span of 132 feet, it is held by a bolt 3¼ inches diameter. In the roof of Swansea Station, with a span 64 feet 6 inches, the tie is held by a pin only 1½ inches diameter. The end of the tie of the Cannon-Street Station is held between two plates by means of key-wedges, so that it can be tightened up if necessary, the plates being secured to the foot of the rafter with fifteen ⅞-inch bolts; and in the London-Bridge Station of the Brighton Railway, the same method is adopted, as well as in that of Lime-Street, Liverpool. Where the tie-rod is in several lengths, as is the case with all large roofs, the ends are united either by being screwed into sockets, or else by bolts passed through them, the ends being widened out to receive the bolts. The screw-joint has the advantage of allowing the tie to be tightened up when necessary. The ends of struts are fixed to the rafters with bolts or rivets, and are either bolted directly to the tie-rod or else to a plate attached to the screw-socket above mentioned. Suspension-rods are bolted to the web of the rafter and passed through the tie-rod with nut and screw to tighten them up. Braces are generally bolted to the rafter, and also a plate attached to the tie-rod; but in some large roofs they are fitted with key-wedges or screwed into sockets so as to allow of tightening.

In roofs of large span which have tie-rods, one end is generally laid upon rollers to allow for expansion and contraction by change of temperature. In the roof of Exeter Station, of which the span is 132 feet, it was found, however, after some time had elapsed, that the rollers had never moved, and might have been dispensed with. In arched roofs without ties it is impossible to leave one end free, consequently the only way in which they can expand is by raising at the crown.

One great drawback to the use of iron for roofs is its liability to corrosion and decay, especially in the case of wrought-iron, so that a few years of neglect might cause the strongest framework to fall to pieces. Numerous methods have been devised for preventing decay, that of galvanizing being very largely used; but this process is said to render the iron brittle. The most efficient protection for iron appears to be that of coating it with magnetic oxide by exposing it to a current of highly-heated air. This is known as the Bower-Barff process. Even this protection, however, seems to fail where the metal is subjected to severe strains, which cause the coating to peel off from wrought-iron and steel, although it answers very well for cast-iron.

Mr. Walmisley is of opinion that "oiling is a very much better protection from the effects of the weather or the action of steam than painting, but care is needed properly to clean off the black scale or oxide formed upon the iron by contact with the air immediately after leaving the rolls."

A process is said to have been recently invented of rendering iron rust-proof without diminishing its strength, by alloying it with other metals, as copper and zinc, which perhaps may revolutionize the whole system of iron working. The discoverer of any efficient process of preserving iron might certainly be regarded as a benefactor of the human race. — *The Builder.*

THE ILLUSTRATIONS.

ACCEPTED DESIGN FOR THE GARFIELD MONUMENT, CLEVELAND, O. MR. GEORGE KELLER, ARCHITECT, HARTFORD, CONN.

THE tower rises from broad terraces, which are reached by wide-spreading steps, forming a dignified approach to the monument.

A projecting porch at the base of the tower contains a vestibule, on one side of which is placed the keeper's office, and on the other a room for a visitors' register, and for the reception of interesting relics. The vestibule leads into a round, vaulted chamber, the stone domical roof of which is carried on eight massive polished granite columns, arranged in a circle around the sculptured tomb, which occupies the centre of the chamber. The capitals of the columns and the moulded arches between are richly carved; the pavement is tiled in harmonic colors and design, and the whole is lighted by richly mullioned windows which throw a softened light on the tomb. An aisle, or ambulatory outside of the columns surrounds the chamber, the side wall of which is decorated with niches for the reception of statues or vases of flowers, and window seats are formed between the jambs of the mullioned windows. A spiral staircase of stone leads from this ambulatory to the top of the tower, so constructed that in ascending the tower it winds around the tomb below. In making one revolution of the tower there are four flights of stairs, and a landing is provided at the foot of each flight, lighted by triple windows, from which a view of the landscape can be had. At the level D (see section) the spiral staircase opens on a wide gallery from which the surrounding country can be viewed, and at the still higher level E a more commanding view can be obtained.

On the outside of the monument, above the deeply-recessed portal, is a band or frieze of sculpture, six feet in height, extending entirely around the base of the tower, and within easy view from the ground. It is divided into panels containing bas-reliefs which represent, in a graphic manner, the career of Garfield as an educator, a soldier and a statesman; the long and anxious waiting and watching of the world over his death-bed, and the remarkable funeral procession from Elberon to Cleveland. The arms of the different States are inserted in the parapet tower.

The remains of the deceased President are enclosed in a crypt, built below the level of the chamber, and immediately under the carved tomb.

Vaults for his family are provided back of his chamber, occupying the space between two of the bays.

Ohio stone is to be used for the structural part of the design, in connection with buff-colored terra-cotta for the frieze of sculpture, which runs around the base of the tower. The whole monument can be built thoroughly and artistically for less than $150,000.

Of this design, Mr. Henry Van Brunt, of Boston, one of the experts employed, speaks as follows in his report, submitted to the jury :—

"Its closest competitor (No. 25), following a type, but not an individual of a type, gives us a round tower, like the keep of a French castle of the sixteenth century, with a machicolated cornice and a bold conical roof in two steep ascents. An order of canopied and traceried windows enriches and breaks the summit of the tower. At its base projects a square porch, decorated externally with an historical frieze, and containing a recessed doorway with the memorial statue in the centre; within this porch is a vestibule giving access to the mortuary chamber in the lower story of the tower, which is capable of noble development, though wanting in the sort of dignity which size alone can confer. The shaft of the round tower is occupied by a staircase. I commend this design more for its capacity for development than for its actual excellence of composition, though in this respect it is inferior to none in the exhibition. The form is large and noble, and its execution is within the reach of the means at your disposal. I do not object to its military suggestions, its type being a tower of defence; but I venture to suggest that a new significance might be conferred upon it by inscribing upon its stones, not in panels, but frankly upon the curved surface of masonry, in great raised letters, sentences which shall recall the most important utterances of the deceased President. I would propose also the enlargement of the porch, so that the statue may have a more worthy environment; an enlargement also of the vestibule so that the first runs of the stairway may be contained in it, instead of occupying the ambulatory of the inner chamber; I should also remove the columbaria to a vault underneath, thus giving the memorial chamber a large scope. The entrance should be turned towards the city."

Several of the alterations here suggested have been incorporated in the amended design which is here published.

THE CATHEDRAL CHURCH AT SÉEZ, FRANCE.[1]

ECCLESIASTICAL history refers the establishment of the bishopric of Séez to the fourth or fifth century. Azo, who succeeded to the mitre in one of the last years of the tenth century, erected the first cathedral that is upon record at Séez. William of Jumièges relates of him that he destroyed the walls of the city, and with their stones built a church in honor of St. Gervais, the martyr, "*ubi sedes episcopalis longo post tempore fuerat.*" The same author tells that, in consequence of this church having been turned into a place of refuge by some rebels, about fifty years afterwards, Ivo, the third from Azo

[1] From *Cotman's Antiquities of Normandy.*

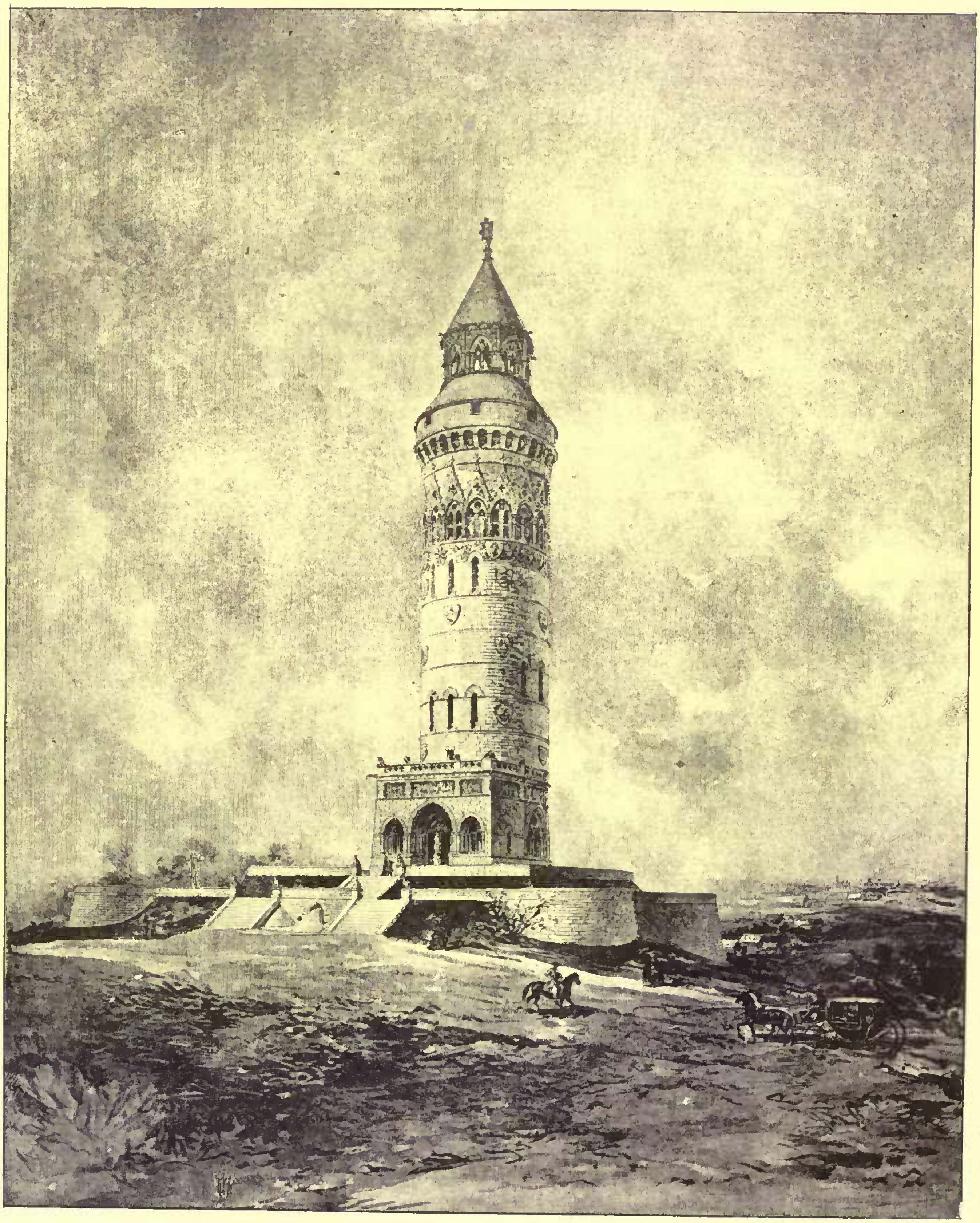
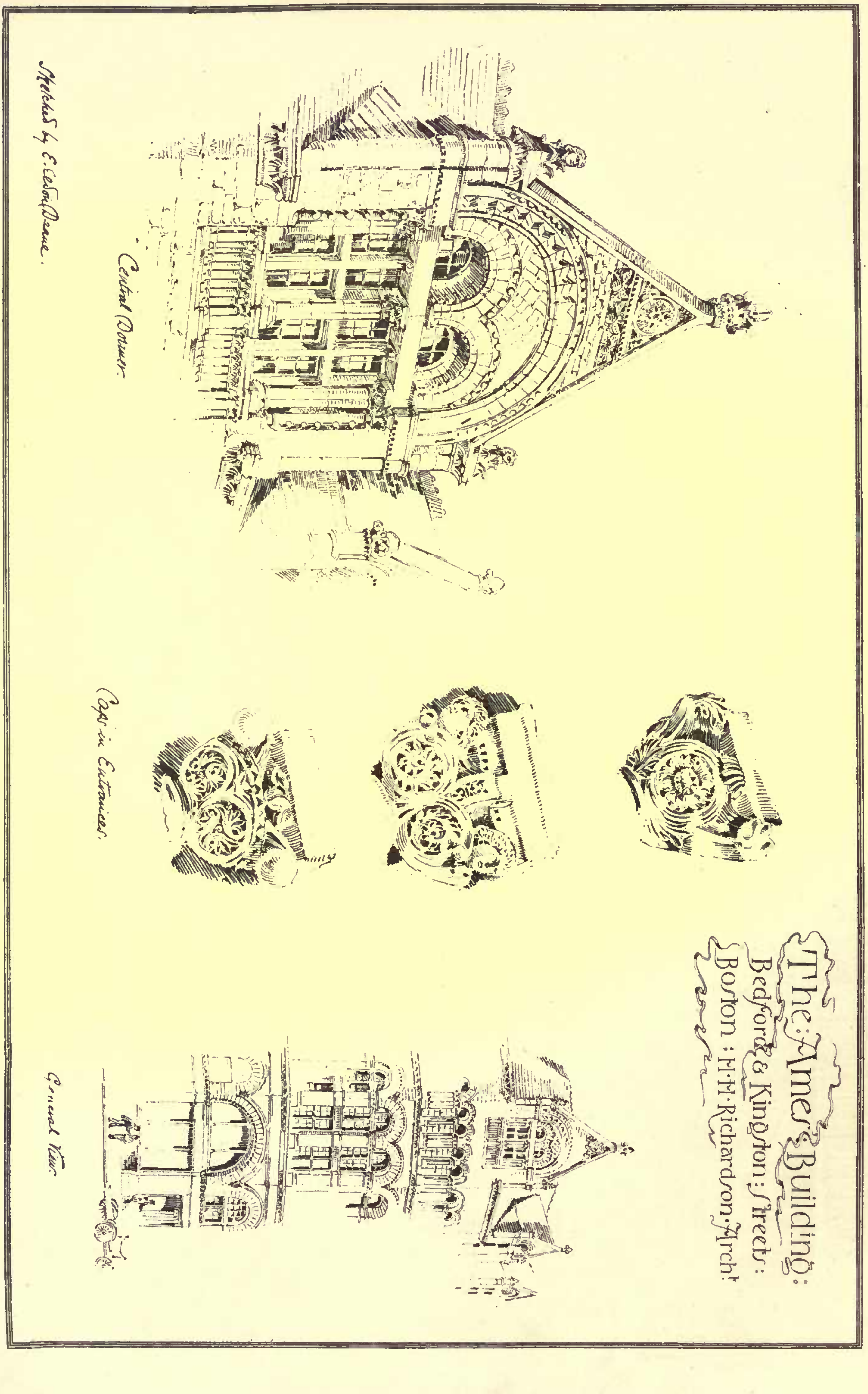
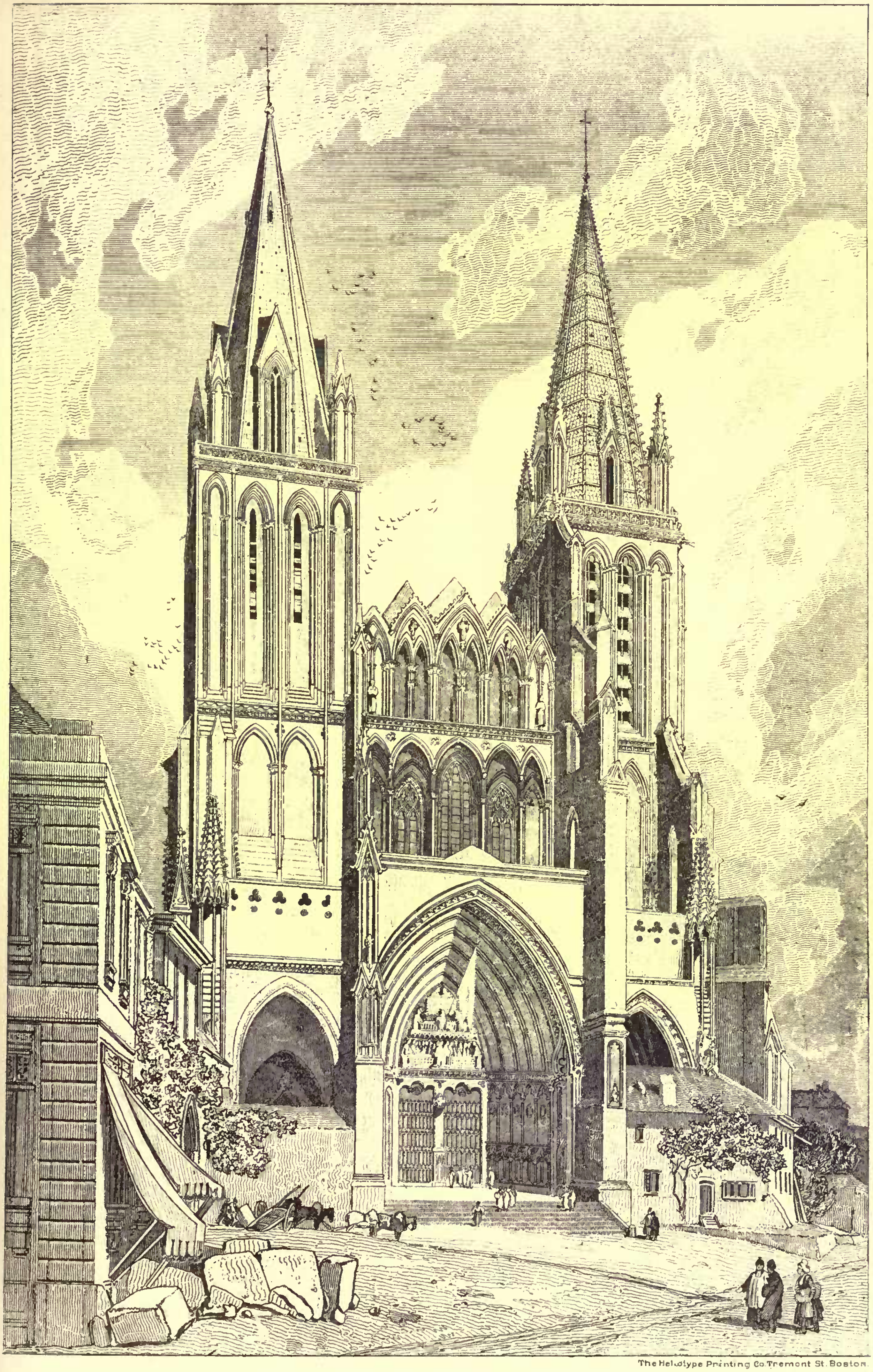


PHOTO CAUSTIC. HELIOTYPE PRINTING CO. BOSTON

Accepted Design for the Cleveland Garfield Monument.—Mr. Geo. Keller, Archt.

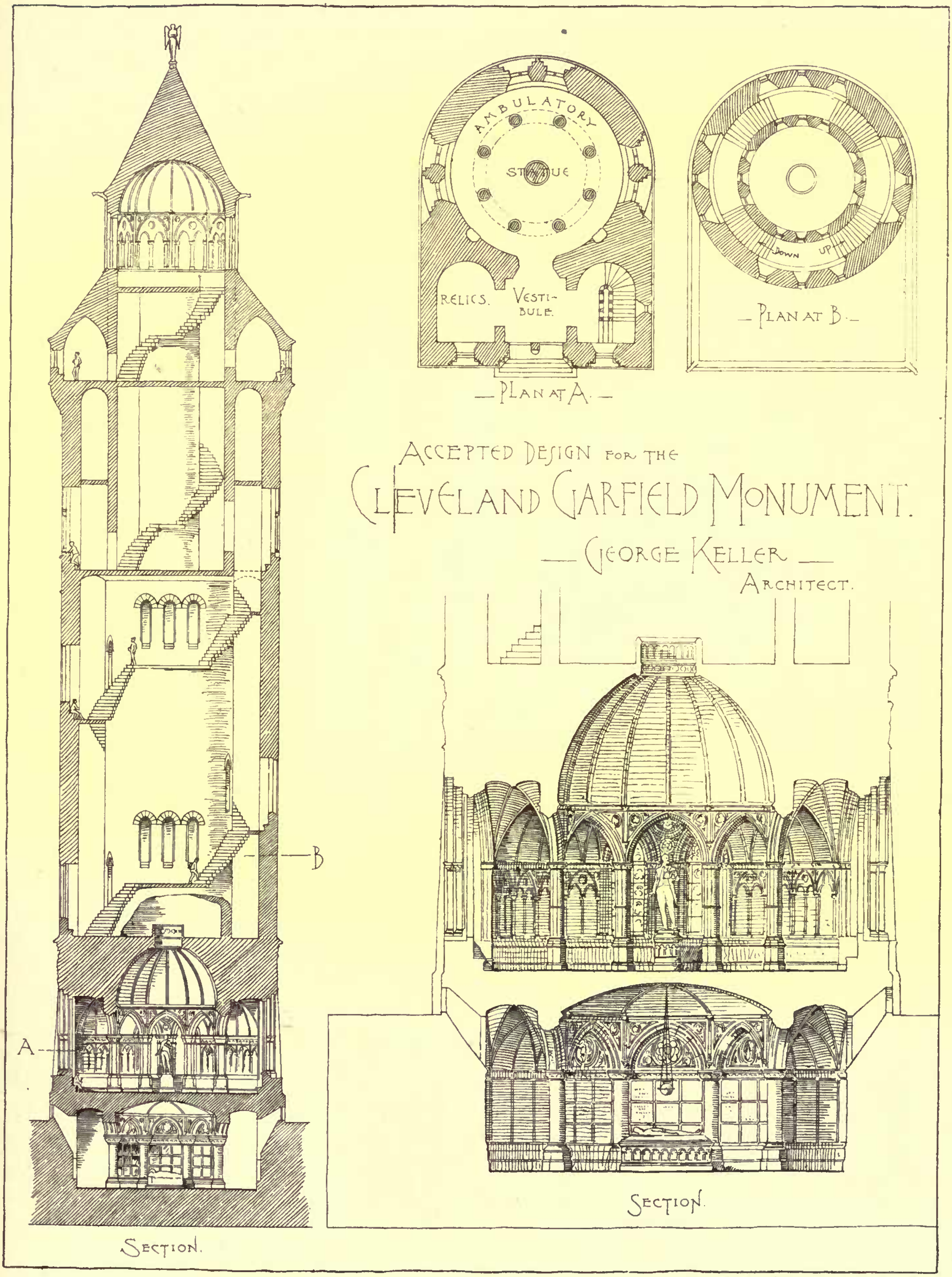

The Ames Building: Bedford & Kingston Streets: Boston: H.H. Richardson Archt
Central Dormer.
Caps in Entrances.
General View.
Sketched by E. Eldon Deane.



The Heliotype Printing Co. Tremont St. Boston.

CATHEDRAL CHURCH OF NOTRE DAME, AT SÉEZ.

West Front



The Heliotype Printing Co. Tremont St. Boston.

upon the episcopal throne, set fire to the adjoining houses, for the purpose of dislodging them, and the church fell a victim to the flames. The act, though unintentional, brought upon the prelate a severe reprimand from the Pope, and Ivo, to repair his fault, undertook a journey to his relatives and friends in Apulia and Constantinople, whence he returned loaded with rich presents, by the aid of which he undertook the erection of a new church upon so large a scale that "his successors, Robert, Gerard, and Serlo, were unable to complete it in fifty years." The cathedral then raised is said to be the same as is now standing, and there is nothing in its architecture to discredit such an opinion. The first stone was laid about 1053; the dedication took place in 1126. Godfrey, archbishop of Rouen, performed the ceremony in the presence of Henry, then duke, who at the same time endowed the church with an annual income of ten pounds.

The diocese of Séez is surrounded by those of Lisieux, Mans, and Bayeux. According to De Mossville, it extended, before the revolution, twenty-five leagues in length, and from eight to ten in width, comprising the districts of le Homee, les Marches, and a part of le Perche. The towns of Séez, Alençon, Argentan, Falaise, Hiesmes, Montagne, and Bellême, together with several smaller towns and five hundred villages, were also included in its limits, as were five archdeaconries, six rural deaneries, and many abbeys and other religious houses. The episcopal revenue was estimated at only ten thousand livres.

The church of Séez may be compared in its architecture, with those of Coutances and of Lisieux; they are unlike, indeed, but by no means different. The points of resemblance exceed those of a contrary description: —

"*facias non omnibus una,*
Nec diversa tamen, qualem decet esse sororum."

Severe simplicity characterizes Lisieux; Coutances is distinguished by elegance, abounding in decoration; Séez, at the same time that it unites the excellences of both, can rival neither in those which are peculiarly its own. On the first view of the church, its mean and insignificant western tower strikes the spectator with an unfavorable impression, which, on nearer approach, the mutilated and encumbered state of the western front is by no means calculated to remove. And yet this western front, all degraded as it is, cannot fail to derive importance from the great depth of the central doorway, which is no less than forty-seven feet, a projection exceeding that of the Galilee of Peterborough Cathedral. It is in the interior that the beauty of the church of Séez is conspicuous. The noble, lofty arches below; the Moresque ornament, like those of Bayeux and at Coutances, in the spandrels; the double lancet arches of the triforium, placed in triplets; and the larger pointed arches above, arranged two or three together, and encircled with arches of the Norman form, though not of the Norman style — all these beauties, added to the enrichments of the sculptured walls and windows of the aisles, render the cathedral, if not the first of Norman religious building, at least in the number of those of the first class.

"*Extremi primorum, extremis usque priores.*"

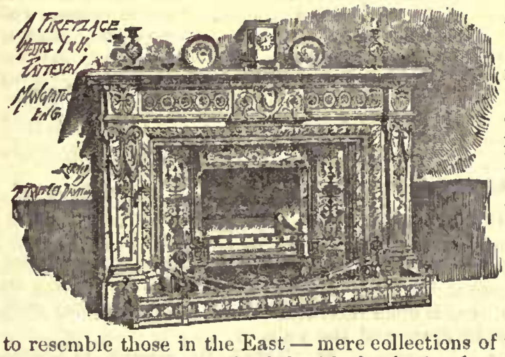
The following are the dimensions of the parts of the building: —

	Feet.
Length of nave (including a space of 64 feet under the towers),	218
" choir.	57
" aisle behind the choir,	14
" Lady-chapel,	25
" each transept,	39
Width of nave and choir, including aisles,	72
" Lady-chapel,	20
" transepts,	30
Height of nave and choir,	80
" north-west spire,	232
" south-west spire,	210

DETAILS FOR THE AMES BUILDING, BOSTON, MASS. MR. H. H. RICHARDSON, ARCHITECT, BROOKLINE, MASS.

We add to those published last week a few more details from this interesting building.

THE CONSTRUCTION OF CHIMNEYS.[1]



Chimneys, at present at any rate, are integral and important features of ordinary buildings in England. It may be that they can and will ultimately be altogether dispensed with, and our towns made, by the progress of economic science, to resemble those in the East — mere collections of flat-roofed boxes; and these may possibly be fed with fresh air of varied temperature, and drained of their fouled air by some parish pump and common heating apparatus. When this scientific millennium arrives, such dwellings may be left to purely scientific men, to whom æsthetic considerations are questions of superfluity.

I have, however, now to speak as an architect, addressing a sanitary conference, upon chimneys as existent, and I wish to show how they can and should be treated, that they may be practically useful and ornamental as well. They have been both in former times; witness the graceful chimney-shafts of Grosmont Castle, Southwell Priory, Hampton Court, and a host of Elizabethan mansions, the acknowledged picturesqueness of which is mainly due to the treatment of their chimney-stacks. Alas! however, they are seldom either useful or ornamental nowadays, as a glance at the skylines of our streets will reveal, since they are almost invariably disfigured by ugly cowls and "tallboys." These are but records of domestic misery and discomfort, every one representing a martyrdom, endured until it became intolerable; and their aggregate cost amounts to a tax upon the inhabitants of our cities, which were it an enforced one, might lead to a revolution. Yet the makers of such monstrosities occupy no inconsiderable space in this very Health Exhibition, and recommend their wares as palliatives for a disease which they assume to be not only universal but inevitable. I maintain that it is not the latter, and need not be the former, and that such costly and ugly excrescences may be altogether dispensed with, if but a little attention be given to the proper construction of these portions of our buildings — chimneys, and fireplaces.

Now, let me ask, why do our chimneys smoke? First, because, as a rule, air is not laid on or provided to houses as water is; but rather, indeed, it is in general sedulously excluded. The more sanitarily impervious (that is to say, air-tight) we make our dwellings, the more necessary it is to provide for the admission of fresh air to their interiors, and, unless this be done, smoke cannot ascend the flues of their chimneys; secondly, chimneys smoke because the fireplaces are ill-constructed, and gathered over from the openings of the fireplaces to the flues in such a gradual manner as to leave large vacant spaces above the grates, which act as reservoirs for stagnant cold air, by contact with which the smoke is chilled and prevented from rising and being drawn at once into the flues; thirdly, chimneys smoke because flues are ordinarily made too large (the usual size is 9″ x 14″); they should rarely be made more than 9″ x 9″; fourthly, because no provision is made in the flues for such down draughts of air as may invade them to expend and exhaust themselves before they reach the fire-place; and fifthly, because the tops of the chimney-shafts are not carefully constructed with guards against wind in a proper and sightly — that is to say, an architectural manner. Usually all such provision is left to be supplemented by some miserable metal makeshifts, by the chimney quacks whose fantastic creations Dickens satirized so keenly, and yet, as it would appear even from this exhibition, quite vainly.

As it is useless to expect that chimneys can properly perform their office, of conducting readily into the outer atmosphere the smoke from fireplaces, unless their construction is proper throughout, I shall treat of the fireplace, flue and chimney-top as a whole, of which the several parts are inseparably connected; and I shall begin at the bottom with the fireplace, as the most important of the three, and the one most commonly in fault in the case of smoking chimneys, although it is generally the last to be noticed or examined with a view to its correction. The grate itself, however, I shall leave for later consideration, though it is by no means of the least importance.

The first thing to be done is to provide a good and sufficient supply of fresh air to the fire-place from the outside of the building. To insure its being good it is well, when possible, to bring this from as high a level as can be arranged, yet not from the top of the chimney-stack, lest smoke from other flues be drawn down thence with the fresh air. It may be drawn from the lower part of the stack, just above the roof, by special air-flues brought down to the chimney jambs. This, however, is not always possible, and then it must be brought in through the walls, or by pipes through the floors. An advantage of bringing the fresh air to the fireplace, rather than to any other part of an apartment, is that even if cold, it does not produce the inconvenient draughts usually complained of. It spreads then upwards and gradually, before being finally drawn up the chimney by the fire in the fireplace; whereas, if admitted elsewhere, its passage is direct to the fire, and unpleasantly so to those who may intercept its course. When no provision for air is made, it has to force its way in at windows and doors, with the same result, made all the worse because of the low temperature at which it enters. The air, however, brought to this point, may be tempered or warmed by being made to pass around the grate before it is admitted to the apartment, and an essential for both comfort and health is that it should be so tempered; every grate, stove, or heating apparatus should, in fact, be thus made the fountain or source whence fresh air is admitted to apartments.

The next point to be considered is that of the outlet of the smoke from the fireplace to the flue. The flue should be here contracted at once to its normal size, or rather made a little smaller, immediately above the fireplace, in order to promote a quick draught of the smoke into it. The usual construction of this part of chimneys, already adverted to, does not conduce to this end. The opening of the fireplace is gathered gradually, in an arched form to the flue, leaving an objectionable space for cold air. Now arch and chimney-bar may be economically dispensed with by forming a mantle-block in Portland cement concrete *in situ*, extending the full width of the wall, and nine inches longer than the opening, and nine or twelve

[1] A paper read by John P. Seddon, at the Conference of Architects at the International Health Exhibition.

inches deep, pierced with the smoke-flue in the centre, and one for warmed air on either side. These may be circular, and about eight inches in diameter, and thus, being slightly smaller than the flue over, will insure a quick draught to the smoke-flue. The side holes are intended as outlets for the fresh air that has passed round the grates, and thus can be conducted by flues built above the mantle-block to gratings for admitting it into the apartment, either in connection with the chimney-piece, or just below the ceiling.

The construction of the smoke-flue from above the central hole in this mantle-block is the next point deserving and requiring consideration. As has been said, this is ordinarily made 9″ x 14″, but hist is too large, and as such becomes a frequent cause of smoking chimneys. Flues should not generally be made more than 9″ x 9″ in brickwork, and are better if lined with fire-clay pipes within such, which reduces them to about eight inches in clear circular diameter. The interior surfaces of the pipes should not be smooth, or else much inconvenience will be caused by frequent small falls of soot, from its being unable to cling to the pipes at all.

Midway between the top of the mantle block and the ceiling line of the apartment, the smoke-flue should have a portion expanded and formed in such a manner as to break the direct line of ascent of the smoke. This is in order to allow down draughts, or gusts of air that have invaded the flues from the top to expend themselves, without checking the smoke as it rises from the fireplace. A flat ledge should be provided in this expanded part of the flue, immediately under the smoke-flue above, that air driven down may impinge upon it, and be diverted, and a sideways rotary motion given to it, directing it upwards again, together with the smoke rising from below. Specially formed pipes can be introduced into flues lined with fire-clay pipes for this purpose, and more than one of these may be inserted in the course of the flues with advantage.

We now have arrived at the chimney-stack above the roofs, and the principal object in its construction is to maintain throughout its warmth, as it is there of course exposed to cold and damp; and it is well known and observed that those chimneys which are in external walls are, from this cause, far more liable than others to smoke. Pervious brickwork becomes saturated by rain, and the flues consequently reduced in temperature are unable to maintain the requisite upward draught. It is well, therefore, for this reason as well as for additional strength, that the chimney-stacks above the roof should be built in cement instead of common mortar, and of impervious bricks or stone and lined with fire-clay pipes.

The tops of the chimney-stacks need careful arrangement, because the exit of the smoke from them is very liable to be disturbed and hindered by gusts of wind, particularly when beneath other high objects in the neighborhood. There should, therefore, be at the top of every flue an expanded space, within which most down draughts of air will rotate and expend their force without invading the flue below; and there should be louvred openings so arranged as to direct the winds upwards, and so make it assist, instead of interfering with or retarding the exit of smoke. This is the object generally, and often rightly attempted by the supplementary cowls, at any rate by the best of them; but it may and should be rather executed in proper architectural form, and durable and sightly materials, such as stone, brickwork or terra-cotta, instead of metal. Terra-cotta is perhaps specially suitable, as being very easily manipulated into the somewhat complicated forms required for the purpose.

So much, then, for the construction of these three parts of a chimney — the fireplace, the flue, and the chimney terminal of the stack. Unless all are well and properly executed, no special appliances for particular parts can be of much avail. I have endeavored to point out the general principles that I think should be attended to in connection with them, and believing that the health and comfort of the community is at present very injuriously affected by their general neglect, I earnestly commend them to the consideration of this Conference.

There is, however, one more part connected with the chimney which is perhaps quite as important as any of the rest with which I have dealt, but what I have to say about it is somewhat more tentative and experimental. This is the grate within the fireplace. Volumes have been written about it, and yet it remains open for discussion, and inviting improvement. My contributions to its literature will be short, and yet it will embody the result of much time and thought expended upon it.

Burning coal principally, as we do in England, we have to seek in the consumption of its smoke, or at least of as large a proportion of it as possible, within the grate itself, the solution of the main difficulties we are considering. For the smoke being consumed, smoky chimneys will be cured. The office of the flue will then be to convey away the gaseous products of combustion only, and not soot. This is, I believe, attainable by means of diverting the current of the smoke, after it has issued from the top of the fire, in such a manner as to force it to pass through the body of the fire before it ultimately is allowed to escape up the chimney-flue. Perfect combustion is, I think, more to be sought than what is called "slow combustion," and it is a mistake in my opinion to smother a fire in its own ashes by preventing their dripping through a grating into an ash-pan. The cheerful aspect of an English open fire is not likely to be driven out of fashion by even Health Exhibitions; nor if it could be, and the attempt were made, do I think that the public salubrity would be improved by the substitution of any description of close stoves in apartments, notwithstanding the preference they have obtained on the Continent, and to a great extent in America. Nor do I believe that any of the systems that have been proposed for keeping up throughout dwellings, an equable temperature, are likely long to curtail the liberty of English subjects to make their several rooms of whatever degree of heat may please their occupants. I should certainly therefore not advise the most ardent believer in such a system to expend capital in building houses otherwise than as at present, or to try to dispense with chimneys, the construction of which I have been dealing with.

But there are many grates shown in this exhibition which presume fresh air to be brought to them, and in which means are provided for warming and distributing such air into apartments, and I cannot too highly commend the system, and advise its universal adoption by the public, and I may point out that this can and should be done, more often than it is, in the case of the kitchen chimney, which is almost always in use, and that the air warmed thereby, not being wanted in the kitchen, should be conducted to the general hall of the house, which supplies air to the rooms whenever their doors are opened, though of course there should be means of shutting it off in summer, when it might prove rather a nuisance than otherwise.

Trusting then that soon, if it be not already achieved by any of the grates shown in this exhibition, that most desirable end, the consumption of smoke within the grate itself will be successfully carried out, I conclude these few observations upon the construction of chimneys, waiting discussion thereon from the members of this Conference.

IS TRAP VENTILATION A MISTAKE?

It is worth while to give as much currency as possible to the *Sanitary Engineer's* disparaging remarks on Mr. Putnam's report to the Boston Board of Health, as, setting aside all questions of personal rectitude, the matter is of much real interest to the public as it affects both its pecuniary and sanitary welfare,— of the upper classes at least.

The question is simply, Is trap-ventilation a necessity?

The *Sanitary Engineer*, with much emphasis, says that it is, and Mr. Putnam says, just as emphatically, that it is not. The *Sanitary Engineer* has for years been committed to the advocacy of the efficiency of trap-ventilation, and has been a most active and successful promoter of the trap-vent laws now enforced by many boards-of-health, and if it would consent to modify its efforts, so that a reasonable discretion in the use of trap-vents should be allowed to practitioners of at least equal intelligence and experience with those of the conductors of that journal, we would most cordially agree that its untiring efforts in this direction had been productive of great good. But until we are prepared to admit that the devisers and framers of "cast-iron" laws on any subject have absorbed the sum and substance of all past, present and future knowledge of the subject of such legislation, and that all the rest of mankind have only intelligence enough to do as they are told to do, we shall consider that the "last word" on any subject has not been said, so long as there exists a man who can formulate a reasonable and intelligent adverse conclusion. In the matter of sanitary science, particularly, we stand ready to retract, modify or reaffirm any statements we have made or may make, according as the future advances made in the science may require.

We have private information which leads us to believe that the *Sanitary Engineer* opposes Mr. Putnam's conclusions, and maintains its belief in trap-ventilation as the *summum bonum* of sanitary science, not only because it would be disagreeable for its editor to recant, but that it does so as a mere matter of expediency. That is, it believes that the evils which certainly arise from trap-ventilation are of less consequence than those which would arise from the absence of such ventilation. To a degree the championing of trap-ventilation as a measure of expediency is defensible; but the position can be maintained with dignity, without asserting that it is not possible to achieve the same security by other means, or by indulging in reflections on the character of those who differ from it. To us it seems that it would be a higher aim to search out and declare the whole truth, rather than to stop short at an expediency.

The *Sanitary Engineer* in its last issue, makes its apologies to Mr. Putnam for its flings at his character, but in so doing ingeniously contrives to convey the impression that Mr. Putnam has done something which he really ought not to have done. The argument that an investigator cannot make an honest investigation if he have an interest in the result would have a singular application to any past investigation or discovery.

Mr. Putnam did *not* "place himself before the public as an expert endeavoring to introduce an improvement in sanitary appliances"; he appeared before the public as an investigator during whose authorized investigations a discovery was made, which he was as clearly entitled to benefit by as is the journeyman who discovers a means of improving his master's machinery on which he is at work.

The heinousness of the crime appears to lie in the success of the discovery. Other patent traps were, as stated, tested by Mr. Putnam at the request of the Board of Health, though the action of pot-traps was the special subject of inquiry, and we are willing to believe that had any of them stood the tests as satisfactorily as did his own, the fact would have been duly recorded in the Report.

We think, too, that whatever may have been the defects of the apparatus, or the bias of the observer, the value of the tests as comparative records, made under similar circumstances, need not have been passed over in silence.

Turning to our own remarks, the *Sanitary Engineer* says: —

"In this connection we notice that the *American Architect and Building News*, in its last issue, expresses indignation at our treatment of the case, and is evidently but poorly informed on the subject. We are complained of for not having "investigated both sides," when we were not aware that any controversy existed."

As to our being "poorly informed," it might have been guessed that, even supposing the source of our information to be Mr. Putnam, our information was better than its own, seeing that we had the benefit of Mr. Putnam's statement, *plus* those which the *Sanitary Engineer* puts forward as the statements of the other interested parties. We may also say that we were unaware that an "investigation" could be made only of a matter in "controversy," and also that in nature, as in logic, things have usually more "sides" than one.

It then continues: —

"The *Architect* thinks 'Mr. Philbrick and Mr. Bowditch made a mistake in withdrawing their assistance.' The fact is, these two gentlemen were never employed in the case by any one. They consented, at the request of the Chairman of the Board of Health, and Mr. Putnam, to be present at some experiments, merely as a personal favor to these gentlemen, having had no voice in the preparation of the apparatus. They soon found that this apparatus was, in their opinion, so defective that no value could be attached to the results, and they so reported to the Board of Health at once."

If Messrs. Philbrick and Bowditch — we regret exceedingly to drag their names into the discussion — "were never employed by any one," as any one who reads the article in the *Sanitary Engineer* of August 7 would certainly be justified in thinking they were "employed" by the Board of Health, why was it sought to clothe the action of these private individuals with a glamor of officialism, and why should Mr. Putnam solicit their signatures to his report, and why, again, should these gentlemen have "so reported to the Board of Health at once"?

We freely admit that this rejoinder is just about as disingenuous as the *Sanitary Engineer's* manner of replying to our criticism of the action of these gentlemen.

The *Sanitary Engineer* then goes on to say that: —

"The *Architect* further states that the criticism made by these gentlemen concerning the defects in the apparatus is a 'quibble,' and 'an old tale of disagreeing doctors. On the one side stand Philbrick, Bowditch and the *Sanitary Engineer*, on the other Putnam and Waring. Whether a quibble or not, further experiments will doubtless show. But we doubt if Col. Waring, or any other sanitarian of good sense and experience, will advocate the construction of four-inch branches in a soil-pipe, without extending them of full size to the open air. If he or any other 'doctor' does so, we shall certainly disagree with him and let the case stand on its merits."

Our arraying of Messrs. Putnam and Waring against Messrs. Philbrick, Bowditch, and the *Sanitary Engineer*, was not, as is here made to appear, on the matter of what was "good practice," and whether the apparatus used fell under that head, but was done simply because the subject is one of trap-ventilation or no trap-ventilation, and we arrayed in this way the most pronounced advocates of either system. We do not see why Colonel Waring is here set up as a man of straw, only to be knocked down for advocating a method of construction which, so far as we know, it has never entered his mind to carry out.

The reply then closes as follows: —

"We would recommend to the editor of the *Architect* to try the experiment himself, as to the difference between a two-inch and a four-inch branch under the circumstances referred to before taking such a decided tone in condemning our reasoning, which we still believe to be correct. Its accuracy can be proved by any candid person who cares to make the trial. We stated that four and one-half gallons of water "would form a solid piston in a four-inch pipe seven feet in length, or longer if somewhat scattered," and we are not inclined to abate a single inch of this statement, which any one can verify in five minutes. If we assumed from Mr. Putnam's diagram that it fell some forty feet, when it actually fell only twelve feet, the scattering would be much less than we supposed probable."

We do not recognize in our previous remarks the "decided" tone about the 4″ x 4″ branch, which is here objected to. We did suggest the possibility of a *reductio ad absurdum*, but then it was a very modest suggestion, with little that was didactic or "decided" about it.

If the *Sanitary Engineer* or the gentlemen who support its views, will put themselves squarely on record as to how far this 4″ x 4″ branch vitiated the results obtained by Mr. Putnam, theoretically or practically, we will then furnish them with an account of the experiment it here advises our making.

We make this suggestion or challenge, simply because after two months consideration the upholders of the trap-vent law have been able to challenge the credibility of Mr. Putnam's elaborate experiment and the justness of his conclusions in only two particulars, the style of closet used, and the use of the 4″ x 4″ branch; all else appears to be satisfactory beyond criticism. It is therefore a matter of considerable interest to the parties to the discussion, and still more so to the public, that the question having been narrowed down to this point should be settled definitely, now and at once.

Either the presence of the 4″ x 4″ branch was a great defect, and produced such serious practical effects that the conclusions from the experiments must be admitted to be valueless, or else the presence of this branch produced no practical effect on the experiments, or such effects as were only in favor of the trap being tested. If the first position, that upheld by the *Sanitary Engineer*, can be maintained, then one of the arguments against trap-ventilation, to wit: that the vent-pipe fails to fulfil its purpose, must await further demonstration, and until such time the public must pay for its trap-ventilation. But if it can be proved that the 4″ x 4″ branch (the use of which is really the only point that has been assailed) did not practically affect the results, then Mr. Putnam's conclusions are seemingly beyond attack, and the public should learn at once that trap-ventilation is not the safeguard it is asserted to be.

We never denied that "4½ gallons of water in a 4-inch pipe would form a solid piston seven feet in length," although we had not calculated the cubic contents of seven feet of 4-inch pipe; but our disbelief in the continued solidity of this seven foot piston after a fall of forty feet, is not exactly shaken by finding the statement reiterated as above, with the important omission of stating at what point of its fall it is now to be measured. As an expression of concomitant condition of matter, a "somewhat scattered" solidity is worth noting for future use.

COPY OF AGREEMENT WHICH THE MASTER PLUMBERS' ASSOCIATION WISHES THE DEALERS AND MANUFACTURERS TO SIGN, AND THEIR REPLY.

Propositions presented to the Associations of New York and Brooklyn, and adopted unanimously:

I. *That the Manufacturers and Dealers in Materials* shall not sell to others than *Licensed Plumbers* who shall exhibit a *Certificate duly signed* by the *President and Secretary* of their respective Association. *This Certificate* guarantees that *such Plumber* is entitled to all privileges, and be renewed every three months. Approved.

II. *That no Manufacturer or Dealer shall figure on Plans or Specifications* for any person, whether engaged in the *Plumbing Business* or not. Approved.

III. *That no Plumber, Manufacturer or Dealer in Patented Articles* shall sell to others than *Licensed Plumbers* as stipulated in Article I. Approved.

IV. *That any Plumber who waives his discount in favor* of his Customer shall be dealt with *as one not entitled* to the regular *Trade Discounts*, and his *Certificate* shall be revoked and remain so until he be properly reinstated and *receive a new Certificate from his Association.* Approved.

V. *That Manufacturers and Dealers shall not furnish* Repairs, or do the same, except through a *regularly Licensed Plumber.* Approved.

VI. *That Manufacturers and Dealers shall not become Sureties for the fulfilment of any Plumbing Contract.* Approved.

VII. *That where Manufacturers and Dealers require Security* from Plumbers, such Security shall not be accepted from any interested party, *whether Owner or Contractor.* Approved.

VIII. *Agents of Manufacturers and Dealers shall be prohibited* from selling Plumbing Goods to any person other than those stipulated in Article I. Approved.

IX. *That the Manufacturers and Dealers pledge themselves* not to sell or deal with any person or persons other than those stipulated in Article I. Approved.

THE MANUFACTURERS' REPLY.

MR. A. YOUNG, *Chairman National Association Master Plumbers of the United States*: —

Dear Sir, — We much regret the receiving from your Association the set of resolutions which we now most respectfully return. We regret it for the simple reason that we do not like to feel that a document so untenable, so unbusinesslike, so opposed to all the established laws of commerce and trade, both written and unwritten, should have emanated from your body, and which, were it possible to carry into effect, would not only, in our opinion, be ruinous to your business, dishonorable to yourselves, but would place you in the very unenviable light of extortionists, before the eye of the public. To say that we cannot give it any consideration seems almost like reiteration; nor can we yet believe that it represents the intelligence, or that it is the result of the thoughtful and deliberate majority of your craft.

We further regret the position you have placed us in, as we are most desirous of furthering the interests of the plumbing trade, recognizing how largely our interests are mutual. Why you, as intelligent men, do not see and appreciate this fact, we are at a loss to explain; it cannot be possible that you so underrate our business ability and common-sense that you imagine we cannot see that the most friendly and intimate relations with the plumbing trade is to be desired by us above all things. Furthermore, we must embrace this opportunity of stating *most distinctly* that we find no just cause for any *special protection* other than that which the usual and accepted laws of commerce accord alike to all. That misunderstandings do occur, that there should be friction sometimes, is only in the nature of all human things, and no set of resolutions can make it otherwise; but why these matters cannot be adjusted by the usual business methods in the future, as they have been in the past, we fail to see.

Finally, let us ask you, and believe that we do so in the most friendly spirit, do nothing rashly; confer with the less impulsive and conservative members of your Association; also, remember that a great deal of good may result from mutual confidence and friendly intercourse, while combinations, threats, and such like, will only tend to provoke opposition. And let each one, whether Buyer, Maker or Dealer, look to a well-earned reputation for upright and honorable dealing as the only lasting and safe protection of their interests.

Respectfully yours,

Fred Adee & Co.,	Durham House Drainage Co.,
Abendroth Bros.,	Wm. H. Hussey,
Myers Sanitary Depot,	Staats & Dillmeier,
Tatham & Brothers,	Henry Huber Co.,
The J. L. Mott Iron Works,	Williamsburgh Lead Pipe W'ks,
McNab & Harlin M'f'g Co.,	The E. G. Blakslee M'f'g Co.,
The Meyer Sniffen Co., Limited,	L. Waefelaer Co., Limited,
Mayor, Lane & Co.,	Geo. D. Kimber & Son,
Chas. Harrison & Co.,	Cassidy & Adler,
Miller & Coates,	Jamer, Jacobs & Co.,
Ronalds & Co.,	Thomas Maddock & Sons,
Henry Steeger & Co.,	Peck Bros. & Co.,
Jochum & Jetter,	David Morrison,
James Bulger, Jr.,	The Le Roy Shot & Lead M'f'g Co.,
Theodore Susemihl,	Hunter Keller M'f'g Co.,
L. Brandeis & Son,	Bird, Faulkner & Co.,
J. Trageser Steam Copper W'ks,	T. R. McMann & Bro.,
Colwell Lead Co.,	J. C. Bryan,

Henry McShane & Co.

A QUESTION OF CUSTOMARY PRACTICE.

Savannah, Ga., Aug. 18, 1884.

To the Editors of the American Architect: —

Dear Sirs,— Will you be kind enough to inform me through the columns of your valuable paper the customary practice of the profession in the following case? I was employed, by Mr. H., to design and erect a residence at the usual five per cent; he was to supply the grates and mantels, but the contractor was to set them. He intended getting mantels from the dealers, but changed his mind during progress of the work, and requested me to make designs for the six mantels required, and to see that the contractor carried out the drawings. Now the point I wish to ascertain is, have I the right to charge extra for this work, or should the five per cent commission cover it, no extra bargain being made with Mr. H., he simply giving me the order to have the mantel drawings prepared and the work of making them superintended? Very truly yours, J. J. N.

[This mantel question is a rather vexed one, but we will give the same answer that we gave once before, apparently with the approval of the profession generally. This answer is: That, although mantels by themselves are to be classed as furniture, and cannot profitably be designed and the execution supervised, for a smaller charge than ten to twenty-five per cent on the cost, or even more, it is nevertheless customary for architects to include the designing of the mantels for their buildings, or the selection, which is worth quite as much, in the general commission of the building. J. J. N.'s case is different from most, as his original agreement was to design and supervise the work without mantels; and his client, in requesting him to undertake them as a separate matter, probably expected and intended to pay him suitably for his trouble. But we think he would do best to show his amiable feeling toward his client, and his interest in the house, by making his charge for the mantels as near the five per cent, to which he would, of course, be entitled, as he could without actual loss. — Eds. American Architect.]

FOR THE BENEFIT OF ARCHITECTURE IN AMERICA.

Des Moines, August 19, 1884.

To the Editors of the American Architect: —

Dear Sirs, — There appeared in your issue of May 17th, a column of letters in reply to your "open letter on competitions."

Architecture will be benefited in America by your publishing, as a contrast, the following letter, received by the D. M. Association, endorsing the more civilized, Continental, "intensely" anti-British, but not yet American system of demanding competent judges of architectural competitions.

[Copy of letter.]

St. Paul, Minn., August 9, 1884.

Mr. E. H. Taylor, *Sec'y Architectural Ass'n, Des Moines.*

Dear Sir, — Your several circulars concerning professional practice and competitions among architects were received several days ago.

I wish to say that I heartily accord with the principles you enunciate, and have been, will, and am doing all I can in my private way to forward the ends desired.

I believe that by a dignified, consistent course of action; a careful self-cultivation in the principles of design and construction; and a positive refusal to subordinate principles to money-getting; together with a realization of the fact that architects as well as the general public are apt to be wrong, which should keep us ready to judge of all things with unbiased minds, will, in a near future, enable us to gain our point, and elevate our art. Yours sincerely, ——

This letter has the ring of good metal in it. Any such metal you may have in *New* England, we shall be glad to see at Chicago this fall. D. M. A.

NOTES AND CLIPPINGS.

A Trades-Union Outrage.— The *Metal-Worker* says that a horrible union outrage occurred at Bradford, Pa., a short time ago. The glass works at that place, which have been shut down for a month, were about to be reopened with non-union men. A French foreman had been engaged, and on the day mentioned he and two others were at the works. The union men previously employed are Belgians. A gang of them suddenly attacked the works, secured the French foreman, and deliberately gouged out his eyes, lacerating the eyeballs in a terrible manner, but inflicting no other injury. He will lose both eyes, and will probably die. One of the strikers said that the non-union men would be helpless without the aid of the foreman, who was a skilled workman; therefore they put out his eyes. Five of the strikers were arrested, and warrants are out for sixteen more. Such an outrage is calculated, we should suppose, to sensibly diminish the "respect" that Mr. John Beverly Robinson entertains for the methods of strikers.

Burning of the Royal Armory, Madrid. — The recent burning of the Royal Armory, at Madrid, is a calamity the full force of which will be most appreciated in the world of art, which by the catastrophe sustains irreparable losses. The armory occupied one wing of the great palace, which is a pile of granite and white stone, 470 feet square and 100 feet high, with a central court 240 feet square. The collection of armor was, beyond compare, the finest in the world. Superb coats-of-mail of all epochs, cunningly wrought by master artificers; armor on which had been expended the treasures of the artist's imagination and all his wonderful resources of skill; shields wrought by the geniuses of Augsburg, Florence and Milan, the best and most complete collection in existence of Toledo and Damascus blades — these were but a part of the peculiar furnishings of the great armorial hall of the Alcazar. In addition to the display of armor, there were treasures from the easels of the old masters of painting, Velasquez, Tintoretto, Murillo, Paul Veronese, Rubens and other names no less famous being here represented by works of surpassing beauty and grandeur. The greatest number of paintings in the palace, however, are in the picture-gallery at some distance removed from the armory, and these art treasures have probably escaped uninjured. It is to be hoped that the earlier reports of damage by the flames will prove exaggerated. — *Metal-Worker.*

Excavations at Zoan. — A few weeks ago, Mr. Petrie reported the discovery at Tanis in the Delta (Zoan of the Bible), of a "colossus of colossi," exceeding in size any human statue of which there is record — of hard granite and higher, if placed erect, than the nave of Westminster Abbey. Now he reports among many interesting unearthings, the finding of a huge granite sarcophagus in a royal tomb. It is 14½ feet in length, 7 feet and 9½ inches in width, and 8 feet in height, or considerably larger than the famous sarcophagus of the Apis in the Serapeum at Sakkarah, near Cairo. Near by, a portion of a black granite sphinx bore the cartouche of Rameses III, the first king in the dynasty succeeding that of the great oppression of the Israelites. The able and successful labors of Mr. Petrie at Zoan are followed by many people with deep interest, and his report in full of nearly five months' labor at Zoan, soon to be given at the general meeting of the Egypt Exploration Fund Society, will be a highly valuable archæological and historical document. The appeal for aid by Rev. W. C. Winslow, of Boston, has met with a cordial response from men representative of scholarship and official station. The undertaking is a vast one, such as only a Petrie, a Naville or a Maspéro can properly manage, and cause to yield rich results. The explorations will be resumed in the autumn. — *Springfield Republican.*

Patent Fuel in France.—The United States Commercial Agent at Nantes says that the coal dust, which was formerly rejected as worthless, is now consumed in immense quantities in France in the form of "patent fuel," or coal bricks. The natural supply of dust from the yards of the coal merchants being entirely insufficient for the needs of the brick works, the manufacturers, particularly in the Nantes district, import a large quantity of coal-dust from Cardiff, Swansea and Newport. The process of manufacture is very simple. The coal-dust is mixed with pitch, and the mixture poured into cups attached to a belt, each cup containing just enough material for a brick of the size desired. The belt in its movement passes this material through a chamber where it is exposed to steam which fuses the two substances into a homogeneous mass. This is poured by the descent of the belt into moulds, where it is subjected to an enormous pressure by a hydraulic press or by machinery set in motion by a steam-engine. The brick is square in form, its thickness being about one-third of its other dimensions, and it weighs five, ten or fifteen pounds. Certain of the French railway companies refuse to accept fuel unless at least ten per cent of pitch has been used for its agglomeration. It is stated that *briquettes* are preferable to ordinary coal for exportation to the colonies and to warm climates on account of their compact storage and freedom from small fragments and dust, also for use on locomotives, both on account of economy and space, and because firemen can always determine the amount of fuel they are employing in a given time, the weight of each brick being exactly known. The manufacturers claim that the "patent fuel" is more healthy for domestic use than ordinary coal, citing in support of this theory the declaration of certain well-known physicians. At the present day a number of bricks are made for domestic use, of small size, and perforated with circular or longitudinal openings. — *Journal of the Society of Arts.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

303,610. Knob Attachment. — James Reuben Binns, South Windham, Conn.
303,615. Pipe-Joint Packing. — Cotter T. Bride, Washington, D. C.
303,623. Chimney-Cap.—Robert H. Craighill, Buffalo, N. Y.
303,633. Friction-Hinge. — Wm. E. Gard, Meriden, Conn.
303,636. Safety-Bolt. — Perkins A. Gordon, Milan, Conn.
303,638. Fire-Escape. —Arthur H. Hall, Chicago, Ill.
303,640. Sink-Trap. — Benjamin Holland, Jr., Providence, R. I.
303,647. Vise Attachment. —Theodore E. King, Westport, Conn.
303,654. Window-Bead Fastener. — David Carruthers McGregor, East Oakland, Cal.
303,666. Combination-Tool. — Fred'k W. Ritchie, Vanceborough, Me.
303,667. Steam-Heating Apparatus. — Charles W. Rugg, Cambridge, Mass.
303,685. Awning. —Nelson S. White, Canton, and James E. Stevens, Stoughton, Mass.
303,707. Disinfecting Apparatus for Water-Closets. — Edward Mason Chase, Boston, Mass.
303,709. Brick-Machine.—Samuel P. Crafts, Hamden, Conn.
303,712. Valve for Water-Closets.—John Demarest, New York, N. Y.
303,730. Sash-Cord Fastener.—Frederick S. Heiser, Brooklyn, N. Y
303,741. Sash-Holder. — John N. McGriff, Anderson, Ind.
303,752. Monkey-Wrench.—Gustavus B. Sanborn, Bristol, N. H.
303,765. Safety Device for Hot-Water Boilers. — Wm. A. Tracey, Philadelphia, Pa.
303,792. Burglar-Alarm.—Emil Baumbach, New York, N. Y.
303,822. Safety Fluid-Trap. — Rudolph D'Heureuse, New York, N. Y.
303,830. Portable Caisson for Use in Building Subaqueous Structures. — Henry Flad, St. Louis, Mo.
303,846. Water-Closet Valve. —Wm. J. Hearn, New York, N. Y.
303,856. Combination Fire-Proof Arch.—Henry G. Isaacs, St. Louis, Mo.
303,858. Basin-Trap Clearer. — James E. Kelsey, Brooklyn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report twenty-two permits have been granted, the more important of which are the following: —

E. S. Dillon, two-and-one-half-st'y brick building, s s Baltimore St., e of Payson St.

Ang. Hanneman, 9 two-st'y brick buildings, e s Ann St., bet. Chase and Biddle Sts.

Jacob Gerwig, 13 three-st'y brick buildings, w s McCulloh St., bet. Gold St, and North Ave.

Emily J. Cromer, 6 two-st'y brick buildings, n s Preston Pt., com. n e cor. Valley St., and two-st'y brick building e s Valley St., n of Preston St.

George Gogel, 2 three-st'y brick buildings, n e cor. Fulton and Patterson Aves.

Geo. Worick, 2 two-st'y brick buildings, e s Ensor St., s of Hoffman St.

J. H. Sudrink, three-st'y brick building w s Belair Ave., n of Oliver St.

Boston Fear, 2 two-st'y brick buildings, w s Bruce Alley, s of Presstman St.

Clement Smith, three-st'y brick building (square), s s Preston St., bet Eutaw St. and Linden Ave.

Boston.

Building Permits.— *Brick.— Thatcher St.*, rear No. 3, Ward 7, for Rutland Marble Co., stable, 20' and 22' x 24' and 29', two-st'y flat; John Keeley, builder.

Wood.—Sycamore St., near Ashland St., Ward 23, for Robert Wright, dwell., 15' x 15' and 24' x 28' 6", two-st'y pitch; Chandler, Gilman & Jones, builders.

Water St., No. 7, Ward 5, for Moses Pond & Co., storage, 12' x 40', one-st'y pitch; A. R. Nickerson, builder.

Washington St., opp. Allston St., Ward 25, for Samuel S. Leonard, milk room, 12' x 27', one-st'y pitch; Stephen Holmes, builder.

Union Ave., near Green St., Ward 23, for Patrick McDonald, 2 dwells., 6' x 36' and 12' x 16', two-st'y pitch; Geo. A. Cahill, builder.

Tremont St., No. 1601, Ward 22, for Daniel J. O'Keefe, dwell., 25' x 57' 6", three-st'y hip.

Taylor Ct., off River St., opp. Temple St., Ward 24, for John Taylor, stable, 24' x 58', one-st'y pitch; John Taylor, builder.

Neponset Ave., near Commercial St., Ward 24, for Silas Putnam, dwell., 20' x 28', one-st'y pitch; H. P. Oakman, builder.

Bennett St., rear, near Parsons St., Ward 25, for Pierce Quirk, stable, 20' x 28', one-st'y pitch.

Enfield St., rear, near Hazel St., Ward 23, for Warren J. Stokes, stable, 20' x 24', two-st'y pitch; Warren J. Stokes, builder.

Baker Pl., rear, off Baker St., Ward 23, for Wm. Cronin, stable, 15' x 20', one-st'y pitch; Dennis Cronin, builder.

Moore St., near Saratoga St., Ward 1, for Geo. C. Doyle, dwell., 21' x 30', two-st'y flat; G. V. Goodwin, builder.

Unnamed St., off Florence St., opp. Handcock St., Ward 23, for John Richardson, coal-shed, 30' x 100', one-st'y pitch.

Salem St., near Basto Pl., Ward 23, for Samuel W. Bridge, dwell., 12' x 14' and 21' x 30', two-st'y pitch.

Poplar St.; cor. Charles St., Ward 23, for Chas. J. Page, dwell., 24' x 34', two-st'y pitch; John Alden, builder.

Baker Ct., rear, near Dorchester Ave., for Henry L. Pierce, stable, 30' x 50', two-st'y pitch; Jas. Pope, builder.

Seaver St., near Walnut St., Ward 21, for F. W. Dahl, stable, 30' x 40', two-st'y mansard; Valentine Bock, builder.

Attwood Ave., rear, near Day St., Ward 22, for Sarah H. Seaverns, dwell., 14' x 18' and 26' x 33', two-st'y hip; A. Cassidy, builder.

Brooklyn.

Building Permits.—*Eighth St.*, n s, 301' 10" w Sixth Ave., one-st'y brick church, slate roof; cost, $10,000; owner, Hanson Pl. M. E. Church, cor. Hanson Pl. and St. Felix St.; architect, John Mumford; builders, J. Ashfield & Son and Morris & Selover.

Berkeley Pl., No. 220, three-st'y and basement brick dwell., tin roof, iron cornice; cost, $10,086; owner, Mrs. C. S. Brakeley, 451 West Twenty-first St., New York; architect, John Sexson; builder, James K. Spratt.

Broadway, No. 1029, n e cor. Lafayette Ave., three-st'y store and tenement, tin roof; cost, $9,165; owner, Peter D. Kenney, 192 Devoe St.; architect, Th. Engelhardt; builders, Geo. F. Cutler and R. B. Ferguson.

Nineteenth St., n s, 415' w Third Ave., two-st'y frame straw hat factory, tin roof; cost, $2,800; owner, Elizabeth Parsons, Thirty-ninth St., cor. Second Ave.; architects and builders, Spence Bros.

Broadway, No. 781, e s, 25' s Wall St., three-st'y store and dwell., tin roof; cost, $7,000; owner, J. M. Otto, 453 Grand St.; architect, Th. Engelhardt.

Broadway, No. 779, s e cor. Wall St., three-st'y brick store, office and dwell., tin roof; cost, $9,000; owner, etc., Th. Engelhardt, 16 Fayette St.

Manhattan Ave., w s, 100' s Calyer St., four-st'y brick store and tenement; cost, $8,500; owner, Isaac Abrams, on premises; architect, Frederick Weber; builder, M. Smith.

Nassau Ave., s s, between Leonard and Eckford Sts., 12 three-st'y brick tenements, tin roofs; cost for all, $45,600; owner, John Englis, Sr.; architect, Fr. Weber; builders, John B. Woodruff and S. F. Bartlet.

Rodney St., s s, 144' w Bedford Ave., 2 three-st'y brown-stone dwells., tin roofs, wooden cornices; cost, each, $6,000; owner and builder, James Haughran.

Franklin Ave., s w cor. Bergen St., four-st'y brick store and tenement, tin roof; cost, $12,000; owner, Christian Schimersal, 669 Pacific St.; architect, A. Herbert; builder, Jacob Schoch.

Myrtle Ave., n s, 100' e Lewis Ave., two-st'y brick stable and hay-loft, felt and gravel roof; cost, $15,000; owner, Brooklyn City R. R. Co., 10 Fulton St.; architect, A. W. Dickie.

Newel St., w s, 366' n Van Cott Ave., three-st'y frame (brick filled) tenement, gravel roof; cost, $4,300; owner, F. Thos. Aspern, New York; architect, Fr. Weber; builders, Port & Walker.

Madison St., n s, 200' e Stuyvesant Ave., 3 two-and-one-half-st'y brown-stone dwells., tin roofs; cost, $4,000 each; owner, G. DeRevere, 663 Greene Ave.; architect, Amzi Hill.

Private St., between Baltic and Butler Sts., 115' w Third Ave., 24 two-st'y brick dwells., gravel and felt roof; cost, each, $2,500; owner, James W. Dearing, 434 Henry St.; architects, Parfitt Bros.

Eleventh St., s s, 197' e Fourth Ave., 6 two-st'y brick dwells., tin roofs; cost, each, $3,500; owner and builder, C. B. Sheldon.

Chicago.

Building Permits. — St. Aloysious Church and School, 495–501 Davis St.; cost, $12,000; architect, D. Bess.

Mrs. M. O'Brien, two-st'y stores and flats, 240 North Market St.; cost, $4,000.

D. Culrich, two-st'y flats, 467 Superior St.; cost, $2,500, builder, A. Kollhurst.

Archbishop Feehan, barn, 615 North State St.; cost, $20,000; architects, Willett & Bashley; builders, Robinson & Miner.

M. Mooney, two-st'y store and flats, 2358 Cottage Grove Ave.; cost, $6,000.

C. Silet, cottage, 187 Bissel St.; cost, $2,700.

W. A. Passarant, three-st'y hospital, 188–192 Superior St.; cost, $25,000; architect, Charles Birkner, builders, Sleinmetz & Ellenberger.

D. Levy, two-st'y flats, 17 Cornelia St.; cost, $4,700.

J. Jancek, three-st'y flats, 760 Allport Ave.; cost, $4,400.

J. Wilimosky, three-st'y store and flats, 593 Blue Island Ave.; cost, $8,000; architect, P. W. Reibl; builder, A. Lula.

R. Ruble, two-st'y dwell., 233 Ashland Ave.; cost, $10,000.

W. R. Loveland, three-st'y flats, 205 Third Ave.; cost, $5,000.

J. Devoos, two-st'y dwell., 191 Racine Ave.; cost, $2,500.

P. Hardy, three-st'y store and flats, 383 Maxwell St.; cost, $8,000; architect, J. W. Warner.

McCormick Harvester Co., three-st'y warehouse, Leavitte St.; cost, $25,000.

D. A. Titcomb, two-st'y flats, 12 Plumb St.; cost, $3,500; architect and builder, W. J. B. Hunter.

A. & V. Deip, 2 cottages, 722–724 California Ave.; cost, $3,000.

M. Mulvey, two-st'y dwell., 337 West Huron St.; cost, $3,000.

C. W. Boynton, three-st'y dwell., 388–390 Ontario St.; cost, $10,000.

Thos. Murphy, cottage, 464 Dayton St.; cost, $2,600.

J. Racby, two-st'y dwell., 492 Superior St.; cost, $4,000; architect, E. Saudelbach.

P. Metzger, two-st'y store and dwell., cor. Thirty-first and Wall Sts.; cost, $4,500.

T. B. Blair, 3 cottages, 3616–3620 Lasalle Ave.; cost, $4,500.

O. Meller, two-st'y dwell., 314 Twenty-second St.; cost, $4,600; architect, T. Frank; builder, C. Spoor.

W. H. Knox, three-st'y flats, 873 Van Buren St.; cost, $6,000.

Turner & Bond, 4 cottages, Idaho St.; cost, $6,400.

H. H. Porter, two-st'y addition, 311 Erie St.; cost, $2,500; builder, L. Dweich.

F. B. Clarke, 5 two-st'y dwells., 59–65 Robey St.; cost, $8,000; architect, R. Ray; builders, Geo. Lehman & Son.

J. P. Bell, two-st'y dwell. and store, 621 North Clark St.; cost, $3,500.

R. & D. Gibson, two-st'y dwell., Washtenaw Ave.; cost, $3,000.

Cincinnati.

Building Permits.—W. Fair, three-st'y brick building, Bair St., between Mound and Cutler Sts.; cost, $5,000.

J. Bergfeld, three-st'y brick building, w s of Sycamore St., between Woodward and Franklin Sts.; cost, $3,000.

Ph. Paul, two-st'y brick building, Fort Ave., between James and Rachael Sts.; cost, $3,600.

J. H. Wolf, three-st'y brick building, e s Kendell Ave., between Bank and Central Aves.; cost, $4,000.

A. N. Roberts, addition, 298 Vine St.; cost, $3,200.

M. A. Nathan, three-st'y brick building, 330 West Sixth St.; cost, $5,000.

Louis Shutz, three-st'y brick building, e s State Ave., between Storrs and Stable Sts.; cost, $4,000.

Wm. Strekamp, three-st'y brick building, e s State Ave., between German and River Road; cost, $3,000.

Total cost, $30,800.

New York.

Store. —For Mr. M. H. Rosenstein, a six-st'y and basement store, 23' x 130', iron front, is to be built at No. 102 Bleecker St., at a cost of about $65,000, from designs of Mr. Alfred Tucker.

Flats. —On the n e cor. of First Ave. and Eighty-third St., 5 five-st'y brick, brown-stone and terra-cotta flats, three 25' x 70', one 27' x 85', and the other 26' x 85', are to be built at a cost of about $80,000, by Mr. P. Braender, from plans of Mr. John Brandt.

At No. 385 First Ave., a five-st'y brick and stone flat, with store, 25' x 81', is to be built by Mr. W. B. Boyd, at a cost of $18,000, from designs of Mr. J. Hoffmann.

On the s s of One Hundred and Thirty-third St., 80' e of Madison Ave., 2 five-st'y brick, brown-stone and terra-cotta flats, 27' 6" x 76' each, are to be built at a cost of $35,000, for Mr. Frank M. Clemens, from designs of Mr. J. Brandt.

Building Permits.—*Bergen Ave.*, w s, 49' s One Hundred and Fifty-third St., three-st'y frame tenement, tin roof; cost, $3,500; owner, George Urstadt, North Third Ave., cor. One Hundred and Fifty-third St.; architect and builder, J. C. Stichler.

West Fifty-seventh St., No. 517, three-st'y brick stable, tin roof; cost, $25,000; owner, Conrad Stein, 221 West Fifty-seventh St.; architect, J. Kastner.

Madison or Bathgate Ave., w s, 100' n One Hundred and Eightieth St., two-st'y frame dwell., tin roof; cost, $2,700; owner, Auguste J. Paris, 2058 Vanderbilt Ave., Twenty-fourth Ward; architect, W. W. Gardiner; builder, J. Knox.

Ave. A, w s, 79' 5" s Fifty-eighth St., five-st'y brick tenement, tin roof; cost, $10,000; owners, P. & J. F. McManus, 161 East Fifty-seventh St.; architect, J. H. Valentine; builder, J. F. McManus.

Fourth Ave., n e cor. One Hundred and Twenty-eighth St., 2 four-st'y brick tenements and carriage-shop, gravel roofs; cost, $10,000 and $12,000; owner, Chas. C. Schildwachter, 77 East One Hundred and Twenty-fifth St.; architect, B. Walther.

St. Nicholas Pl., e s, 50' n One Hundred and Fifty-first St., four-st'y stone, brick and terra-cotta dwell., slate and tin roof; cost, about $30,000; owner, M. Van Rensselaer, 141 East Thirty-seventh St.; architect, C. Pfeiffer; builder, F. Lyons.

Water St., Nos. 640 and 642, 2 five-st'y brick tenements, tin roofs; cost, each, $9,000; owners, Hedwig Hafker, 273 Delancey St., and Leonard G. Preusch, 86 Cannon St.; architect, J. Boekell; builder, H. Hafker.

Tenth Ave., No. 128, five-st'y brick tenement, tin roof; cost, $18,000; owner and architect, Matthew Colligan.

Second Ave., s w cor. One Hundred and Twenty-eighth St., 4 five-st'y brick tenements and stores, tin roofs; cost, each, $16,000; owners, Alexander P. Ketchum, 32 Mt. Morris Ave., and others; architect, Geo. Martin Huss.

St. Nicholas Pl., w s, 50' 10" n One Hundred and Fifty-sixth St., three-st'y stone and frame dwell., tin roof; cost, $5,000; owner, Henry Moll, 1576 First Ave.; architect, John Brandt.

One Hundred and Tenth St., n s, 125' e Fourth Ave., 4 five-st'y brown-stone front tenements, tin roofs; cost, each, $20,000; owner, John Van Dolaen, Bedford Flats, Eighty-second St., cor. Tenth Ave.; architect, A. Spence.

One Hundred and Fifty-ninth St., s s, 200' w Elton Ave., three-st'y brick and frame dwell., tin roof; owner, Mary Ogden, 1049 Washington Ave.; builders, John Freese and Alex. Weir.

Morris Ave., s e cor. One Hundred and Forty-sixth St., three-st'y frame dwell. and store, tin roof; cost, $3,250; owner, Theresia Tompkins, 576 East One Hundred and Forty-fifth St.; architect, H. S. Baker; builder, Ed. Gustaveson.

West Seventy-second St., Nos. 418, 420, 422, 424 *and* 426, 5 four-st'y brown-stone front dwells., tin roofs; cost, each, $29,000; owner, Geo. W. Hamilton, 408 West Seventy-first St.; architects, Thom & Wilson, done by day's work.

West Fiftieth St., Nos. 414 *and* 416, 2 five-st'y brick tenements, tin roofs; cost, $6,000 each; owner, Adolph Koschel, 153 Fourth Ave.

Fifty-seventh St., n s, 269′ w Sixth Ave., four-st'y brick and stone dwell., slate and metal roof; cost, $30,000; owner, Dr. G. Langmann, 151 West Forty-third St.; architect, Edward E. Raht; mason, Marc Eidlitz.

One Hundredth St., s s, 100′ w Tenth Ave., 7 four-st'y brick dwells., tin roofs; cost, each, $10,000; owners, Mrs. Annabella Koughran, 364 Lexington Ave., and Mary E. McCool; architect, John C. Burne.

One Hundred and Forty-third St., s s, 141′ 6″ e Willis Ave., 2 two-st'y frame dwells., tin roofs; cost, each, $3,000; owner, Fred. McCarthy, 634 East One Hundred and Forty-third St.; architect, H. S. Baker.

ALTERATIONS. — *Fourth Ave.*, s w cor. Sixty-second St., raised in portions one st'y, walls strengthened, and internal alterations, rear half of building re-built, etc.; cost, $100,000; owner, Edward Martin, Yonkers, as trustee New York Life Ins. Co.; architect, W. E. Worthen.

West Forty-seventh St., *No.* 206, extension to be raised one st'y, walls of front building rebuilt; cost, $5,000; owner, John Spannhake, 206 East Forty-seventh St.; architect, Adam Weber.

Ninth Ave., n e cor. Thirty-ninth St., one-st'y brick extension, tin roof; cost, $5,000; owners, trustees of the North Presbyterian Church, John Camerdon, treasurer, 334 West Twenty-ninth St.; architects, J. C. Cady & Co.; builders, Jas. H. Parker, and Wm. Mulgrew.

New St., *No.* 69, new store front in basement, and internal alterations; cost, $5,000; owner, Wm. Spencer, 111 East Sixty-ninth St.; architects, A. B. Ogden & Son; builders, David E. Herbert, and John C. Umberfield.

University Pl., s w cor. Eighth St., one-st'y brick extension, tin roof; cost, $4,000; lessee, John E. Cusick, 11 Avenue D; architect, John Brandt.

East Twenty-fifth St., *No.* 116, add one-st'y flat, tin roof; cost, $6,000; owner, John Smith, 114 East Twenty-fifth St.; architect and carpenter, C. F. Valentine; mason, E. A. Thorp.

Third Ave., n e cor. One Hundred and Forty-fifth St., 2 buildings, raise one-st'y and four-st'y frame extensions, tin roofs; cost, $4,000; owner, Elizabeth Fitzsimmons, 853 First Ave.; architect, Adolph Pfeiffer; builder, not selected.

Philadelphia.

BUILDING PERMITS. — *Adaline St.*, w of Seventeenth St., 2 two-st'y dwells., 16′ x 40′; R. B. Beath, owner.

North Delaware St., e of Twenty-second St., one-st'y factory, 22′ x 80′; Empire Dry Color Co., owners.

Fairhill St., cor. Cambria St., three-st'y dwell., 19′ x 52′; Jno. Sheabur, owner.

Twenty-fifth St., cor. Brown St., addition to church-building, 70′ x 80′; A. H. Williams, contractor.

Adams St., *No.* 1020, two-st'y dwell., 18′ x 36′; J. M. Buchanan.

Pennock St., s of Brown St., 3 two-st'y dwells., 14′ x 35′; Wm. Charlton, owner.

Thirty-second St., n of Chestnut St., 4 three-st'y dwells., 16′ x 45′; G. P. Bland, owner.

Almond St., n of Somerset St., two-st'y dwell., 18′ x 50′; A. McClay, contractor.

Ninth St., n of Columbia Ave., 5 two-st'y dwells., 16′ x 40′; H. Rookstool, owner.

Meadow St., w of Paul St., one-st'y planing mill, 40′ x 45′; Jas. Comly.

Carlisle St., cor. Columbia St., 6 three-st'y stores and dwells., one, 18′ x 65′; three, 17′ x 65′; two, 16′ 4″ x 65′; Thos. P. Turbill, owner.

Second St., n of Tioga St., 2 two-st'y dwells., 17′ x 45′; Wm. Lawrence.

Leiper St., s of Foulkrod St., three-st'y dwell., 16′ 8″ x 50′; Wilson Milnor, contractor.

Penn St., cor. Oxford St., three-st'y dwell., 34′ x 65′; Wilson Milnor, contractor.

Kirby Ave., n of Oak Lane, 2 three-st'y dwells., 16′ x 38′; R. J. Kirby, owner.

Indiana St., e of Eleventh St., two-st'y dwell., 16′ x 40′; Joseph Miller, contractor.

Germantown Ave., cor. of Miller St., two-st'y stone stable and shop, 20′ x 32′; J. K. Pierson, owner.

Locust St., n of Willow St., 2 three-st'y dwells., 13′ 8″ x 50′; Chas. D. Greeves, owner.

St. Louis.

BUILDING PERMITS. — C. Walter, 2 adjacent brick tenements; cost, $4,000; J. E. Truitt, contractor.

S. Marx, 3 adjacent brick tenements; cost, $3,000; O. Koenig, architect; Joe Weiss, contractor.

J. Fegschoff, 5 adjacent brick stores and tenements; cost, $11,500; H. C. Brinkmeyer, contractor.

Conn. Mutual Life Ins. Co., five-st'y brick business houses; cost, $50,000; Charles E. Illsley, architect; F. C. Bonsack, contractor.

St. Louis Board of Public Schools, three-st'y school-house; cost, $13,900; Wilkemi, architect; M. Britt, contractor.

S. H. Hoffman, two-st'y frame dwell.; cost, $3,000; S. Hoffman, contractor.

Mary Landecker, two-st'y brick dwell.; cost, $3,-450; Jno. Martzleff.

German Cumberland Presbyterian Church, two-st'y dwell.; cost, $3,600; J. Smiley, contractor.

Louis Hohlby, 3 adjacent two-st'y tenement-houses; cost, $3,500; sub-let.

Lee Magee, two-st'y dwell.; cost, $4,000; A. E. Cook, contractor.

Shaeffer Bros. & Powel, two-st'y warehouse; cost, $9,000; Nic Rissi, contractor.

Shaeffer Bros. & Powel, one-st'y boiler-house; cost, $4,000; Nic Rissi, contractor.

James Verdin, two-st'y dwell.; cost, $4,500; G. M. Theobold, contractor.

Jno. W. McCullough, two-st'y dwell.; cost, $6,000; J. McGrath, architect; N. Wickwire, contractor.

A. Koehm, two-st'y stores and tenements; cost, $4,800; Phil Tremann, architect; A. Beinke & Co., contractors.

General Notes.

ABBOTTSTOWN, PA. — Mr. Warren W. Hafer has commenced work on a brick house, to cost $15,000; drawings by J. A. Dempwolf, architect, York, Pa.

BELLOWS FALLS, VT. — The laying of the corner-stone and blessing the foundation of St. Charles Catholic Church was celebrated August 17.

BRYN MAWR, PA. — Country-house for J. R. Segee, Esq., first st'y Trenton brown-stone, second st'y tile, finished in hard wood; cost, about $12,000; plans by Hazlehurst & Huckel, architects, Philadelphia.

COLUMBIA, PA. — The School Trustees are building a two-st'y school-house in stone, pressed brick and terra-cotta; total cost, $15,000; architect, J. A. Dempwolf, York, Pa.

DARLINGTON, S. C. — The Darlington Hotel Company has been organized to build a hotel here.

EAST NEW YORK, N. Y. — The corner-stone of a new school-house was laid, August 9, at New Jersey and Fulton Aves. The building is to cost $10,000.

FALL RIVER, MASS. — The Baptist Church Society have voted to raise their church and make a vestry underneath it, at a cost of $1,600. Dr. Shurtleff, G. H. Melvin, and A. H. Hood were appointed a building committee.

HAMILTON, N. Y. — T. I. Lacey, of Binghamton, N. Y., is the architect of the new Theological Hall for Hamilton College. It will cost $50,000.

KANSAS CITY, MO. — R. J. Gillelen, business building on Union Ave., opposite Union Depot; cost, $4,500.

John H. Gow, business house at 909 and 911 State Line; cost, $5,000.

F. J. Hammer, house in Reid's addition; cost, $5,-000.

J. D. Boyer, brick livery stable, at lot 216, block 15, McGee's addition; cost, $4,500.

Thomas S. Ridge, stone front brick business block, near the n e cor. of Twelfth and Main Sts.; cost, $12,000.

E. B. Griff, livery and store room, s w cor. Fifth St. and Grand Ave.; cost, $5,000.

Evangelical Association, wood chapel, n e cor. Nineteenth and High Sts.; cost, $2,000.

Coale Cracker Co., addition to factory at 206 Main St.; cost, $7,000.

GETTYSBURG, PA. — J. A. Dempwolf, architect, of York, Pa., has in hand the following work in this borough: —

Alteration of house of Mrs. McCammon; cost, about $3,500.

Alterations to Presbyterian Church; cost, $3,000.

Remodelling of Lutheran Church, including chapel and infant school-room; cost, $10,000, inclusive of new tower, the gift of Dr. Swope.

Mr. Dempwolf has also prepared designs for Memorial Episcopal Church at Gettysburg, at an estimated cost of $30,000.

HANOVER, PA. — Designs for new High School building, to cost $15,000, have been furnished by J. A. Dempwolf, architect, York, Pa., and accepted by the committee.

LITTLESTOWN, PA. — Mrs. A. S. Hinkle is building a brick house and store; cost, $4,500; architect, J. A. Dempwolf, York, Pa.

LYNCHBURG, VA. — Since last report the following houses have been let to contract: —

Corner Church and Seventh Sts., brick house, two-st'y, for Dr. Parsons; cost, $6,000; E. J. McCrossius, architect.

Between Main and Church Sts., on Ninth St., addition to "Lone Jack" Tobacco Works; cost, $6,500; R. C. Burkholder & Son, architects.

College Hill Ave., frame house, for Jas. Cleland; cost, $2,000; R. C. Burkholder & Son, architects.

Between Church and Court Sts., on Twelfth St., brick tobacco factory, for Miller & Hawkins; cost, $7,000.

Clay St., between Eleventh and Twelfth Sts., brick factory, four-st'y, for Miller & Hawkins; cost, $10,000.

Diamond Hill, Cabbell St., brick factory, five-st'y; cost, $8,000; for Hancock Bros. & Co.

MINNEAPOLIS, MINN. — John Kelly, two-st'y wooden double dwell., n s of Eighth Ave., n e, bet. Second and Third Sts.; cost, $3,500.

Augsberg Seminary, three-st'y wooden dormitory, w s Twenty-second Ave., bet. Seventh and Eighth Sts., s; cost, $5,000.

E. Tolefson, two-st'y wooden dwell., s Eleventh Ave. and Ninth St.; cost, $3,500.

E. Tolefson, two-st'y wooden dwell., Fifteenth Ave. and Fourteenth St., s; cost, $3,000.

Mrs. S. J. Williams, two-st'y wooden dwell., Stevens Ave., cor. South Fifteenth St.; cost, $4,000.

J. S. Bell, two-st'y brick-veneered dwell. and barn, s e cor. Park Ave. and Fourteenth St.; cost, dwell., $20,000; barn, $1,500.

Leland & Crocker, brick skating-rink, cor. South First Ave. and Sixth St.; cost, $19,500.

Mrs. Clara Gardener, two-st'y wooden stone-front dwell., s s Seventh St., between Eighth and Ninth Aves., s e; cost, $2,200.

J. S. Kingman, same kind of structure, n s of South Second Ave., between Franklin and Twenty-second Sts.; cost, $3,500.

City of Minneapolis, two-st'y brick engine-house, n s of Blaisdell Ave. and Twenty-eighth St.; cost, $9,154.

MONTCLAIR, N. J. — Plans are prepared for a large new house for Mr. Thomas Porter, of this place; cost, $30,000.

MT. HOLLY, N. J. — Burlington County Court-House to be remodelled and an addition added thereto (is to be fire-proof, to be of stone and brick), from plans by Hazlehurst & Huckel, architects, Philadelphia, Pa.

PIERRE, D. T. — Mr. Ernest Baillie is the architect of the new building for the Presbyterian College.

REDWOOD FALLS, MINN. — The Catholics are building a new church.

ROCHESTER, N. Y. — Work has just been commenced on the following buildings, Jas. G. Cutler being the architect: —

Baptist Church, cor. of Meigs St. and Park Ave.; to cost $30,000, built of red Medina stone; building to be 80′ x 89′, fronting on Meigs St.; Stranghen & Derendorf, contractors.

Frame dwelling-house on Meigs St., to cost $5,000, for Mr. Jno. F. Alden; W. I. Devendorf, contractor.

Frame dwelling-house on Nichols Park; cost, $4,000; E. E. Howell, Esq., owner; W. I. Devendorf, contractor.

Improvements to building on Franklin St.; cost, $4,000; Mr. H. O. Stevens, owner; Schnarr & Becker, contractors.

Remodelling dwelling on East Ave.; cost, $3,500; R. A. Sibley, Esq., owner; J. G. Wagner, contractor.

Improvements to house of A. G. Yates, Esq., on South Fitzhugh St., using red Medina stone, red slate, tile, etc.; cost, $18,000; J. B. Pike, contractor.

Frame dwelling-house on Alexander St., for Mrs. Judson; cost, $3,700; W. I. Devendorf, contractor.

It is expected that contracts for the new Government building on Fitzhugh St. will be let about the first of September.

ROCKVILLE, MD. — The new stone, brick and terra-cotta building for the Montgomery County National Bank is almost completed; J. A. Dempwolf, architect, York, Pa.; N. Weigle, builder, of the same city.

SPRINGFIELD, MASS. — The County Commissioners have discussed plans for the new jail, and decided to consult several well-known architects concerning the best methods of obtaining plans. There will probably be no public competition, as the Commissioners prefer to select some reliable man and give him charge of both plans and construction.

PROPOSALS.

LATHING AND PLASTERING.
[At Jackson, Miss.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., August 21, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 11th day of September, 1884,** for all the wire-cloth lathing and the plastering required in the court-house, post-office, etc., at Jackson, Miss., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
Supervising Architect.

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STEAM-HEATING APPARATUS.
[At Middletown, Conn.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., August 22, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 19th day of September, 1884,** for supplying and putting in place, complete, a low-pressure return-circulation steam-heating apparatus required for the custom-house, etc., at Middletown, Conn., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the custodian at the building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
Supervising Architect.

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IRON-WORK.
[At Columbus, O.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., August 25, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 10th day of September, 1884,** for furnishing and putting in place, complete, the iron beams and columns required for the court-house, post-office, etc., building at Columbus, O., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
Supervising Architect.

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CITY-HALL.
[At Richmond, Va.]

CITY ENGINEER'S OFFICE,
RICHMOND, VA., August 16, 1884.

Sealed proposals are invited **until October 1 next, at 6 o'clock, P. M.,** for building a new city-hall at Richmond, Va.

Drawings, specifications, and printed forms can be seen at this office.

The Committee on Grounds and Buildings reserves the right to reject any and all bids.

For further information apply to the undersigned.

W. E. CUTSHAW,
City Engineer.

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BREAKWATER.
[At Greenport, N. Y.]

ENGINEER OFFICE, U. S. ARMY,
11 INSURANCE BUILDING,
NEW HAVEN, CONN., August 8, 1884.

Sealed proposals for extending the Greenport breakwater will be received at this office **until 10 o'clock, A. M., on Monday, September 22, 1884.**

Proposals must be made in triplicate. Specifications, blank forms, and instructions to bidders may be had on application at this office.

WALTER McFARLAND,
Lt.-Col. of Engineers.

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JOINER'S WORK AND WOOD-FLOORING.
[At Memphis, Tenn.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., August, 26, 1884.

Sealed proposals will be received at this office **until 2 P.M., on the 23d day of September, 1884,** for furnishing and fixing in place complete all the joiner's work and wood-flooring required for the custom-house and post-office building at Memphis, Tenn., in accordance with drawings and specification, copies of which may be seen, and any additional information obtained on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening, will not be considered.

M. E. BELL,
Supervising Architect.

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CONTENTS.

WE cannot profess much surprise at the result of the *plébiscite* that we lately suggested, which had for its purpose to ascertain how many of our present subscribers cared enough for illustrations printed from gelatine to be willing to pay an increased subscription price for the sake of securing such prints. After waiting a month, we find that a very small fraction of one per cent of our subscribers — in fact, just *eleven individuals,*— seem to be willing to pay an extra dollar for the sake of receiving once each month a gelatine print, from nature, of the best architectural subject we can procure. Any one who has ever had to purchase a dozen photographs of the size of our illustrations will know that our offer was no niggard one, and it still is open to our subscribers. We presume very many more — possibly enough to encourage us to make the change, and we would really like to make it — would be perfectly willing to pay the extra dollar; but if they will not take the trouble to express such willingness, we must ask them to share the burden of complaint that reaches us, because we do not issue gelatine prints for the present subscription price.

THE unfortunate inhabitants of Newark and Jersey City are again in trouble about the water-supply which both towns derive from the Passaic River. It will be remembered that the liquid which now flows through their pipes has been at times mingled with sewage both from above and below the intake, as well as with arsenic, carbolic acid, petroleum and other chemicals from pipe-lines and factories on the upper course of the river and its tributaries, but after a season of protest and resistance the citizens seemed to have resigned themselves to circumstances, and it has needed the adoption of a scheme by the city of Passaic for building sewers to convey house drainage into the river just above the Newark and Jersey City cribs to arouse them to renewed activity, and their awakened attention is likely to be fully employed for a time. Among other novelties in water-pollution of which they are the victims, the inspector employed to watch the river describes the recent formation of a public dog-pound on the border of a tributary stream, in which had already been buried the carcasses of seventy-five dogs, within a few feet of the water's edge. On making this interesting discovery, the inspector applied to the authorities of the town which maintained the dog-pound, and learned from them that they were "ignorant of this violation of the law," and that they "would have the bodies exhumed at once." It is hardly necessary to say that this promise was not kept, and the deceased dogs continue to dissolve in the Newark drinking-water, while the attorneys of the respective cities wrangle over the legal questions involved.

CINCINNATI is to have two elegant new ruins, built under the supervision of the Trustees of the Art Museum on the Museum grounds in Eden Park. One of them is to be in the shape of a castle, "modelled after that of Elsinore," and is to be placed at the foot of the slope crowned by the Museum building. The other is to be built near the top of the hill, and is to consist of a pile of broken columns, bases and entablature blocks from the Court-House burned last year. The real castle of Elsinore is a jumble of incongruous styles, constructed at the end of the sixteenth century, but it has the advantage of being large and high, while a little model of it, dropped at the foot of the hill, can only be ridiculous. The other ruin, having no extraneous interest and no beauty of detail, will be just as artistic as any pile of goods in the yard of a dealer in second-hand building-materials, and no more so, while its affectation of being picturesque will make it offensive to every person of sense or taste who has the misfortune to see it. How it could have entered the heads of the Trustees of the Cincinnati Museum to spend the money confided to them on these disgusting follies we are at a loss to imagine, and we trust that the report is nothing but a silly joke. If it should be well founded, and, still more, if it should be true, as we are told by the New York *Times*, that "those most interested in the Museum and in making Cincinnati an art centre favor it," we can only advise strangers visiting that city hereafter to keep their eyes closed when they pass the Museum grounds, that they may be spared the sight of two objects which are, it is said, intended to be, as we hope indeed they will be, "the most unique on American soil."

A NEW architectural style is to be illustrated in Milwaukee, if we may believe a correspondent of the New York *Times*, in the construction of a museum of art which Mr. Frederick Layton of that city is about to erect for presentation to his fellow-townsmen. Plans for the building have been made by the Messrs. Audsley of London, gentlemen well known here, both personally and by their works, and we may be sure that the design will, in their hands, be all that it should be, the *Times* reporter having probably drawn upon his imagination for the information which he furnishes us, that "the style of its architecture will be what is known as Thompsonian Greek, a style in which Egyptian solidity is tempered with Greek grace." We are further told that "the former characteristic of the building," that is, we suppose, the Egyptian solidity, "will mark it as a treasure house," while "the latter," that is, the Greek grace, "will indicate that its treasures are from the world of art. We are glad to have this ingenious symbolism explained, as the interpretation would certainly never have occurred to us otherwise, and hope that an inscription setting forth the allegory will be placed in a conspicuous position on the front wall for the benefit of those unclassical individuals who have hitherto connected Egyptian solidity with tombs and jails rather than treasure-houses. How the Greek grace is to be used for "happily tempering" the Egyptian solidity we will wait for the Messrs. Audsley and the Thompsonians to show us, but we suppose that they depend upon variety in the materials, which comprise Milwaukee brick, gray Ohio sandstone and terra-cotta, to enliven the elevation. The cost of the building will be about one hundred thousand dollars, and Mr. Layton proposes to spend as much more in buying pictures and statues to put into it, trusting that others will add to the collection for which his generous gift will furnish at once a nucleus and a home.

WE regret exceedingly that we find reason for suspecting that the Architectural Association of Des Moines, Ia., appears to believe that there is ill feeling between the architects of the Eastern and Western States, but whether this feeling is supposed to be reciprocal we will not hazard a guess. The reasons which support our surmise are somewhat intangible, but we think the tone of the official comment upon a letter we published in our last issue is an indication that there is in Des Moines an undesirable and uncalled for amount of feeling toward New England, at least. Our belief is strengthened by the receipt of a letter from a Des Moines architect, whom we assume to be a member of the Association, who, with much sarcasm asks how we ventured to compare as similar the proceedings of the late Paris Congress of Architects with those of the last Convention of the American Institute of Architects, when, forsooth, the latter was marked by no distribution of prizes! It is possible that the "feeling," if it exists, is directed only towards ourselves who, the Association seems pleased to assume, are antagonistic to its attempt to introduce a "more civilized, Continental and intensely anti-British" competitive system. This we beg to state is entirely a mistaken supposition. If the Association is successful in its attempt "to lead our profession to its place in the van, and will not consent to lag behind with either New or Old England," we will surely fall into line with the earliest proselytes. The same postal-card says that having "turned over to the A. I. A. your English system . . . . will you not now investigate a better?" We fear the writer of the official utterances of the Association has not been a reader of the *American Architect*, else he would have discovered that we, and through us our readers, had been for years familiar with the "more civilized" method which we are now invited to investigate. We dare say that the real cause of complaint lies in our having styled the circulars, which the Association is issuing with a "fixed purpose" in view, "merely rhetorical addresses." At the risk of magnifying our offense we must point out that, unless greater pains is taken in the preparation of these essays than has been bestowed on that published elsewhere in this issue, those who read them will characterize them in less complimentary manner.

TWO or three valuable hints in regard to fire-resisting construction are given in a letter to the *Builder*, from Mr. Edwin T. Hall, a London architect. In speaking of the common method of laying wooden boarding over floors of iron beams filled in with concrete, by bedding wooden strips in the concrete, and nailing the boarding to these, Mr. Hall says, with great reason, as those know who have had occasion to use this construction, that the strips buried in the cut concrete inevitably swell at first, and then shrink, becoming loose in consequence, so that the boarding no longer lies firmly in its place. Instead of such a construction, he therefore uses in his practice a concrete mixed with coke or cinders, without fillets, nailing the flooring boards, when the concrete is perfectly dry, directly to it. With ordinary concrete, the driving of the nails would be difficult, and they would be loose after driving, but with the cinder concrete there is no such difficulty, the nails holding even better than in wooden beams, so that, as Mr. Hall says, he has seen boards pulled up by force, leaving every nail with which they were originally fastened sticking in the concrete. If desired, tar or asphalt can easily be spread over the concrete, and the nails driven through it.

IN regard to long iron girders Mr. Hall makes the suggestion that, besides the casing with fire-clay, which is now recognized as indispensable, the ends of the girders should be laid in the walls in such a way as to give opportunity for expansion. If the girders are simply built in, in the usual manner, the expansion alone, which in case of fire may amount to several inches in a long girder, is very likely to destroy the walls. The last part of the letter contains a brief description of a method for holding up fire-proof filling between wooden beams which is simple, but sufficient for ordinary purposes, and consists in nailing strips of wood, of triangular section, on the sides of the beams, near the bottom. After setting these in place, a temporary platform of planks is built in the usual way, one and one-half inches below the underside of the beams, and the concrete is poured into the space from the top. On removing the planks, after the concrete has set, a smooth ceiling, ready for finishing, is left, sustained by the fillets. This is much cheaper than the French system, which employs iron cross-bars, hooked over the joists, and longitudinal wires laid upon them, to sustain the concrete, and although not so strong as the iron bars, the fillets have very little weight to carry, and carry that in an advantageous way.

A PAPER was read at the last Conference of British Architects which, among other things, gave an excellent description of the French mode of carrying on certain details of building business. Most people know something of the voluminous official documents, called in France *Séries de Prix*, or, as we should say, Schedules of Prices, containing the value, for materials and labor, of every item which enters into the cost of a building, large or small. These schedules form the basis of all ordinary contracts, but important work is generally taken at a certain discount, or *rabais*, from the schedule prices, the builders who compete for the contract making offers of such discount as they think they can afford, and the one offering the greatest discount usually getting the work. The same schedule forms also the means of fixing the price of extra work, or the value of deductions or omissions, so that a gross overcharge is impossible; and in determining the value of small work generally it affords an invaluable guide to the architect and owner, as well as to the builder. Great care is taken to make the Série as accurate as possible. Until within a few years that prepared for the city of Paris was the standard everywhere; but both wages and the cost of certain materials have increased very rapidly of late in Paris, while they have remained nearly stationary in the provinces, and the inconvenience both to contractors and owners in country districts, of being obliged to estimate everything at a certain large discount from the official scale, has recently led to the formation, under government auspices, of a number of provincial schedules, while the Société Centrale des Architectes has prepared one for general use according to its own ideas of what such a thing ought to be.

THE obvious disadvantage of contracting for building work at a certain discount from a fixed set of prices is that unless the quantities of all the items are estimated with very great accuracy from the drawings and specifications, the owner has no means of knowing, except approximately, what the cost of his undertaking will be. An experienced and careful architect can estimate pretty closely, with the help of the schedule, but a careless or ignorant one has excellent opportunities for leading his clients into trouble under this system, and on this account it is not unusual to make contracts *à prix fait*, or for a lump sum, without reference to the Série. By this means the owner knows at the outset what his building will cost, if the drawings and specifications are sufficient, and no changes are made, and if he wishes subsequently to add extra works, he can estimate the cost of them very closely before ordering them. A third mode of contracting combines the other two, and resembles a form often used here in making agreements for day work. By this method, called the *marché de maximum*, the contractor agrees to do the work at the Série prices, and also to guarantee that the cost shall not exceed a given sum. After the work is done under any of these forms of contract, the builder is in France allowed certain facilities for getting his pay which resemble those provided by the mechanics' lien laws in our own country, with the difference that the French architects are allowed to participate with the builders in this *privilège*, while the American practice inclines toward refusing the advantages of the lien law to the professional man who merely designs and directs the work. The French *privilège*, however, is not so easily secured as the mechanics' lien. To claim it, the builder must, before commencing his work, apply to the local court for the appointment of an expert to draw up a description of the property which he is about to improve; and within six months after the completion of the new building he must apply again for an expert description of the property as improved. Both of these documents must be recorded in the Registry of Mortgages of the district, and from the first is made an estimate of the value of the estate before the construction of the new building, while the second serves to show the value of the estate with the building upon it. Up to the limit of the first valuation the contractor and architect have no claim on the estate beyond that of any other creditor, and mortgagees take precedence of them; but upon the increase in the value of the property, due to the improvement, their claim is entitled to priority over all others; and if the estate is sold, they are entitled to be paid their bills out of the excess of the sum received for it over the bare value of the unimproved land, without regard to whether anything is left for mortgagees or other creditors.

THE vacation season is perhaps appropriate for reproducing a mildly romantic story told in the *Builder* about the celebrated spire of Grantham Church in England. The church and spire date from the thirteenth century, and the latter is two hundred and seventy-three feet high,—eleven feet less than the spire of Trinity church in New York. The romance about it is that there is now living in the town an old lady who, when a girl of eighteen, actually climbed to the top of the spire by the crockets, and returned alive. The inducement which led the young woman to undertake this daring feat was a promise from a youth of the neighborhood that he would marry her if she would do it, and it is quite in character with the nature of a man who would see a girl risk her life to please him that he refused to keep his promise after she got down, on the ground that he could not think of marrying any one foolish enough to attempt such a thing. Within a few weeks the danger of this sentimental adventure has been made still more apparent by the discovery of some workmen engaged in putting up a lightning-rod, that the masonry of the spire was very badly decayed. An architect was called in, who examined the work through a telescope, and decided that the upper portion must be entirely rebuilt, and during the preliminary operations for that purpose it was found that the crockets by which the expectant bride had climbed the spire were cut on the separate stones of a rib simply lying in the angle of the octagon, without bond-stones, cramps, dowels or other attachment to the body of the masonry.

HAMPTON COURT PALACE.

Memorial to the late Lord Cavendish: South Nab: nr Bolton Abbey Eng.s Worthington & Elgood Architects.

THE old palace and gardens of Hampton Court are well worth a visit, even by tourists who have but limited time; for besides its historical interest, it is one of the most complete specimens of Tudor architecture in England. Begun by Cardinal Wolsey as a residence for himself, he soon found that he was unable to keep it up in spite of his huge revenues, and therefore made it over to the King. Henry VIII added to, or rather continued the building, which was only finished by William III; the latter sovereign's additions being more bad substitutions than restorations of the original fabric. But during the last few years, the hideous eye-sores of the Georgian period have been pulled down, and real restorations of the old buildings substituted for them.

The palace stands on the banks of the, here, placid Thames, on which small boats are the only craft, and its gardens go down to the towing-path, which alone separates them from the water; formerly, no doubt, the inhabitants of the palace could take ship at the garden steps. The principal entrance is through the Trophy Gates and across the Barrack Yard. These gates consist of four brick piers, surmounted by two groups of trophies, a lion, and a unicorn, the latter each supporting a shield bearing the arms of George II. On the left of the "Outer Green Court" or Barrack Yard are the barracks, partly built in Charles II's reign, and finished under William III. This "Green Court," or rather the portion of the palace which is situated in it, was entirely built by Cardinal Wolsey; but unfortunately the central gate-house was much restored in 1771, and all the turrets have lost their cupolas, with their pinnacles and gilded vanes; a loss which it is hoped the present generation may live to see recovered; for all the restorations (observe the new chimneys) are now made in the best of taste. The bricks of this part of the building are of a rich purple-red color. The south wing facing the river is very picturesque, but is said to be haunted by the ghost of Edward VI's foster mother, Mrs. Penn. This is by no means the only haunted part of the palace, there being a "Haunted Gallery," where the ghost of Queen Catharine Howard is given to shrieking; but as the public is not admitted, and as it is shut up at night with its lumber of old pictures, there are no means of testing the truth of the statement. Certain, however, it is, that it was here that the Queen ran along on escaping from her own room where she was shut up, previous to being conveyed to the Tower of London, in order to interview the King, who was hearing mass in the chapel hard by. Just as she reached the door, the guards seized her, and carried her back, her amiable and religious husband being so taken up with his devotions that he paid no attention to her screams, although they were heard all over the palace. So, it is said, a woman (of course dressed in white), rushes frantically along the gallery screaming, till she reaches the door at the end. Another ghostly story of the palace is connected with the astronomical clock, which is said to stop whenever a resident of the palace dies within its precincts, having begun this sympathetic practice at 4 A.M., on the 2d of March, 1619, when Anne of Denmark, Queen of James I, departed this life.

The great gate-house was part of Wolsey's work, but was so destroyed in 1771, that the interior had to be almost rebuilt during the reign of the present sovereign. Its fan-vaulted roof is a beautiful restoration; the quartrefoils contain shields with the arms and initials of the great cardinal, except the central one on which are Queen Victoria's. The west court is 141′ x 167′, and is called the "Base Court." Over the gateway is a fine oriel window, with Henry VIII's arms carved on a panel beneath. "Anne Bullen's Gateway" beneath the clock tower leads into the "Clock Court," which was also built by Wolsey. On the north side is the great hall with its tall windows and buttresses. On the tower are Wolsey's arms surmounted by the Cardinal's hat in terra-cotta, and the motto "*Dominus mihi Adjutor.*" Here too, as also in the "Base Court," are medallions of the Cæsars in terra-cotta, inserted in the walls: they were made expressly for the Cardinal by Joannes Maiano. The fan groining of Anne Bullen's gate-way is an excellent restoration of the original. The arms and badges of Henry (a rose, portcullis, and fleur-de-lys), and those of Anne (the falcon), are here united, and their initials entwined into a true lovers' knot. Strange and characteristic fact: 'ere the great hall was finished, the masons had to interlace J. S (Jane Seymour), with the H. in the true (!) lovers' knot! From this gateway a staircase leads up the great hall built by Henry, which is a splendid example of Tudor architecture. The roof is a grand specimen of open wood-work, gilded. At one end is a minstrel's gallery, supported by two screens forming three openings to the hall, the wood-work of which is carved tracery, with Tudor badges of Henry's initials. At the other end is a raised dais. There are thirteen side windows of eight lights, and a great bay-window of thirty-two lights, which rises from the floor to the roof of the hall. The roof of this bay is in very fine fan vaulting. The glass of all the windows is modern (about 1840) and bad. The floor was originally paved with tiles, but these were unfortunately removed about one hundred years ago. The hall was used by Henry for great functions, junketings, receptions, banquets, mummeries, and plays. It is said that later even Shakespeare performed here; while it is a fact that Katharine Parr was proclaimed here (12th of July, 1543). In subsequent reigns it was also used for the same purposes, and one of the most magnificent entertainments it ever saw was "The Vision of the Twelve Goddesses," a masque by Samuel Daniel, which was played before King James on a Sunday night (January 8th, 1604), when the Queen, Anne of Denmark, and her ladies took the leading parts. Here is a precedent for mild entertainments on Sundays — not that this one was probably very mild. But if plays were performed before the King's Highness on Sundays in 1604, surely museums might be opened, and concerts held for the recreation of the Queen's subjects in 1884.

The walls are covered by Arras tapestry, the subjects being taken from the "Life of Abraham." They are said to have been executed from designs by the Flemish painter, Bernard Van Orley, at Brussels; but the borders are far more Italian than Flemish in character. However, in an inventory of Henry's effects in 1548, we find amongst the tapestries at Hampton Court: "Tenne peces of newe arras of thistorie of Abraham." In 1649, they were appraised by the commissioners appointed by the Long Parliament at £10 a yard, that is £8,260, but were not sold.

From the Great Hall the visitor enters the Presence Chamber, built in 1536 by Henry. Here Jane Seymour lay in state, and levées were held by Henry and his successors. The cartoons above the tapestry (not of much value) are by Carlo Cignani, a Bolognese painter. They are designs for the frescoes painted in the Ducal Palace of Palma about 1660, and are executed in chalk and sepia. The ceiling is late Tudor, flat, ornamented with oaken ribs between which are the rose, fleur-de-lys and portcullis, and the initials J. and H. intertwined. The tapestry is old Flemish: all the pieces were sold at Charles I's sale for £47, but Cromwell seems to have prevented their removal. They illustrate, I. "Ye Storye of ye Thre Fatall Ladyes of Destenye;" "Ye Triumph of Fate, of Renown, and of Time." II. "The Story of Hercules." III. A Tudor subject, unknown. IV. A French subject, unknown. Over each part of the first series is a scroll with quaint old French verses and legends, worked in black letters, indicating the moral of the allegory beneath.

The old astronomical clock is a curiosity. Hidden for years in a room amongst mere lumber, it was brought out some three years ago and made to go again. It was made for Henry in 1540. The dial consists of three separate copper discs of different sizes, with a common centre, but revolving at varying rates. It tells the hours, the days, months, and year; the phases of the moon; the signs of the Zodiac; the position of the sun in the ecliptic; the number of days since the beginning of the year; and high water at London Bridge. It takes half an hour to wind up every week; and it must be noted, that having been designed before the discoveries of Galileo, the sun is made to revolve round the earth.

Perhaps one of the most picturesque parts of the palace is the Fountain Court, designed by Sir Christopher Wren for William III. It is an excellent specimen of Wren's work, being a colonnade surmounted by three rows of windows, those of the second row are circular, on the south side these are (in place of windows) filled with frescoes by Laguerre, "The Labours of Hercules."

The King's great staircase was designed by Wren also, and finished about 1700. It is noble in its dimensions, and the gilt iron-work is fine; but the decorations, by Verrio, of sprawling gods and goddesses are in the worst possible taste. Verrio had been employed much by Charles II at Windsor, for the decoration of which he had received over £8,000, and Walpole relates that he resented working for William, on account of his politics and religion. However, he was finally and unfortunately induced to do so, and this staircase is one of the results. Walpole says, "he did it as ill, as if he had spoilt it out of principle." Probably the King thought so, for Verrio complains that although he was promised £1,800, he only received £600, certainly not much for the labor!

One of the finest of the suite of state rooms is the King's guard-chamber, in which room there are some fine wrought-iron gates taken from the gardens. South Kensington and Bethnal Green Museums both contain similar ones; which were also formerly in the gardens.

It is not worth noticing all the rooms: compared with the palaces of Fontainebleau, of Versailles, they are decidedly homely and plebeian. In some of them are some fine examples of wood-carving, birds, and flowers, and fruits in lime wood, by Grinling Gibbons. In others are good specimens of embroideries. Some chandeliers in silver and cut-glass are noticeable; and also a good deal of old Oriental china, and a few pieces of furniture of the seventeenth and eighteenth centuries.

The pictures are accredited to all the celebrated painters of the Italian, Flemish, and Dutch schools, but with little truth. The portraits of Erasmus and Froben are probably by Holbein, but the many which bear his name are but copies. In the King's Gallery are many old contemporary portraits, which if not of value as being the work of the celebrated painters whose names they bear, are still most interesting. Thus we have many of Queen Elizabeth, one most curious one in a fancy dress, a sort of Persian attire, perhaps one of the three thousand dresses found in her wardrobe at her death. Another represents the three goddesses, Juno, Venus and Minerva thunderstruck at the sight of the Virgin Queen's loveliness. Looking at all these portraits of Elizabeth and Mary Stuart, and Charles II's Beauties, one must fain wonder in what beauty consists. Elizabeth, no doubt had lovely hair, and a beautiful complexion; but her eyes are small, her nose hooked, and her expression inane; which could not have been true of such a woman. Mary Stuart is never twice alike; sometimes dark, sometimes fair, but never beautiful. And of all Sir Peter Lely's portraits, what can be said? Looking at the Duchess of Portsmouth, and Lady Bellasys (in the character, too, of St. Catherine!) at the Duchess of Richmond, and the Duchess of Cleveland, at the Countess of Grammont, and all the rest of them, one does not know what to wonder at most, the intense impudence of their costume, the silliness of their expressions, or the taste of their admirers. Then the impertinence of their posing as saints and goddesses! The best of the collection, as a painting, is that of the Countess of Grammont (Mrs. Hamilton), but it has the softness and pinkness of porcelain painting; and one can scarcely understand Walpole considering "Lely's women handsomer than Vandyk's!" He says, too "I don't know whether even in softness of the flesh he did not excel his predecessor," (Vandyk). Certainly in "softness," but where is the vigor of Vandyk, or his elegance, his truthfulness and manliness, his excellent coloring and perfect drawing? Lely's work is eminently namby-pamby, like his sitters.

In the Queen's audience-chamber are some quaint old works representing events of Henry VIII's reign. "The meeting of Henry and Maximilian I, after the siege of Tournay in 1513." "The Embarkation of Henry from Dover, 1520, to meet Francis I at the Field of the Cloth of Gold." "The Meeting of Henry VIII and Francis I at the Field of the Cloth of Gold." This is one of the most curious. Every incident is in it, from the arrival of the cavalcade to the actual meeting of the Kings: on one side is seen the kitchens and cooks, on another the magnificent "Summer Palace" which Henry erected on the castle green. The whole is painted with the greatest minuteness, and gold is lavishly laid on in relief. But the "Triumph of Julius Cæsar," by Mantegna, a series of pictures painted on linen in tempera, are the most celebrated works in the palace. They originally decorated a gallery of a hall in the Ducal Palace at Mantua, and are in all eighty feet long. They were seen there by Charles I's agent in 1628, but the price asked for them (including some statues) £10,000, was deemed so high by Daniel Nys, that he did not purchase them; but later, when Catherine de Medici began to treat for them, Nys thought better of it, and rather than let France have them, he paid £10,500 for the collection. At the sale of Charles's gallery, Cromwell again showed his wisdom by reserving these works. They were probably painted about 1485 for Lodovico Gonzaga, the Duke of Mantua, and so pleased was he at the result that he conferred upon Mantegna a large gift of land. Their color is still fine, although much patching and repainting has taken place from time to time.

The gardens are still laid out in the Dutch style, formal beds, lopped trees, and prim avenues; but in their way they are charming. The vine is one of the sights, being reputed the largest in England, if not in the world. It was planted in 1768, and bears annually about 1250 bunches; forty years ago its annual yield was as much as 2500 bunches weighing about a pound each.

The Lion Gates which lead into Bushey Park are very handsome, and were built by Queen Anne; in fact all the wrought-iron work in the gardens is excellent, and well worth the study of visitors and others interested in iron-work. S. BEALE.

REMARKABLE TREES.

ONE-THIRD of the land surface of our planet is covered with trees. The largest tree in the world is situated in Mascoli, near the foot of Mt. Etna, and is called "The Chestnut Tree of a Hundred Horses," and is believed to be the oldest tree in the world. Its name arose from the story that Queen Joan of Aragon, with her principal nobility, took refuge from a violent storm under its branches. At one time it was supposed that it consisted of a clump of trees united, but on digging away the earth the root was found entire, and at no great depth. Five enormous branches rise from one trunk, which is 212 feet in circumference. A part of the trunk has been broken away, and its interior is hollow, and large enough to contain a flock of sheep, or to admit two carriages driving abreast through it. It still bears abundance of fruit, and its collectors have built a hut within the trunk, the better to promote their proceedings.

At Tortworth, England, there exists a chestnut tree measuring, at four feet from the ground, 60 feet in circumference, although at the present time it is nearly a sylvan ruin. A fig tree stands on the northerly bank of the river Johnstene, in East Australia, in latitude 27°, longitude 151°, near Brisbane, measuring, three feet from the ground, 150 feet, and at 55 feet, where it sends off great branches, 80 feet in circumference. There lies upon Mt. Bawbaw, Giggsland, South-east Australia, a gum tree measuring 480 feet as it lies where it was broken off at the top, and it is calculated to have stood 520 feet high; it measures six feet in circumference [? diameter]. In Bougouderch, near Constantinople, is a plane tree measuring 149 feet in circumference. At Bajak Bournarbashi, Asia Minor, is a pond overshadowed by three gigantic plane trees, the trunk of one of which, one foot from the ground, measures 43 feet in circumference. The largest tree in the United States stands near Bear Creek, on the north side of Tule River, Cal. It measures 140 feet in circumference. In Toulumne Grove, Nevada, stand "The Dead Giant Redwood Tree," measuring 119 feet in circumference, which has been so entirely hollowed by long use as a chimney that the road-makers could not resist the temptation of completing the work of camp-fires, so they have cut a great archway right through the farther side of the poor dead stump, and led the road through it, so that now the high, crowded coach daily passes through the very heart of the great tree, which may have been young in the days of Julius Cæsar. There are thirteen other trees standing near it, measuring from 72 to 96 feet in circumference.

The "Grizzly Giant," the monarch of Mariposa Grove, measures 92 feet in circumference. The Tulare-Fresno forest, so called from being situated in those two counties (California), extending 70 miles in length, with a width in some places of ten miles, consists mainly of big trees, with a multitude of smaller ones, measuring from six to 120 feet in circumference. Near Santes, in France, stands an oak tree measuring 91 feet in circumference. At Holwood, near Bromley (England), stands an oak tree, with a root projecting on one side into the shape of a settee. Seated upon that root, William Pitt and William Wilberforce held together a conversation, as a result of which the latter on May 12, 1789, brought the question of the abolition of the slave trade before the House of Commons. The tree is still known as the Wilberforce oak. Pliny (A. D.) 23, tells us of a plane tree, growing in his time, which was in itself a forest: the Governor of Lucia gave an entertainment to his friends in the hollow trunk, which is 80 feet in circumference. John Dowd discovered in Calaveras County, California, a grove of 103 trees, covering a space of 50 acres, measuring 70 to 96 feet in circumference. Throughout all England there are oak trees of remarkable size. The "Cowthord Oak," on the banks of the Nidd, in Yorkshire, measures at the ground 78 feet in circumference. The famous tree called the "Charter Oak," near Hartford, Conn., which fell August 21, 1856, was 33 feet in circumference at the ground, and it fell so as to leave eight feet of stump on one side, and six feet on the other. A double-trunked oak tree is standing in a garden in South Beaver, Pa., which begins at the root with a single trunk; this divides into two about one foot from the ground, continues thus for ten feet, and then becomes united again. Each of the twin trunks at the point of division, measures three feet in circumference.

At Enys, in Cornwall, is a wych-elm, which was planted originally on the left side of a stream, but having from some unknown cause been laid prostrate, the trunk fell on the opposite side of the stream, where it took root, and rising again, has acquired such dimensions, that it covers an area of one-sixth of an acre. The main stem, which now forms a natural bridge across the stream is ten feet in circumference, and the three trunks which rise from the right bank of the stream, measure severally eight and a half, six feet, five feet eight inches in circumference. An engraving of it may be seen in "*John's Forest Trees of Great Britain*," page 232. There is an elm tree in the south of England, which measures 61 feet in circumference. On the Hubbard farm in North Andover, Mass., stands a magnificent elm tree, measuring 27 feet in circumference. A barberry bush has taken root in a notch 20 feet from the ground, which can be remembered by some of the oldest residents during their boyhood. At Hingham, Mass., near the former site of the Old Colony House, is an elm tree, measuring 25 feet in circumference. "The Washington Elm," in Cambridge, which has completed two centuries of existence, measures 14 feet in circumference. Never was a tree cherished with greater care, but its days are numbered. A few years, more or less, and like Penn's "Treaty Elm," and the famous "Charter Oak," it will be remembered with the things that were. One of its stout limbs has been recently sawed off to prevent danger to travelers, and it will probably close its existence with the present century.

At Prilly, near Lausanne, is a lime tree measuring, five feet from the ground, 23 feet in circumference: the proclamation of the Reformation was posted on its trunk in 1530. Lambert's pine, on the north-west coast of America, attains the age of 1,400 years, and trees of 1,100 are not uncommon. In Norfolkshire there is a famous pine tree, measuring 48 feet in circumference. At Furstenfeld, Germany, in a churchyard, there stands a linden tree 45 feet in circumference: it is supposed to be 1,000 years old. A remarkable olive tree stands near Magliano, Italy, measuring 30 feet in circumference. — *The Lumber World.*

THE BUILDING MATERIALS OF AMERICA.

TERME "JUPITER" – BASSIN D'APOLLON – VERSAILLES. FR.

WE believe our readers will value more the following facts because they have been collated by the *Builder* than if we had done the work ourselves: —

Some eighteen or twenty years ago a very valuable record was issued, by the English Geological Survey, of the "Quarries and Building Stones of the United Kingdom," and although it was confessedly incomplete, it is much to be regretted that the publication was not continued. It was the old story of expense and no money, — the usual manner in which we in England deal with matters of real utility, while we spend like water for doubtful political purposes. Americans are far before us in these respects, and the frequent reports of their material resources are models of what a country should do. What strikes every student of the United States is, not so much the enormous riches that that great continent possesses in silver and gold (a Tom Tiddlerish way of looking at things which takes the multitude, and is always brought prominently to the front) as the more homely wealth of the earth's resources, — wealth, that, in the glare of Californian and Colorado discoveries, was completely thrown in the background. But now that gold and silver have taken their proper places as mining undertakings, the Americans have time and opportunity to examine into the condition of their other mineral treasures, and they may well congratulate themselves on the universal presence and abundance of nearly every metal and rock that are known to science. Although the enormous superficies of the States permits the various formations to extend for long distances, there are some parts,—such as the Rocky Mountains, where the areas of disturbance have been profuse, causing every variety of alteration in the character of the rocks, and an unequalled scope in the choice of ornamental building stones.

The building-stone quarries of America (not including those of limestone for the purposes of flux and lime-burning) are estimated at 1,525, and the product during the census year at 115,380,133 cubic feet, valued at $18,356,055; and as there are a good number of little quarries worked by one or two hands, of which no account was taken, the annual value of the stone may be certainly placed at $20,000,000. These quarries are thus tabulated: —

	Quarries.		Cubic feet.
Crystalline and silicious rock	313,	yielding	20,506,568
Sandstone	502,	"	24,776,930
Limestone and marble	616,	"	65,523,965
Slate	94,	"	4,572,670

In the first category are included granite, trap, steatite, porphyry, gneiss, serpentine, syenite, etc., Massachusetts and Maine taking the lead with ninety-two and sixty-eight quarries respectively, followed by New Hampshire, Connecticut, Rhode Island, Vermont and Virginia. These States are the principal areas of that great belt of eozoic rock which enters America from Canada, and forms the backbone of the Appalachian range, dying away in the south as low down as Georgia and Alabama. Maine possesses inexhaustible stores of excellent granite, mostly dark colored and porphyritic; in Massachusetts it is lighter colored and rather finely grained (that of Monson being noted for its large monoliths); New Hampshire has immense quarries at Concord, its capital, with a wide reputation for quality, and which have been worked continuously for one hundred years or more, and there is a remarkably good red granite quarried at Saint Johnsbury Mountain. In fact, the whole of the White Mountains and of the Adirondacks in New York State are of granite, and would supply the requirements of the entire globe. The State House of Vermont is built of fine-grained granite from Barre Hill, serpentine being also largely quarried in the same State, and syenite in that of Maryland. Virginia possesses a number of quarries of gray granite and pink gneiss; as also, though to a smaller extent, does North Carolina. The Western States, consisting largely of level prairie and low river grounds, do not contain granite, or, indeed, any great variety of building stone; but as we approach the vast chain of the Rocky Mountains we find it in great abundance. It is extensively developed in Colorado, to the west of the Hogback, a wedge-shaped outlier which runs from the Spanish Peaks into Wyoming. The district possesses a vast variety of granites, mica slates and schists, hornblende, felspathic rock, syenite and porphyry, all of which are largely used for foundations and bridge structures. Some of the dikes furnish red crystalline rock, which is susceptible of a high polish, and very valuable for ornamental work.

A favorite building stone in Denver is a fine pink lava from Douglas County, and a brisk trade is arising from shipping it over the Denver and Rio Grande Railway. There is no lack of granite in California, especially in Placer County, and at Penryn, on the Central Pacific Railway, some twenty-eight miles from Sacramento. It is to be hoped that as time goes on, granite will be more used for building purposes, the houses of the far West being, as a matter of fact, principally constructed of wood, owing to the vast supplies and cheapness of lumber, though at the same time the foundations are mostly of brick or stone. There is, however, a considerable demand for granite in San Francisco and the largest cities for curbing the sidewalks and street-crossings. The Penryn quarries are amongst the most extensive of the kind in the States, covering some 680 acres, and employing 200 hands. The great reputation of the Penryn granite arises from the fact that it does not change color by exposure, and that it contains no iron, and this gives it great superiority when used for monuments, tombstones, or when placed in any position where it is much exposed to the atmosphere. The prevailing shades of the Penryn granite are blue, gray and black, the latter resembling the black granite of Egypt, and taking a beautiful polish.

Limestone and marble are found in almost all the States, there being 616 quarries, employing 15,646 hands, 190 quarrying-machines and 499 dressing-machines. Judging from the statistical returns, Iowa presents the greatest activity in limestone quarrying, heading the list with 128 quarries, and succeeded by Ohio with 119. Indiana possesses 65, Wisconsin, 46, after which the numbers become small. Taking the States in their alphabetical order, we find that Alabama possesses an excellent white marble known as "Talladega," as also gray and white non-crystalline varieties, and variegated marbles, all of sub-carboniferous age. Besides these there are magnesian limestones and yellow crystalline marble of tertiary date. Arkansas has an oolitic limestone that takes a good polish; Connecticut has some quarries of dolomitic marble; while the limestone of Florida is of a coralline nature. In Illinois the quarries are of carboniferous age, and yield a great deal of good building stone, that known as Lemont marble being largely used in the building of Chicago. The Indiana stones are upper silurian and oolitic freestone, and those of Iowa are carboniferous and magnesian. Kansas possesses some very fine black marbles and cream-colored dolomitic stone, soft and easily dressed. Similar material is also found in Kentucky, together with freestone and limestones of lower silurian formation. In Maryland are a valuable brecciated limestone, known as Potomac marble, and a verd antique, which is extensively worked in Frederick County. Massachusetts furnished from her quarries at Lee the limestone used in the building of the Capitol at Washington; and New York State is well supplied from the Eastchester and the Sing Sing quarries, as also from the many outcrops of white crystalline limestone of the northern highlands. The cities of Cleveland and Toledo in Ohio are, in a great measure, built of the well-known Sandusky limestone; but in Cincinnati a limestone of the upper coniferous division is most in request, and largely worked in the quarries in the neighborhood.

In the Rocky Mountains, and all through the Pacific States, marble is very profuse, and of varied quality. The Hogback, which has been mentioned before in connection with granite, is composed of cretaceous or Juratriassic formations, and is an inexhaustible source of fine building stone, with two separate parts, formed wholly of limestone; and throughout Colorado generally, there are quantities of breccia, white, apple-green, and clouded marbles. In California there are also great deposits in Toulumne County,—masses weighing 600 tons having been blasted out, and single blocks dressed weighing 13,000 pounds. Most of the stone is of an unclouded white, but all is fine-grained and extremely hard. Near Suisun there is a singular stone, which, in its rough state, looks very like rosin. It occurs in heavy beds, blocks measuring from 800 to 900 cubic feet having been frequently raised. On the McCloud River there is a pure white marble, fit for the most delicate purposes of statuary, though it has been but little worked. It is singular that, with such a profusion of excellent marble throughout the State, the Californian demand, which is always heavy, has been, up till now, met by importation from Italy. Probably, however, when a greater depth of working has been attained, marble equal to the finest Carrara will be readily found. The Californian quarries also yield handsome specimens of Cipolin marble; white, with shadings and streakings of green, together with the Porton or Genoese yellow; and there is a variety known as Ruin marble, a yellowish stone with broken lines, very much resembling the ruins of fortifications.

Sandstone is very generally found throughout the States, but is worked to the largest extent in New York, Ohio and Pennsylvania, which possess 181, 126 and 95 quarries respectively. The Ohio quarries are on the most considerable scale, having between three and four million dollars invested in them, and with an annual yield of nearly nine million cubic feet. Kentucky, too, possesses vast stores of sandstone in the basin of the Cumberland River, and an excellent stone on the Kentucky and Green Rivers, known as Buena Vista stone, of which considerable portions of Louisville and Cincinnati are built. One of the best stones in America for building purposes is the Potsdam sandstone of New York and New Jersey, the latter State containing also a very durable conglomerate, known as the Green-Pond Mountain conglomerate.

In the Pacific States sandstone is not so widely developed as limestone, although there are several deposits of very handsome varieties. One of these, a fine-grained stone of greenish-gray color, is quarried at Angel Island in the Bay of San Francisco, and a brown sandstone from Alameda County is largely used in cemeteries as bases for monuments and for vault construction.

Slate, fit for roofing purposes, is rather limited in its development in comparison with other structural stones in the United States. But ninety-four quarries are worked, producing annually nearly half a million of squares, and of these the greatest number are to be found in Vermont and Pennsylvania. Of other kinds of rocks useful for building we may mention trapped, worked pretty extensively in Connecticut, and trachyte, another igneous rock, very common in the Western mining regions. It is usually of a pinkish-gray color, and is very soft when taken from the quarry, though it gradually indurates on exposure to the atmosphere.

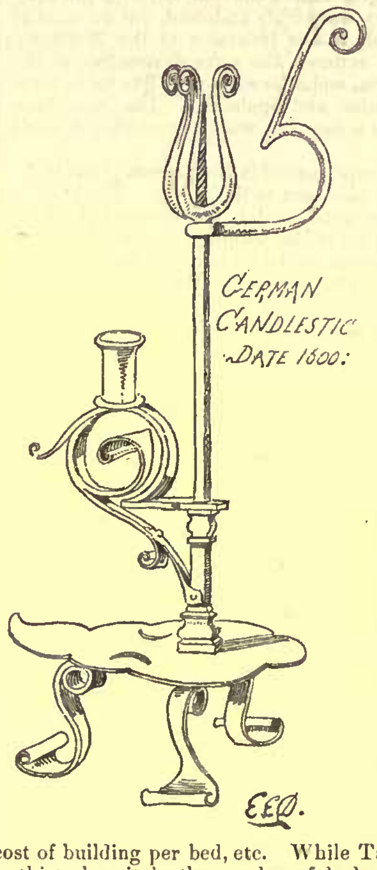
Building materials, otherwise than rocks, are of importance almost beyond that of their intrinsic value, inasmuch as they employ so many hands in their preparation. For instance, the making of bricks, tiles, fire-bricks and drain-pipes gives occupation to 70,000 hands, the annual value of the products being estimated at $34,000,000. Most of the cement is made from natural rock, hydraulic limestone being more or less developed in the majority of the States. There are, however, certain localities which make a specialty of cement production. One of these is Rosendale, in New York State, the rocks of that neighborhood, which are the bottom beds of the Lower Helderburg group, and the top beds of the Niagara group, containing from 17 to 22 per cent of silica, 34 to 48 of lime, and about 10 of oxide of iron and alumina. The production in this centre is at the rate of 1,600,000 barrels per annum. Natural cement is also produced in Kentucky and Indiana, and is known as Louisville cement. The total yield of cement throughout the States is about three and one-half million barrels, of which Portland cement only ranks at 85,000, the great bulk of this latter, as indeed of all the artificial cements, being imported. The barrel of natural cement, which weighs 300 pounds, has an average value of $1.10, while that of Portland (which is 400 pounds) is $2.25 at the works. All these three kinds, viz., Portland, Rosendale and Louisville are generally used for work under water, and where great strength and tenacity are required, such as the foundations of heavy buildings, like sea-walls, sewers, light-houses, etc. But while admitting the excellence of the natural cements there is no doubt but that the Portland, whether made in America or imported, is the most useful, and possesses a greater resistance to crushing than all other cements. The prices in the Western States and those of the Rocky Mountain districts vary greatly. In Denver (Colorado), where about 100 barrels of 400 pounds are turned out daily, the value of this local production is $6 per barrel, that of Portland (375 pounds net) being $7 to $7.50, and that of Louisville (265 pounds net) being $4. Both the importation of Portland cement and the local manufacture are on the increase, which is due, not only to the actual increase of building everywhere, but to the fact that cement is rapidly superseding lime mortar for ordinary purposes, and especially in large and expensive erections.

A common rock in America is that of steatite or soapstone, which is used to a considerable extent as refractory linings for furnace hearths, grates, stoves and foot-warmers, and also for stationary laundry-tubs and sinks. It is principally quarried in the New England States, the production being at the rate of 6,000 tons per annum, and the average price at about $15 per ton. Apropos of limestone and marble it may be mentioned that some 25,000 tons are annually ground down and sold as marble dust at $7 per ton. The employment of this material is in a truly American fashion, viz., for the generation of carbonic acid in soda-water fountains.

As far as the natural source of plaster-of-Paris is concerned, it might be produced to an unlimited extent, seeing that such vast beds of gypsum exist in the United States extending in Texas alone for many hundreds of miles along the head waters of the Red River. There are also beds of great thickness in New York, Virginia, Kansas, Ohio, Arkansas and Michigan, those of the latter state belonging to the upper sub-carboniferous formation, the yield of which in 1882 was 701,450 net tons of plaster, and 1,109,810 barrels of stucco (of 300 pounds each). It is somewhat singular that, although New York State has such large deposits of gypsum, most of the plaster and stucco made on the Atlantic seaboard is from imported Nova Scotia stone. All through the Rocky Mountains and Pacific States there are enormous beds of gypsum, and particularly in Nevada, Arizona and New Mexico, though the lack of a market renders them practically valueless. In New Mexico it is mixed and made into plaster by the natives, who take it to Santa Fé, and sell it for one dollar per bushel. At Socorro, in the Southern part of the territory, gypsum is called "*hasped*" or "*yeso*," and is used as window-lights, and as plastering in whitewashing the interiors of their adobe houses. There is a steady manufacture of plaster-of-Paris at San Francisco, where it sells as follows, per barrel: hard, for finishing and general use, $2.75; for casting ornaments and moulds, $3; superfine, for sculptors' use, $3.50; while common plaster is ground on a large scale for fertilizing purposes, and fetches about $12.50 per ton.

Disinfecting the Thames.— It is said that twenty-two tons of chloride of lime are dumped into the Thames every day to neutralize the sewage of London. This costs about $500 per diem, and it is now proposed to use permanganate of potash as being a more powerful and less expensive agent.

HOSPITALS.[1] — II.



The second volume of this handsome book fully satisfies the expectations raised by Part I, and completes the best work of reference in regard to hospitals in the English, and probably in any, language. Its treasures of information, statistics and illustration are made available by a full general index, table of contents and list of illustrations, which together cover 18 pages. In the same line with these may be mentioned three tables of summaries, presenting in condensed form information certain to be needed by one the moment he begins to inquire into the hospital question with any practical end in view, and not to be collected by one's own efforts, except at an expense of time and labor, known only to those who have attempted the task.

Thus Table I gives for thirty-five different hospitals the date of erection, number of beds, area of site per bed, area of site *covered* per bed, character of connecting corridors, areas of principal wards, height of pavilions and their distance apart, cost of building per bed, etc. While Table II gives forty-four wards in thirty hospitals, the number of beds in each, and for each bed the wall-space, floor-space and cubic feet, as well as the window-space and ventilation.

At the end of the volume is a paper by Dr. Mouat (of 50 pp.) on the "Organization of Medical Relief in the Metropolis" (London), which with its map of the distribution of hospital accommodation within the metropolitan area, contains an astonishing account of the demand for and supply of hospitals in London. It includes a scheme for the reorganization of the whole system, and may have a practical value for us as a warning against the evils and dangers which a vicious system of charitable medical relief may bring upon our cities.

In a final page entitled "Conclusion," the authors state briefly and modestly what they suppose to be the value of their work, from which we quote the following: "We believe it to represent fairly the present state of the question in its medical and architectural aspects without pretending to be exhaustive in either. . . .

"We trust that the index and illustrations will enable all inquirers easily to find the information they desire on each of the details of hospital construction and management which they are in search of.

"The only classes of hospitals of which illustrations have not been given are fever and convalescent hospitals. These are in a transition state, and the views in regard to them are still to a great extent matters of speculation and discussion."

With this work, and Dr. Burdett's on "*Cottage Hospitals*" to refer to, the labors of those who have to plan new or alter old hospitals will be much lessened.

THE ILLUSTRATIONS.

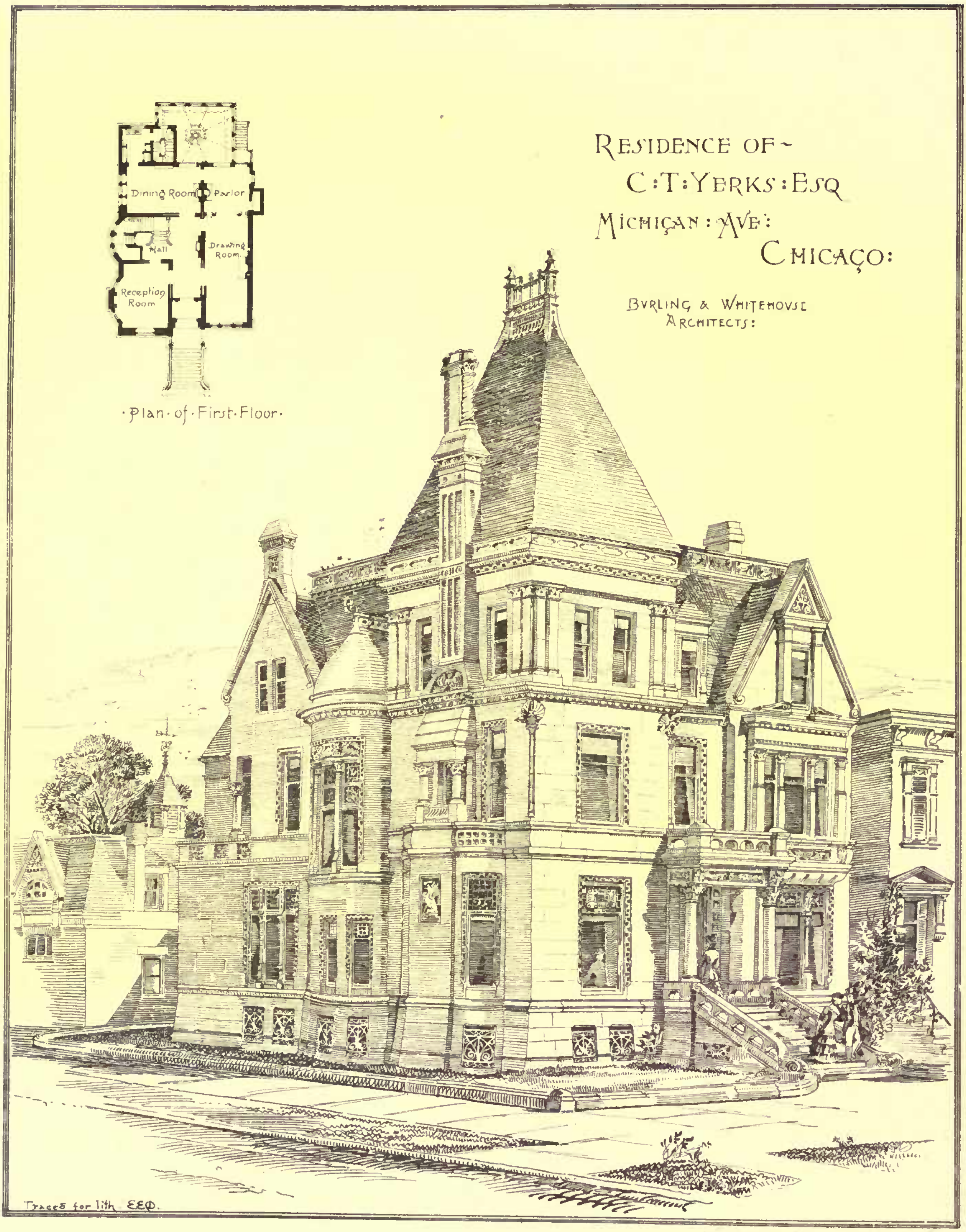
CHURCH OF MONTIVILLIERS.[2]

Montivilliers is a town of about four thousand inhabitants, situated in a beautiful valley upon a stream called the Lezarde near the western extremity of the Pas de Caux, within the distance of six leagues from Fécamp and two from Havre de Grace. Its fortifications, now in ruins, were erected near the close of the fourteenth century, till which time it was altogether defenceless; but the state of France, just recovered from one English invasion and threatened with another, turned the thoughts of the government towards the securing of all vulnerable points on the northern frontier, and the trade of the place, though at present trifling, was at that period far otherwise. The cloths of Montivilliers were then considered to rival those of Flanders, and the preservation of the manufacture was regarded of so much consequence that sundry regulations regarding it are to be found in the royal ordinances. The two circular towers of one of the gates now standing afford a good specimen of the military architecture of the time.

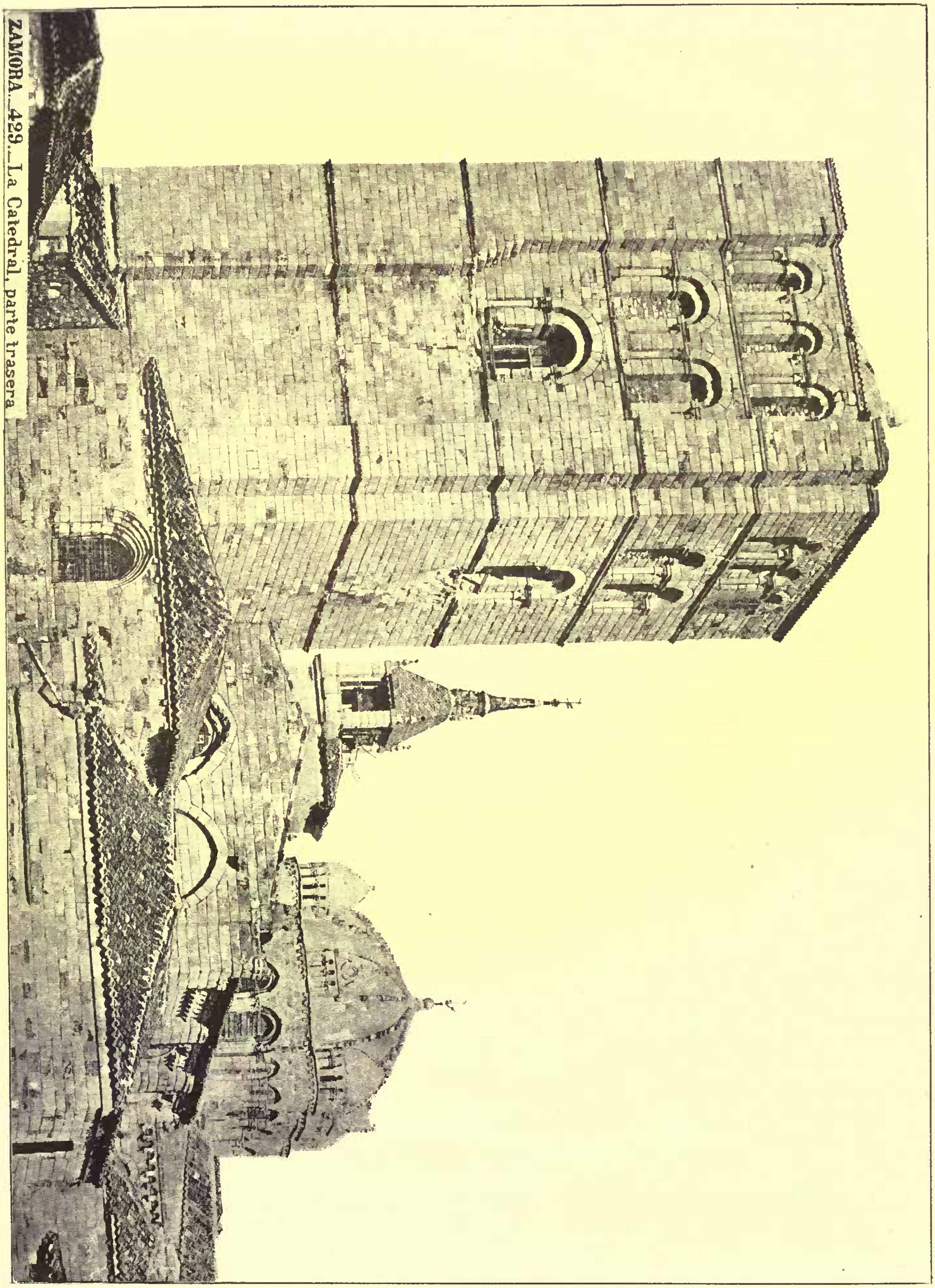
Among the Norman historians the foundation of Montivilliers is

[1] "*Hospital Construction and Management*," by Frederick J. Mouat, M. D., etc., and H. Saxon Snell, Architect, etc., Part II. London: T. A. Churchill & Co., 1883. Continued from p. 80, No. 425.

[2] From Cotman's "*Antiquities of Normandy*."

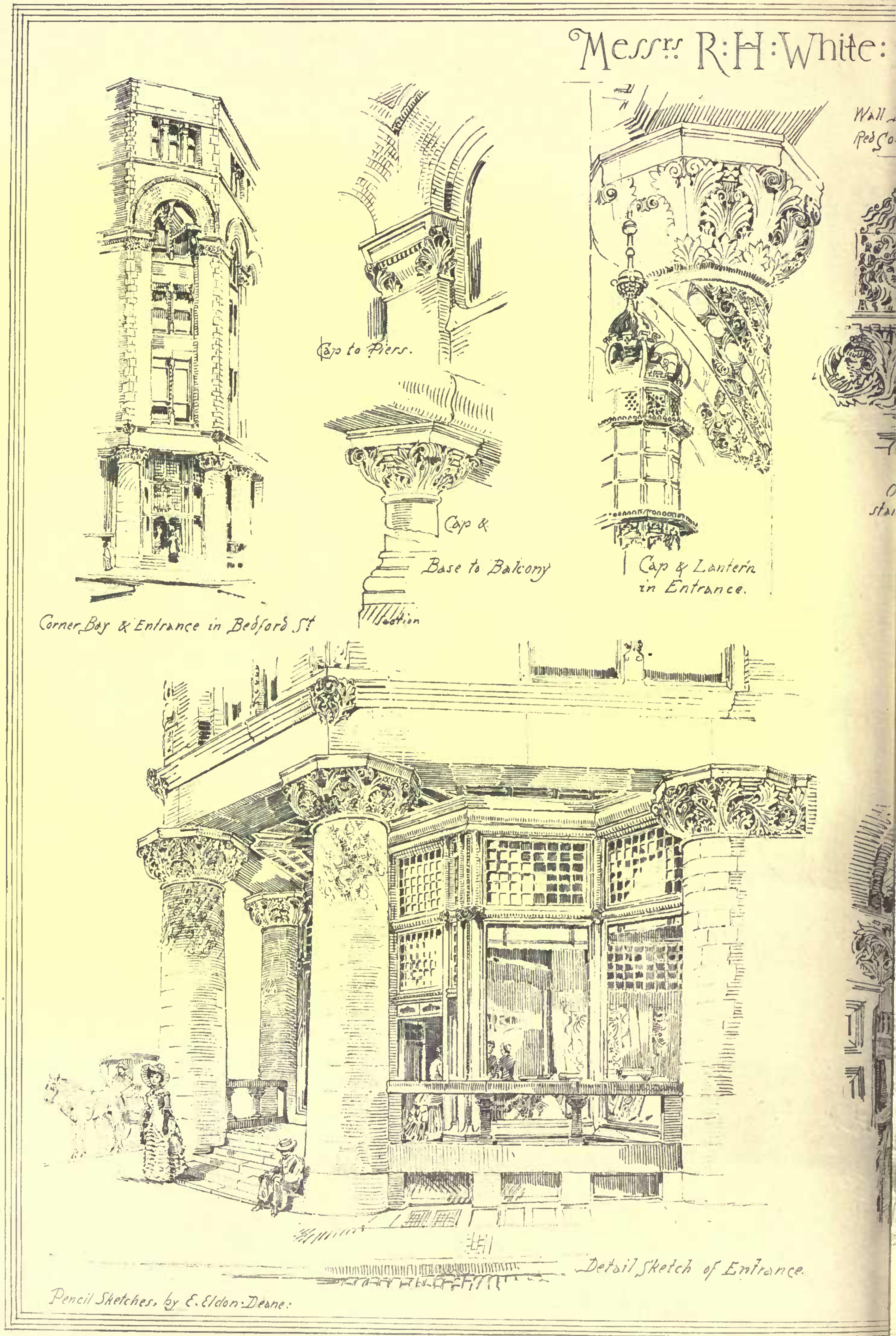


The Heliotype Printing Co. Tremont St. Boston

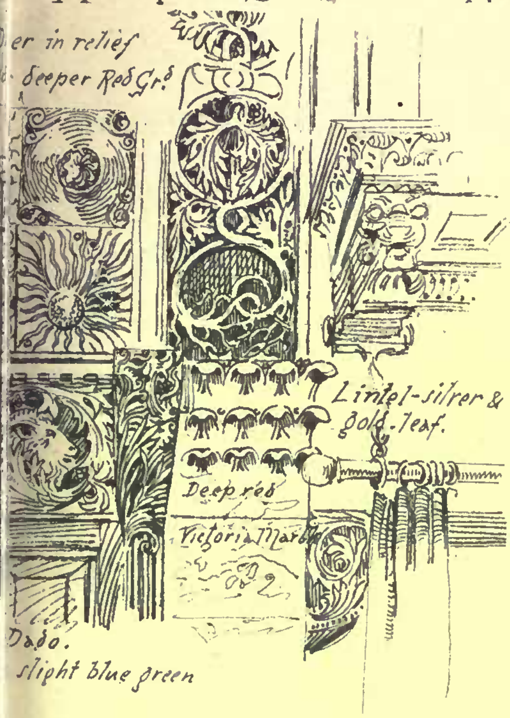


ZAMORA._429._La Catedral, parte trasera

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON

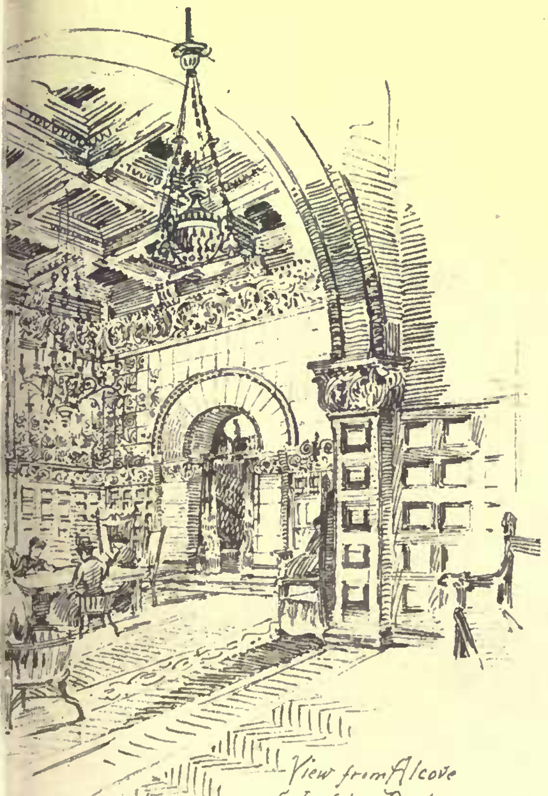

Messrs R:H:White:
Cap to Piers.
Cap & Base to Balcony
Section
Cap & Lantern in Entrance.
Corner Bay & Entrance in Bedford St
Detail Sketch of Entrance.
Pencil Sketches, by E. Eldon Deane.

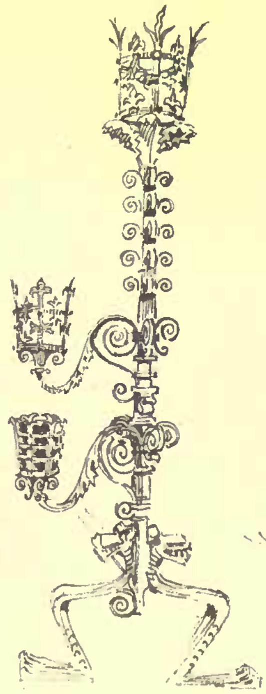
...Co's: Store: Boston:
Messrs Peabody & Stearns Archts

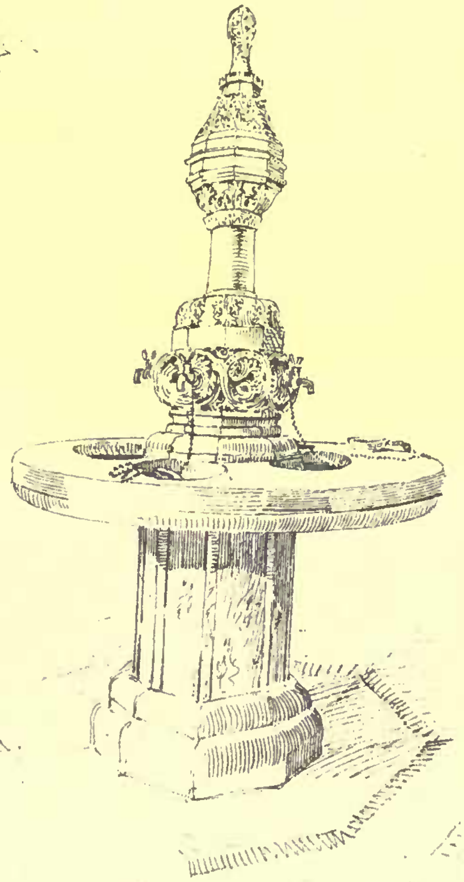



Main Frieze. in Parlor.

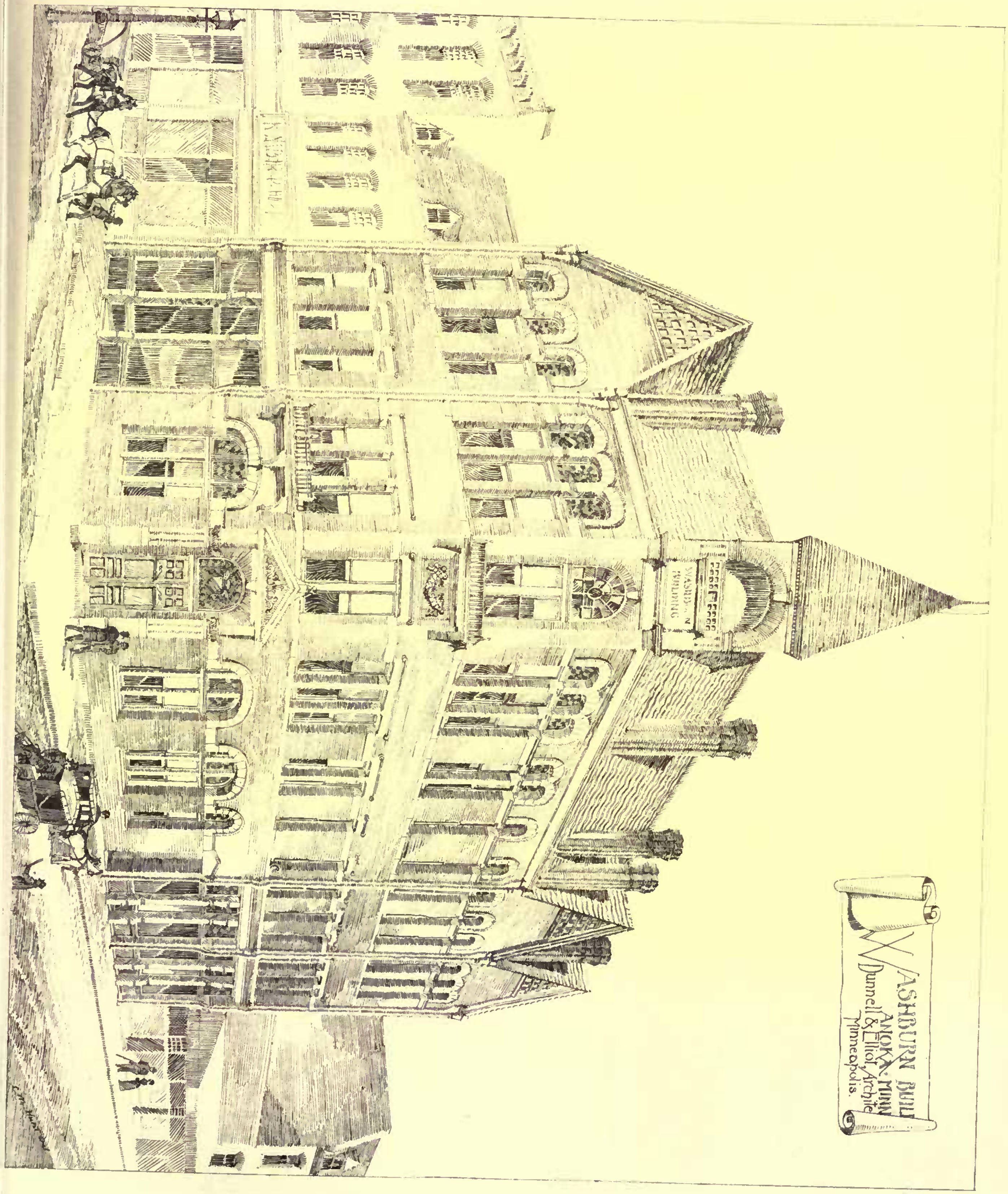

Interior of Ladies Parlor.

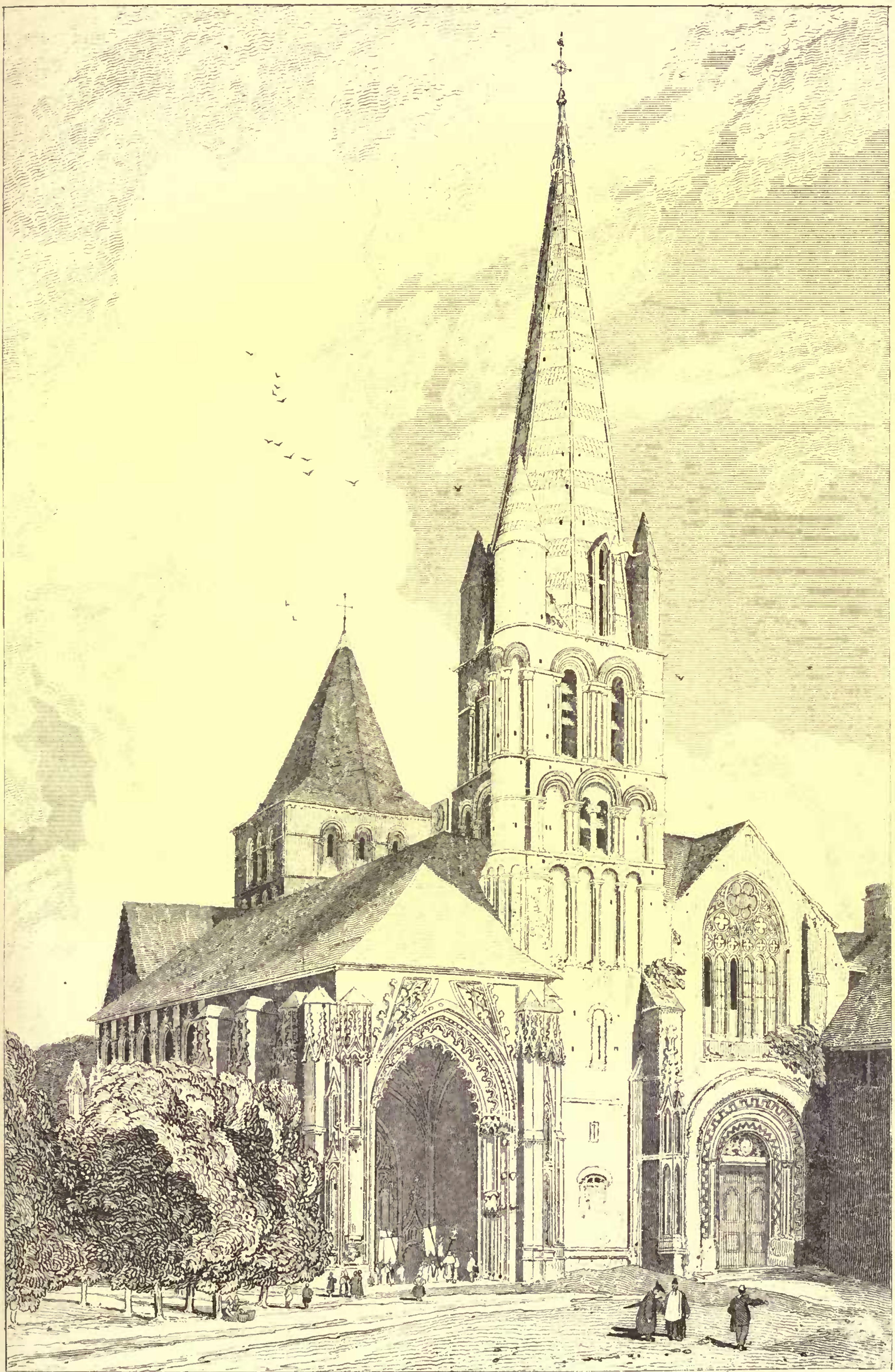

View from Alcove of Ladies Parlor.


Andirons.


Marble Fountain in Store.

The Heliotype Printing Co. 211 Tremont St. Boston.


WASHBURN BUIL
ANOKA, MINN
Dunnell & Elliot, Archite
Minneapolis.



The Heliotype Printing Co. 211 Tremont St. Boston.

ABBEY CHURCH OF MONTIVILLIERS.

referred to the seventeenth century, during the latter half of which St. Philibert, Abbot of Jumièges, built a convent here for the community of nuns. The monastery was richly endowed, but no records are left of its history previously to the incursion of the Normans, under whose hands it at first suffered the same destruction as the other religious houses in Neustria, and afterward rose, like them, from its ashes with increased splendor and opulence. The immediate successors of Rollo rebuilt the abbey, but without restoring it to its original distinction.

The church of Montivilliers, represented in the present plate, is the same as before the revolution, belonged to the abbey. The portion toward the north is the chapter-house, and is the work of the fourteenth century. The greater part of the building, though altered in some places, may safely be referred to the eleventh, at which time it is upon record, that Elizabeth who succeeded Beatrice as abbess, nearly, if not altogether, rebuilt the whole. At subsequent periods the church underwent many considerable repairs and alterations. A sum of seven hundred florins was expended upon it in 1370, the proceeds of a fine imposed upon the town for some injuries done to the nuns; and Toussaints Varrin, the archbishop of Thessalonica, dedicated the edifice in 1513 under the protection of the holy virgin. Five years subsequently the abbess, Jane Mustel, repaired the ceiling and painted the windows, and made the stalls in the choir.[1]

The exterior of the lady-chapel affords a fine example of early pointed architecture; its lofty narrow windows are separated by slender cylindrical pillars, as in the church of the Holy Trinity at Caen. The embattled ornament round the southern door of the western front is far from commonly seen in such situations; in the interior of the nave the same massive semicircular architecture prevails as in the towers, but it is mixed with some peculiarities that will scarcely be found elsewhere, particularly a flat band in the form of a pilaster, enriched with lozenges, which is attached to the front of one of the columns, and is continued over the roof, and again down the pillar on the opposite side. Mr. Turner noticed a small gallery or pulpit, of filigree stone-work, at the west end, near the roof;[2] and upon the authority of the well-known antiquary, John Carter, he supposed it most probably intended to receive a band of singers on high festivals; but some corresponding erection in England would make it seem more likely that this gallery communicated with the apartments of the superior, and was placed here for the purpose of affording her the means of paying her devotions in private, when either from the weather or any other cause, she might not wish to occupy her throne in the choir.

Mr. Turner has also remarked upon the capitals of the columns at Montivilliers, which are very peculiar. Some of them are obvious imitations of the antique pattern, and of great beauty, others are rude and wild.

The mysteries of Christianity, and the fables and allegories of heathenism, the latter, as well in its most refined as its most barbarous forms, occur in endless variety in almost every part of the edifice; one of the capitals contains a representation of the fabulous Sphynx, with her tail in a fleur-de-lys; upon another, is sculptured a figure of Christ in the act of destroying the dragon, by thrusting the end of a crosier into his mouth. Two others, figured in the "*Tour in Normandy*," exhibit a group of Centaurs, and the allegorical *psycostasia:* the remarks of the author of that publication, upon the latter of these shall close their article.

"In this you observe an angel weighing the good works of the deceased against his evil deeds, and as the former are far exceeding the avoirdupois upon which Satan is to found his claim, he is endeavoring most unfairly to depress the scale with his two-pronged fork. This allegory is of frequent occurrence in the monkish legends. The saint, who was aware of the frauds of the fiend, resolved to hold the balance himself. He began by throwing in a pilgrimage to a miraculous virgin. The devil pulled out an assignation with some fair mortal Madonna, who had ceased to be immaculate. The saint laid in the scale the sack-cloth and ashes of the penitent of Lenten time. Satan answered the deposit by the vizard, and leafy robe of the masker of the carnival. Thus did they continue equally interchanging the sorrows of godliness with the sweets of sin, and still the saint was distressed beyond compare, by observing that the scale of the wicked thing (wise men call him the correcting principle) always seemed the heaviest. Almost did he despair of his client's salvation, when he luckily saw eight little jetty black claws just hooking and clutching over the rim of the golden basin. The claws at once betrayed the craft of the cloven foot. Old Nick had put a little cunning young devil under the balance, who, following the dictates of his senior, kept clinging to the scale, and swaying it down with all his might and main. The saint sent the imp to his proper place in a moment, and instantly the burthen of transgression was seen to kick the beam. Painters and sculptors also often introduced this ancient allegory of the balance of good and evil in their representations of the last judgment; it was even employed by Lucas Kranach."

DETAILS FROM THE STORE OF R. H. WHITE & CO., BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

AN exterior view of this building was published in the *American Architect* for September 15, 1883.

[1] "*Description de la Haute Normandie*," II, p. 108.
[2] "*Tour in Normandy*," I, p. 69.

THE CATHEDRAL, ZAMORA, SPAIN.

FOR a description of this building see the *American Architect* for May 10, 1884, page 220.

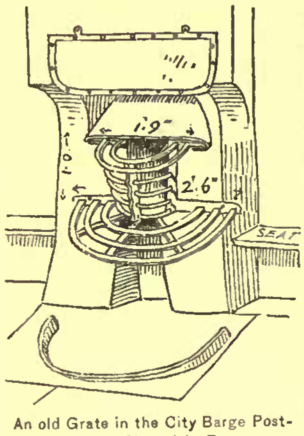
THE WASHBURN BUILDING, ANOKA, MINN. MESSRS. DUNNELL & ELLIOT, ARCHITECTS, MINNEAPOLIS, MINN.

THE ground floor of this building, which is owned by the Hon. W. D. Washburn, is occupied by the Anoka National Bank and three stores.

HOUSE OF C. T. YERKES, ESQ., CHICAGO, ILL. MESSRS. BURLING & WHITEHOUSE, ARCHITECTS, CHICAGO, ILL.

THE cost of this building is to be $80,000.

INSPECTING AND TESTING THE SANITARY ARRANGEMENTS OF HOUSES.[1]



An old Grate in the City Barge Post-House, Cheswick, Eng.

DOUBTS have been expressed as to whether it is possible for the officers of a sanitary authority to find sufficient time to properly inspect and test the sanitary appliances of all the houses in its district. Judging by the staff and assistance usually accorded to such officers I think we may come to the conclusion that such doubts are fully justified. It has been found from actual experience: —

I. That the drains and sanitary appliances of all houses should be examined and tested not less than once a year.

II. That one inspector, giving his whole time to the duty cannot inspect and test more than an average of four hundred houses per annum.

It seems, therefore, improbable that any sanitary authority would keep a sufficiently large staff of inspectors to test every house once a year, even if they had the power to make it compulsory. This average, however, would in practice be very much reduced from various causes, such as the establishment of the Sanitary Inspection Associations, which are daily gaining favor and influence, and also by the attention given to this subject by owners of the better class of houses, who prefer to have their houses (especially when they occupy them) dealt with by private engineers. These and similar causes take a number of the larger and more complicated cases out of the category, and leave to the public inspectors chiefly those houses whose owners are unwilling, or whose occupiers are unable to pay for the inspection and test.

It must be regretted that the sanitary laws empowering compulsory inspection and control of drainage, and other sanitary arrangements fall so far short of what is required to make them practically useful; on the other hand, to have a private house invaded by the corporation officers, without notice, would be well nigh intolerable, but after all the notices and times of probation enjoined by the Acts have expired, and the officer becomes entitled to inspect the premises, the powers and facilities allowed him by law appear to be too restricted to result in thorough investigation, much less remedy. The law, however, does reach all that comes under the head of "Drainage," and the most efficient way of testing the drainage is a subject probably well known to all of us, but still I trust worthy of our present attention and discussion. Further than this, there must be hundreds of householders who are not only willing but anxious to have the sanitary arrangements inspected and tested by the corporation officer in preference to any private source, and I assume that it must be the desire, as well as the duty, of every member of this association, holding an appointment under a sanitary authority, to be able to respond to such a call in a way equally thorough and efficient with that of any officer of a sanitary protection association or a private engineer.

I am quite conscious that to many here to-day I am able to communicate nothing new; but I venture to occupy your attention, hoping to promote such a discussion as will develop and accentuate the knowledge we already have. The first step seems naturally to be to ascertain whether the drainage from the house is actually running freely from the premises and in its proper channels, into the main sewer. Where the entrance to the main sewer is by means of a disconnecting or inspection shaft this can be easily ascertained; but where the house-drain is actually connected into the sewer there is nothing for it but to dig down and expose it to view. In the latter case, when the ground is open, it is easy to construct an inspection shaft or man-hole, which shall not only enable future inspection to be made readily and without expense, but will isolate the drainage from the common sewer, and each house from its neighbor. I take it that this is a primary step in preventing the spread of infection by means of the drains. The man-hole or disconnecting shaft should be ventilated, and should be trapped against the sewer, and the connection of the house-drain into the shaft left open so that a current of fresh air may pass up the drain-pipe. Between the man-hole or common sewer and

[1] A paper by Mr. J. P. Spencer, read before the Association of Municipal and Sanitary Engineering and Surveyors, and published in the *Building News*.

the house there is generally a long length of drain. In many cases, where the town sewer is situated in a back street, no part, or only a very short part, of this drain is situated actually under the house. Under any circumstances it is important that this part of the drainage should be tested, even if only to prevent leakage into the ground and foundations; but where it is situated under the house it becomes specially and essentially important to do so. Where there are no back streets, and the sewers are situated in the front, the house-drains are frequently brought from front to back under the basement floor. These pipes are sometimes of stone-ware and sometimes of metal, but where they pass under any building they should always be metal, with strong spigot and faucet and lead joints. At various intervals along the length of these pipes openings and traps will generally be found for the entry of branch pipes, and they are always, except in the case of badly-designed drains, kept clear of the house. It is evident that a very clumsy and inconvenient method of testing such a drain as this would be to open it all up, pull up the pavement and floors and inspect every joint. A simple expedient is to test it by filling it with water. Select some inlet where you would have a pressure from a head of from two feet to six feet; plug up all the openings whose outlets are below that level, and also plug up the connection into the man-hole or other outlet from the house-drain to the main sewer. The whole system of underground pipes can then be filled with water up to a certain level, care being taken that the outlet at the man-hole is perfectly stopped with pugged clay or other means. If the water remains up to the original level, and does not sink or disappear, it is a proof there is no leakage from the pipes. The pipes should be filled under the eye of the inspector, so that no tricks may be played; for instance, in the case of new houses where the drains have just been covered in, the inspector should know approximately what quantity of water is required, and should not be content to find the pipes already filled for him, or he might discover, perhaps, that a false plug had been put in the first length of pipe, and the water prevented from passing beyond the first joint. By seeing the removal of the plug at the man-hole, such a trick as this might be detected, as the quantity of water used would then show itself if the gradient be known; but a better way is to calculate the cubic contents of the given length of drain-pipes, and measure the number of gallons put in. For instance, a drain 4 inches diameter would require .54, or a little over half a gallon, for every lineal foot; and a drain 6 inches diameter would require 1.22 gallon, or nearly a gallon and a quarter, for every foot in length. The next points to be ascertained are the positions of every sink, bath, lavatory, and waste and overflow pipe in the house. With regard to the sinks, it is frequently found that they each consist of a mere pot-trap, which admits of a large quantity of sediment remaining in the trap to become a nuisance, and a danger to health. A much better and more simple form is the ordinary siphon or "S"-trap, which may properly be styled the "wash-out" trap, and certainly one more likely to enable all foul objectionable matter to be carried away from the house at once instead of being retained, as in the other case. I would, therefore, recommend this kind of trap for all sinks, both indoors and outside, which are meant for the conveyance of liquid refuse. Of course, in the case of garden paths the box gully may be used to prevent the passage of gravel, etc., into the sewers. I need scarcely enlarge upon the absolute necessity of having every waste-pipe and overflow entirely cut off from connection with any drain. This is a condition now generally recognized and insisted upon by all of us.

It is only necessary, therefore, for the inspector to trace every one of these, and be certain that each is made to deliver upon, or nearly upon, the open grate of a siphon trap-gulley outside the house. After tracing and inspecting the waste and overflow pipes from the baths, lavatories, housemaid's-sinks, kitchen and scullery sinks, and other pipes, search should be at once instituted for all those concealed dangers which probably some one has been at great pains and ingenuity to perpetrate. They will consist chiefly of the overflow-pipes from the water-cistern, the waste-pipes from the leads above the portico and bay-windows, the overflow from the conservatory, the overflow from the small ball-trap cistern to the kitchen boiler, and the waste-pipe from the lead safe under the basin of water-closet. Two of these, viz., the pipes from the cistern and from the lead safe, used to be very often introduced direct into the soil-pipe. The positions are so near, and the convenience so great, that the temptation could not always be resisted; besides, it gave another opportunity of wiping a lead joint—a thing dear to the soul of plumbers. The positions of the heads of all the rain-water pipes should be carefully searched out and noted, and if any be near windows or other openings into the house, or under verandas or galleries, they should be completely disconnected from the drain, and made to deliver upon the open grates of siphon gulleys.

The soil-pipe is a part of the sanitary arrangement claiming especial attention. The size is generally four inches in diameter, and, where possible, it is best to keep it outside of the building. The only objection to placing the soil-pipe outside is where it is found necessary to have a trap at the foot of it, or where the constructor of the house has made such a trap, whether necessary or not. If this trap be not placed sufficiently deep in the ground, there is a danger, in severe winters, of the water in the trap being frozen, and then, of course, the whole working of the apparatus is stopped. To avoid this it is best to so construct the drainage system as to obviate the necessity of the trap, but, if found absolutely necessary, it should be placed at such a depth as to protect it from frost. The ventilating-pipe from the soil-pipe should be carried up above the roof the full diameter of the soil-pipe, and it should be clearly ascertained that the terminal of the ventilating-pipe is not in such a position as to enable the air from it to be blown through windows or other openings into the house. The question of what kind of terminal to place on the ventilating-pipe is one about which a difference of opinion exists. Some advocate the fixing of special kinds of "air-pumps," or other patent ventilators; others prefer the end being left simply open or with a mere cone-raised cover. Unless special circumstances suggest the use of a special form of terminal. it is, as a rule, best not to put any one to this expense, and the advantage over the open end has yet to be proved. It is as well, however, to protect the opening by means of coarse wire netting, because the house sparrow is not discriminating as to where he builds his nest. The position and connections of the water-cisterns are of great importance. Certainly the supply to the water-closets should be by means of a separate cistern, and this should be insisted upon. It is best, where possible, to have all taps from which water can be drawn fitted upon the rising service-pipe, so that no water for drinking or cooking purposes shall ever enter the cistern at all; but where this cannot be done, the system should be periodically examined, and the sediment completely removed and washed out. It is quite usual to find cisterns concealed away in the roof, and with dead flies, moths and dusty scum floating on the water, and I have myself found cases where dead mice have been found in the cistern used for drinking-water purposes. It should also be seen that the overflow-pipes are all carried to the outside, and made to discharge upon the roof or otherwise into the open air.

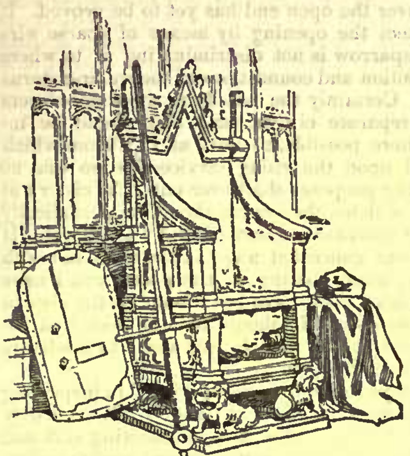
Having thus briefly reviewed the course recommended in inspecting the sanitary and drainage arrangements of a house, I will as briefly again refer to the testing of them. The best engineering skill and design may be nullified through defective materials and workmanship. In these works the whole system is only as efficient as its weakest part, and it becomes important to find out hidden defects, if any exist. I have already dealt with one test for drain-pipes at a low level. This, however, would not be suitable for the pipes and appliances within the house, and ranging from the basement to the roof. A ready means is by the "paraffin" or the "peppermint" test. As a preliminary test, when suddenly called in, and when other means are not at hand, an assistant may be sent upon the roof to pour paraffin down the soil-pipe ventilator; or if there be no such ventilator, then down some distant sink. To use the oil of peppermint in a similar way it should be poured into two or three gallons of hot water, as nearly boiling as possible, and then sent down the pipes. As it should never previously be introduced into the house, if it is not possible to find, or to make, an opportunity of applying it from the outside, the operator (who should not be the inspector) should shut himself in the room where the sink is, and stuff up the crevices of the door. He should then pull up the bottle containing the oil of peppermint through the window by a string; pour it first, and the hot water after, down the sink, and remain where he is. In the meantime the inspector ranges the house, the doors and windows of which have been closed, and if there is any leakage into the house he soon detects, and should proceed to localize it.

A better test still is the "smoke" test, which is applied by a small fan-blast worked by hand. The first process should be to apply it outside, or in the area, to such open gratings as are situate between the traps and the house; and assuming that the desired aim of the sanitary arrangements is to always have a current of fresh air blowing up the drain-pipes and out of the ventilators, the smoke should follow the same course, and be sucked in at the grating, and eventually come out at the tops of the ventilating-pipes. The place of ingress of the smoke may then be covered all round with mats, or with clay, etc., and the places of egress at the tops of the ventilating-pipes stuffed up. The smoke being then forced in the application will be under pressure. If any of the smoke finds it way into the house, it is a sign that there is a defect somewhere, and it can generally be readily traced by following the stream of smoke coming from it. It will be obvious that these tests must be extremely useful in finding out "dry-traps," and detecting those extraordinary connections of pipes sometimes leading the sewer-gas in a concealed and disguised manner, right into bedrooms, dressing-rooms, and bath-rooms. In my own experience I have discovered actual cases where a pipe has been led direct from the drain into all these rooms, as well as into many other places—bad enough—but not so outrageously careless as into a bedroom. I have in my mind now two cases, in first-class houses, where I discovered pipes connected directly into the drain, communicating directly into one of the bedrooms.

The exterior traps can then be tested by applying the smoke, under pressure, at the man-hole or nearest disconnecting shaft, and by endeavoring to force it through the traps. The inspecting engineer may now be said to have finished the first stage of his labors, and I only trust that while endeavoring to carry you over the ground with him I have not finished your patience also. In conclusion, I venture to submit that the objects should be: (1) To isolate the drainage system of each house from its neighbor and from the main sewer; (2) To construct or alter the drainage of each house, so that wherever possible a current of fresh air shall pass up and through the pipes; (3) To have all houses, old or comparatively new, inspected and tested at least once a year; (4) In the cases of new houses, to see that the first two objects are attained and carried out during the construction of the buildings, and as forming part of their original construction; (5) In the case of old houses, to have the first three objects carried out with as little expense and inconvenience to the owner and occupier as possible; and (6) In all cases to have the inspections made by a disinterested person of education, intelligence and special skill — in other words, an "expert," and one who is capable of advising as to the best means of remedying the defects found to exist, and of preventing those likely to arise.

NOTES FROM ABROAD.

LONDON, August 5, 1884.



CORONATION CHAIR
WESTMINSTER ABBEY

THE annual exhibition of the Royal Academy, which has just closed, was somewhat disappointing as compared with its Paris rival, the *Salon*, the portion devoted to architecture especially being quite small and unimportant. The English architects are certainly doing a great deal of large and interesting work all the time, although very little of it seems, ever to get into he Academy exhibitions. Most of the better known architects were not represented at all. The drawings were all small, mostly line work, with a few water-color sketches, but with hardly any large colored drawings. No details of any sort whatever were shown, and no one seemed to have had the courage to send in a plan, if we except two or three instances where a small outline was tucked away in one corner of a perspective. All the drawings were carefully mounted and set in gilt frames, in most cases under glass, so that the first impression was that the exhibitors thought a great deal more of the drawings as pictures, than of the actual work they represented.

Experiments are being made with a view towards new decorations for the interior of the dome of St. Paul's. It does seem a pity that no comprehensive scheme has ever been devised and carried out for putting some color into this grand cathedral. The architecture all suggests color; it would be hard to say just what color or how arranged, but the total absence of anything of the kind is painfully felt. In the Dôme des Invalides, Paris, the glass in the main windows of the church is of a bluish tinge, while the two windows beyond the dome are filled with yellowish glass, and send a flood of warm, golden light down over the high altar. One can sometimes get an idea of how such a scheme could be applied to St. Paul's, by standing, on a sunny day, in the front porch and looking through the wide open doors down the nave. The sunlight struggles over the high house-tops into the upper windows of the dome, giving a warm glow to the centre of the church, while the aisles and nave remain in the cold haze.

A full-size cartoon covering one-eighth of the surface has been put in place against the inside of the dome. The scheme of decoration includes the lower colonnade immediately above the whispering gallery, the pilasters of which are to have decorated panels with a gold ground, and the eight niches in the colonnade are to be filled with statues. Decorated panels cover the wall above the niches on a line with the pilaster caps, combining with them to form a broad, decorated band all around immediately below the entablature. The decoration above will have marked divisions over each niche, made up of Renaissance architectural forms, arranged one above the other, without very definite reason or order, though slightly suggestive of the *avant-scènes* of a French theatre. They give places for two groups of angels and two medallions, arranged alternately one above the other, the whole being crowned by still another group of angels. The dividing bands are about half as wide as the intervening spaces, each of which is occupied by two large figures at the bottom, surmounted by three medallions, one over the other. Above all this there remains a space of a few feet to the central opening of the dome, which is occupied by a continuous row of seated figures in white garments, presumably prophets and kings.

The colors are well chosen, and the abundance of gold ground gives to the general scheme the needed warmth; but the multiplicity of parts and especially the number of vertical divisions, and the lack of any single marked line running unbroken to the top, do much to mar the general effect. It is hard to judge it fairly now, obstructed as it is by the scaffolding, but viewed from the nave of the church the decoration seems to be quite lacking in dignity, giving a petty, fussed look to the dome, that is not at all in harmony with the simple grandeur of the architectural lines. Viewed from the whispering-gallery the effect is better, but it still seems quite evident that the idea of scale has not been rightly worked out. The old decorations, faulty as they are, seem to much better carry out the idea of the architecture.

The proposed decoration is one of the schemes worked up conjointly by Messrs. Stannus, Poynter, and Sir F. Leighton.

C. H. B.

ENGLISH COMPETITIONS.

CIRCULAR No. 4.

TWO British competitions that occurred about a year ago, should be noted by American architects. The first illustrates the workings of that "expert assessor system," when even a building as greatly to be desired as a museum of science and art is to be designed.

It was intended that this museum should imitate in Ireland the working of the South Kensington in England. South Kensington has Godfried Semper to thank for anything worthy of imitation about it: whom the revolutions of '48 drove out into the English. Dublin, however, could see no farther than South Kensington, and received all data from that source.

The judges, or rather "committee of selection," as they were not capable of judging, were five "eminent gentlemen," of whom the Irish architects make no complaint, but they do "resent" the appointment of two Royal Engineers as assessors.

To their cry of too much assessorship, as they only wanted one, and he an "independent" architectural assessor (it was to them not a matter of ability it seems), they are answered in a letter, which it is claimed all English architects will "resent."

The letter states, "I am to say that it appears to my Lords that the assistant which the Royal Institute suggests should be secured through the advice of a professional assessor, would in effect be realized in the most 'independent' and trustworthy manner, through such a committee as was appointed."

The letter of Sir Edmund Beckett, shows the disgust instead of resentment that begins to show itself among the "Honorable Associates" of this renowned "Institute."

The real unadulterated English competition without any "R. E." interference is an amusing spectacle.

With apparently no goal before them, they seem like badly-trained athletes, each one pushing in his own direction until out of wind.

One reluctantly admits, he did not go quite so far as the first, perhaps, but he claims the prize from having travelled over rougher ground—more truly English ground; a third claims that he has most dust upon his cloths.

There are such competitions as that of which the French sing in La Belle Helène, Paris must give the prize of beauty to Juno, because of the gorgeous plumage of her peacock; Minerva merits it because of her prudery; Venus gets it by her bribery: the end a scandal and a row that only Anglo-Saxon architects can hope to ever equal.

The second competition is therefore all the more remarkable as an illustration of the methods that must be adopted to guide competitions into a safe channel.

This is for the Nottingham Municipal Buildings where Americans at least would expect "politics" to have full sway.

The Continental double-competition system was adopted. The architects were not put into straight-jackets, they even chose the one expert judge (or "referee" as they call him; judgment and justice being still beyond their comprehension). The corporation merely claimed the right to name the list of architects (not a very long one) from which competitors must choose their referee.

The eight designs considered worthy of a second competition resulted in a tie for the first honor, yet no scandal seems to have been raised by even so imperfect a competition.

In truth such a judgment was necessary, from the profession in England being without a goal or determined line of advance.

The first and second prizes were lumped and divided between the best planned design and the best "Betsy-Anne" exterior.

Does not the result of this latter competition encourage American architects who take pride in their profession, and have a sincere desire for its advancement to investigate for themselves the merits of the *complete* continental system? Respectfully submitted by the Architectural Association of Des Moines.

J. S. BLAKE, *President*. E. H. TAYLOR, *Secretary*.
August 25th, 1884.

BOOKS.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — Would you kindly mention the best American work on mortars, cements, foundations, etc.? Q.

["*A Practical Treatise on Limes, Hydraulic Cements and Mortars*," by Gen. Q. A. Gillmore, U. S. A. Price $4.00. Also "*Foundations and Foundation Walls*," by Geo. T. Powell. Price $2.00. — EDS. AMERICAN ARCHITECT.]

SCHOOLS OF ARCHITECTURE.

PORTLAND, OREGON, August 11, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen, — Will you be kind enough to inform me which you consider to be the best school of architecture in the United States?

I should like to suggest that, whenever possible, the cost be given in addition to the drawings and descriptions of buildings now published in the *American Architect*. If the cost were given it would be an aid in forming an idea of the cost of proposed buildings. Hoping that my letter may receive your attention, I am,

Yours respectfully, STUDENT.

[OF the several schools or departments of architecture in this country the oldest, and in many respects the best, is that attached to the Massachusetts Institute of Technology at Boston; the newest and probably the best equipped is that attached to the Columbia College School of Mines at New York, while that attached to the Illinois Industrial University at Champaign, Ill., possibly gives the best instruction on the engineering branches of the profession.

As to the suggestion offered by "Student," we can only say that we always do state the cost of the buildings we illustrate "*whenever possible.*" — Eds. American Architect.]

NOTES AND CLIPPINGS.

Longevity of Trees. — According to the estimates of botanists, trees are capable of very long life. De Candolle gave the age of an elm at 335 years. The age of some palms have been set down at from 600 to 700 years; that of an olive tree at 700 years, of a plane tree at 720, of a cedar at 800, of an oak at 1,500, of a yew at 2,880, of a taxodium at 4,000 and of a boahab tree at 5,000 years. — *Problems of Nature.*

Demolition of the Santa Fe Cathedral. — The ancient adobe structure that for two hundred years has served as the principal house of worship in Santa Fé was razed to the ground by a large force of workmen recently. Orders have been issued to push the new stone edifice to completion this fall, and to this end the contractors are working with all their might. The walls of the old cathedral constitute an interesting architectural study. They are six feet in thickness, and the timbers used as keys in the wall are as firm to-day as when first placed two centuries ago. Many relic hunters are preserving sections of the adobes that form this aged edifice. The débris is being removed to the Rio Santa Fé, and will be scattered along the bank in order to give the street a better elevation. — *Cincinnati Commercial-Gazette.*

More Vagaries of the Post-Office Rulings. — A correspondent of the New York *Evening Post* says that a popular German monthly, which everybody, the pages of whose German grammar were cut half way through, would recognize as a periodical, was held dutiable as a "book," because issued in stiff covers. The Post-Office recognizes the "Seaside" and "Franklin Square" Libraries as second-class mail matter, and forwards them at the pound rates for newspapers because issued periodically, while, according to the Treasury, the "distinctive characteristic" of a periodical is a "fresh and concurrent statement of the occurrences of the present passing time." Cervantes's "*Don Quixote*" forms No. 691 of the "Seaside Library," and is thus stamped a "*periodical*" by the Post-Office, and made a "*concurrent statement,*" etc., by the Treasury Depart-ment.

We may also add that at the National Convention of photographers held at Cincinnati, July 31, the Postmaster-General was censured in a resolution for his recent ruling that photographs were fourth-class matter, and a committee was appointed to hand him a copy of the resolu tion, with the request that he reconsider his action.

The projected Algerian Sea. — The proposal of Colonel Roudaire and M. de Lesseps to flood the dry bed of the Shotts in the south of Algeria, and thus create a North African inland sea, has of late met with a good deal of unfavorable criticism in the French Academy of Sciences, one critic, M. Cosson, asserting that, though M. Roudaire has abandoned the idea that the Shotts was the Triton Bay of the ancients, and though a Commission of Inquiry has pronounced unfavorably on the project, he, M. Roudaire, still clings to his original plan. Another critic, M. Letourneux, protests against the French Government giving any countenance to the scheme, which, in his opinion, would cause the complete ruin and destruction of Kelad-el-Djerid and Souf. M. de Lesseps has replied to these criticisms, that M. Roudatre has not abandoned his theory that the Shotts is the same locality as the Triton Bay; but, on the contrary, is still engaged in supporting it; and he points out that the French Academy of Sciences has examined the project and regarded it in a favorable light. Moreover, the Commission nominated by M. de Freycinet, has, he asserts, demonstrated the advantages of the plan, and has never disapproved of it, and, though they will not assist the enterprise, they are far from wishing to oppose it, provided it be carried out by private means. A group of projectors have already been formed, and will begin to construct a port at the mouth of the Oued-Melah, a work whose importance requires no demonstration, since there is no shelter on the Tunisian coast, between Tunis and Tripoli, a distance of some 420 miles. — *Engineering.*

The Sanitary Condition of Paris. — At the present rather grave juncture a few facts respecting the sanitary arrangements of the French capital may prove of interest, as shown in an able work recently issued by M. Wazon. The total available daily supply of water is about 100,000,000 gallons, which, for a population of between two and a quarter and two and a half millions, he considers to be quite inadequate. Between 1876 and 1881 the number of inhabitants rose from 1,988,000 to 2,240,000, at which rate of increase it will be probably two and a half millions in 1886. The supply of water would then be about 40 gallons per head per diem. This is a higher proportion than Londoners obtain, but is far inferior to the supply of Marseilles, which enjoys 180 gallons a head per day. Although the cesspool system still exists in the city, the Commissioners proposed in 1881 a temporary improvement in the use of metallic cesspools, containing from 60 feet to 200 feet cube, to be emptied by the pressure of the air; but the cost of emptying these weekly would be enormous, irrespective of the expense of providing and fixing a cesspool receptacle. The amount of household and street refuse per day in Paris is 2,000 cubic metres, or 54,000 cubic feet, which is removed by 600 carts. The rate for this expenditure varies from 1*d.* to 7*d.* per lineal yard of building frontage, and in 1880 produced £104,-000, the whole cost of cleansing being £212,000. All houses in Paris are obliged to deliver the rain-water and household waste into the sewers, the municipality providing that every street less than sixty feet wide must have one sewer, and that streets over that width must have one sewer on each side of the way. — *Exchange.*

The First Lightning-Rod. — The attention of scientific men in Paris was quickly drawn to the method of defense proposed by Franklin, and M. Dalibard, a man of some wealth, undertook to erect the apparatus at his country residence at Marly-la-Ville, some eighteen miles from Paris. The situation of the house was considered to be eminently favorable for the purpose, as the building stood some four hundred feet above the sea. A lofty wooden scaffold, supporting an iron rod an inch in diameter and eighty feet long, was erected in the garden. The rod was finished at the top by a sharp point of bronzed steel, and it terminated at the bottom, five feet above the ground, in a smaller horizontal rod, which ran to a table in a kind of sentry-box, furnished with electrical apparatus. On May 10th, when M. Dalibard was himself absent in Paris, the apparatus having been left temporarily in the charge of an old dragoon, named Coiffier, a violent storm drifted over the place, and the old dragoon who was duly instructed for the emergency, went into the sentry-box and presented a metal key, partly covered with silk, to the termination of the rod, and saw a stream of fire burst forth between the rod and the key. The old man sent for the Prior of Marly, who dwelt close by, to witness and confirm his observation, and then started on horseback to Paris, to carry to his master the news of what had occurred. Three days afterward, that is, on May 13, 1752, M. Dalibard communicated his own account of the incident to a meeting of the Académie des Sciences, and announced that Franklin's views of the identity of the fire of the storm-cloud with that of the electrical spark had been thus definitely established. — *Popular Science Monthly.*

Solomon's Stables. — A correspondent of the Boston *Transcript* thus describes one of the most famous of the ruined monuments of the greatness of Jerusalem; Descending a flight of stone steps we found ourselves in a most wonderful series of underground vaults. These vaults evidently boasted of an antiquity of centuries anterior to the Christian era, and yet were marvellously well preserved. In some places the rubbish was so deep that we were within ten feet of the arched roofs, and again it was at least forty feet to the roof, showing the real altitude of the supporting piers. We wandered hither and thither by the aid of candles, sometimes in Stygian darkness on the brows of greedy chasms, and then again in broad daylight. I suppose these magnificent vaults reach over acres of ground, and perhaps honeycomb the whole mountain. Doubtless, further investigation would bring to light discoveries of great interest. I measured one of the stones, and found it to be just sixty feet long and perhaps four feet square. Without much thought I incline to the belief that these really were Solomon's stables, and therefore among the wonders which the Queen of Sheba inspected. I reason this out on very simple grounds. Solomon certainly had some magnificent establishment of this sort, for we read in the twenty-sixth verse of the fourth chapter of First Kings that he "*had* 40,000 *stalls of horses* for his chariots, and 12,000 horsemen." The Jewish bevels on the stone throw these vaults back to a very remote past. These two facts dove-tail together well. Besides that, Josephus speaks of vast subterranean vaults of the temple, in which people hid themselves at the time of the investment of the city by Titus.

Boxley Abbey for Sale. — Among the most interesting properties which of late have come into the market is that of Boxley Abbey, near Maidstone, which will be shortly sold by auction. It is described as situated about two miles from Maidstone, and as consisting of about 900 acres of first-class meadow, hop and fruit plantations, arable and wood lands. It comprises the remains of the old Cistercian Abbey of Boxley, with its more modern Elizabethan residence, gardener's cottage, stabling and offices, gardens, lawns, fish-stews and terraced walls, surrounded by the abbey-gate or home-farm lands, partly inclosed within the abbey walls. The estate, we are told, "lies within a ring fence, is well watered by an abundance of springs, is intersected by good roads, and abounds in historical traditions." The pilgrim's road trodden by the feet of so many persons on their way to and from the shrine of St. Thomas at Canterbury, and the walls of the abbey, which is said to have been the first abode of the Cistercian monks in England, dating from the beginning of the eleventh century, a splendid specimen of an old tithe barn in excellent preservation, and a monastic chapel, now converted into a dwelling-house, are objects of especial interest to the antiquary and archæologist. The abbey itself was founded about the middle of the twelfth century by William d'Ipres, Earl of Kent. In the reign of Edward I the abbot was summoned to Parliament on several occasions, and Edward II took up his residence at this abbey during the siege of Leeds Castle in October, 1221, from the refusal of its governor to provide lodgings for Queen Isabella and her suite when going on pilgrimage to Canterbury. It is said that there was here a curious crucifix on the rood-screen, which came to be called the "Rood of Grace," and of which the mechanism would seem to have been extremely ingenious. To this rood or crucifix the abbey was indebted for many offerings, its curious movements being reported as miraculous, and, under that impression, great numbers of people were continually resorting thither. At the time of the Reformation the rood was publicly exposed at St. Paul's cross, in London, by the Bishop of Rochester, and soon afterward broken to pieces and burned. — *London Times.*

Arsene Houssaye's Houses. — A very Frenchy notion is that recorded of Arsène Houssaye — a mania for building typical châteaux: "He now has seven at Beaujon, and is building an eighth. The seven were named respectively, the houses of 'Youth,' 'Love,' 'Knowledge,' 'Family,' 'Renown,' 'Wealth' and 'Wisdom.' They are appropriately furnished; the first looks like a museum of toys, the second is adorned with paintings and statues of Venus and Cupid, the third is a mere library, the fourth is the temple of his Lares and Penates, the fifth contains the gifts and written compliments of admirers, the sixth is rich with treasures and gems, and the seventh is dedicated to Plato and Socrates. The eighth, which he is now building, is the house of 'Death,' and will be the mausoleum in which its author's dust will be placed." — *Boston Herald.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

303,861. COMBINATION-TOOL FOR CARPENTERS. — Peder O. King, Valley City, Dak.

303,884. FIRE-ESCAPE LADDER. — Friederich O. Reisener, West Point, Io.

303,888. SPIKE-EXTRACTOR.— Edgar T. Sharp, Boston, Mass.

303,912. STEAM-HEATER. — Jerome L. Boyer, Columbia, Pa.

303,917. AUTOMATIC FIRE-EXTINGUISHER. — Joseph R. Brown, Bridgeport, Conn.

303,918. CHIMNEY-COWL.—Abram S. Capper, Udall, Kans.

303,919. WEATHER-STRIP. — John A. Cozad, Mercer, Pa.

303,921. METALLIC ROOFING-SHINGLE. — William H. Cusack, Nashville, Tenn.

303,925. ART OF BRICK-MANUFACTURE. — James L. Durrough, Hamilton, O.

303,938. SASH-FASTENER. — John McPherson Lowrey, Jonesborough, Ga.

303,939. LATHING FOR FIRE-PROOF BUILDINGS. — Joseph Manning, Clinton, Mass.

303,994. WOOD-TURNING LATHE. — Frank H. Foster and Davis J. White, Chelsea, and Rufus Holman, Boston, Mass.

304,000. WATER-CLOSET.—Kilian Hartmann, Cleveland, O.

304,002. MACHINE FOR SHAPING SHEET-METAL FOR ARCHITECTURAL PURPOSES. — George Hayes, New York, N. Y.

304,004. HOD-ELEVATOR. — Albert T. Hull, New York, N. Y.

304,038. BRICK-MACHINE. — John Secrist and Elias Vnucannon, Marian, Ind.

304,041. LOCK FOR SLIDING DOORS. — William E. Sparks, New Britain, Conn.

304,064. CLAPBOARDING-TOOL. — Orrin A. Bassett, Plainville, Conn.

304,069. PROCESS OF METALLIZING WOOD, ETC. — Louis Brown, New York, N. Y.

304,081. BLIND-HINGE. — Rufus H. Dorn, Rochester, N. Y.

304,10. BRICK-MAKING MACHINE.—Geo. W. Hardesty, Keokuk, Io.

304,124. CEMENT FOR CHIMNEYS, ROOFS, ETC. — Bernard M. O'Neill, St. Louis, Mo.

304,138. WINDOW. — Albert Shmiedel, Wellsburg, W. Va.

304,154. MANUFACTURE OF PAINTED WIRE-CLOTH. — Chester F. and Theodore H. Wickwire, Cortland, N. Y.

304,159. COMBINED LATCH AND LOCK. — Frederick James Biggs, London, Eng.

304,171. SASH-HOLDER. — Peter Caslin, Chicago, Ill.

304,183. WINDOW. — Christopher Columbus Davis, Flemingsburg, Ky.

304,192. MEANS FOR WITHDRAWING LATCH-BOLTS. — James J. Hall, New York, N. Y.

304,196. COMBINED T-SQUARE AND BEVEL. — Wilber F. Hill, North Manchester, Conn.

304,207. TRESTLE.—Joseph F. Langlais, Cincinnati, Ohio.

304,212. FIRE-ESCAPE. — Larned D. V. Mason, New York, N. Y.

304,213. WEATHER-STRIP. — Daniel D. Mayfield, Pleasantville, Ind.

304,220. CARPENTER'S VISE. — John F. Miller, Pittsburg, Pa.

304,221. DEVICE FOR TINTING AND SHADING SKETCHES AND DRAWINGS. — Charles F. Moellmann, Cincinnati, O.

304,222. SLIDING SASH FOR BOOK-CASES, ETC. — John W. Morrison, Boston, Mass.

304,230. BRICK-MACHINE. — Geo. E. Noyes, Washington, D. C.

304,237. LEVEL AND PROTRACTOR. — John C. Ray, Washington, D. C.

304,245. RULER FOR MEASURING AND DRAWING. — Henry Ed. Thomas, San Francisco, Cal.

304,246. MORTISE-GAGE. — William Ashford Totten, Bedford, Pa.

304,277. COMBINED LOCK AND LATCH.—Elijah Nyswonger, Hanford, Cal.

304,283. BRICK-MACHINE. — Porter L. Sword, and Charles D. Sword, Adrian, Mich.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report nineteen permits have been granted, the more important of which are the following: —

Thos. A. Crane, 2 three-st'y brick buildings, w s Diamond St., bet. Saratoga and Mulberry Sts.

Owen McKenna, 2 three-st'y brick buildings, e s Chase St., e of McKim St.

Geo. C. Hershman, 13 two-st'y brick buildings, e s Ensor St., bet. Biddle and Preston Sts.

C. Holman, 2 two-st'y brick buildings, s s Monument St., w of Chester St.

Matthai & Ingram, two-st'y brick building, 36′ x 41′, and one-st'y brick building, 48′ x 55′, s s Wills St., bet. Light and Byrd Sts.

L. C. Smith, 3 two-st'y brick buildings, s s Heath St., bet. Hanover St. and Goodman's Alley.

Aug. Pabl, 4 two-st'y brick buildings, w s Burke St., s of Monument St.

The labor quotations for September remain unchanged.

Boston.

BUILDING PERMITS.—*Hancock St.*, near Florence St., Ward 23, for A. F. Hughs, dwell., 26′ 6″ x 34′ 6″, pitch; A. F. Hughs, builder.

Whitney St., near Tremont St., Ward 22, for E. F. Mahoney, 2 dwells., 22′ x 40′, flat; W. Ballantyn, builder.

Everett St., near Cottage St., Ward 2, for G. W. Hargrave, 4 dwells., 19′ 6″ x 31′, flat; G. W. Hargrave, builder.

Skinner St., near Washington St., Ward 23, for L. B. Clifford, dwell., 7′ x 20′ and 22′ x 32′, pitch; A. Roger, builder.

Commercial St., opp. Mill St., Ward 24, for Jno. Cotter, boat-house, 12′ x 20′, pitch; Jno. Cotter, builder.

Commonwealth Ave., near Washington St., Ward 25, for L. S. Learned, stable, 28′ x 40′, pitch; Stephen Holmes, builder.

Fairview St., Ward 23, for Margaret G. Devar, dwell., 32′ x 34′, pitch; Swanson & Murray, builders.

Unnamed St., off Walnut St., Ward 23, for J. A. Davis, dwell., 17′ x 32′, pitch; J. H. Burt & Co., builders.

Washington St., No. 2940, Ward 21, for Patrick F. Somvet, dwell and store, 20′ x 38′, flat; Michael Sullivan, builder.

Olney St., near Geneva Ave., Ward 24, for Thos. S. Cox, dwell., 29′ x 31′, pitch; L. Estes, builder.

Glen Road St., near Blue Hill Ave., Ward 23, for City of Boston, summer-house, 20′ x 40′, pitch; City of Boston, builder.

Walnut St., near Glen Road St., Ward 23, for City of Boston, summer-house, 20′ x 40′, pitch; City of Boston, builder.

Scarborough St., near Walnut St., Ward 23, for City of Boston, summer-house, 20′ x 40′, pitch; City of Boston, builder.

Wyoming St., near Warren St., Ward 21, for S. M. Sharpley, 2 dwells., 18′ x 20′ and 25′ x 35′, pitch; S. M. Sharpley, builder.

Wiclow St., near Market St., Ward 25, for Reuben Abbott, 2 dwells., 14′ x 15′ and 20′ x 28′, pitch; W. B. Favvon, builder.

Saratoga St., No. 66, Ward 1, for T. C. Power, dwell., 17′ x 24′ and 21′ x 32′, mansard, T. C. Power, builder.

Prospect St., No. 32, Ward 3, for T. O. Connors, dwell., 26′ x 26′, flat; E. J. Tully, builder.

Parker St., near Parker Hill Ave., Ward 22, for Jos. Hennessey, dwell., 25′ x 41′, hip; Sam'l Rantin, builder.

C St., No. 203, cor. West First St., Ward 13, for R. J. and F. H. Monks, shop, 33′ x 35′, flat; Patrick Morgan, builder.

West Sixth St., No. 43, for Thos. Meeney, dwell., 22′ x 44′, flat; M. S. & G. Miller, builder.

Monadnock St., n Dudley St., Ward 20, for Miss Dowd, dwell., 23′ x 52′ 6″, pitch; W. J. Jobling, builder.

Bowdoin St., near Westville St., Ward 24, for C. A. Bauck, dwell., 8′ 6″ x 12′ and 24′ x 30′, pitch, Parkham & Russell, builders.

Dorchester Ave., near Dorchester St., Ward 15, for R. Campbell, store and office, 20′ x 25′, flat; David Angell, builder.

Princeton St., No. 38–40, Ward 3, for B. F. Campbell, 2 dwells., 16′ x 30′ and 20′ x 33′, mansard, Frame & Patton, builders.

Brooklyn.

BUILDING PERMITS.—*Monroe St.*, s s, 24′ 6″ w Throop Ave., 12 three-st'y brown-stone dwells.; cost, each $6,000; owner and builder, John F. Ryan, 187 Hewes St.; architect, John Herr.

St. Mark's Pl., s s, 150′ e New York Ave., three-st'y brick dwell., slate roof; cost, $30,000; owner, Henry L. Wardwell; architect, Geo. P. Chappell; builders, James Ashfield & Son and Myron C. Rush.

Park Ave., n s, 215′ w Sumner Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $4,000; owner and builder, Chas. Meyer, 20 Adams St.; architect, John Herr.

Maujer St., No. 193, three-st'y and basement brick dwell., tin roof; cost, $5,000; owner, German Evangelical Lutheran St. Johns Church, 187–191 Maujer St.; architect, Th. Engelhardt; builders, J. Rauth and J. G. Hoepfer.

Atlantic Ave., s s, 440′ w Troy Ave., 4 two-st'y frame dwells., brick filled, gravel roofs; cost, each, $2,500; owner, Cora Waldron, Lewisburg, Pa.; architect and builder, Essex Roberts.

Wyckoff St., s s, 51′ w Fifth Ave., four-st'y brick tenement, tin roof; cost, $6,750; owner, Robert Richardson, 430 Wyckoff St.; architect, T. F. Houghton; builders, Pitman & Read and W. Laird.

Lafayette Ave., s s, 278′ 4″ w Throop Ave., 4 two-st'y brick dwells., tin roof; cost, each, $3,000; owner, etc., John K. Bulmer, 213 Adelphi St.

Stockton St., n s, 100′ w Sumner Ave., three-st'y frame tenement, tin roof; cost, $4,500; owner, M. Wels, 237 Stockton St.; architect, H. Vollweiler.

Kossuth Pl., n s, 100′ w Bushwick Ave., 6 two-st'y flats, tin roofs; cost, each, $2,700; owners, etc., Cozine & Gascoine, 307 Evergreen Ave.

Sumner Ave., s w cor. Hart St., three-st'y brown-stone store and dwell., tin roof; cost, $7,500; owner, R. F. Clayton, 401 Fourteenth St.; architect, W. F. Clayton.

Bergen St., s s, 125′ e Albany Ave., 2 frame dwells.; cost, each, $3,000; owner, Peter Young, 209 McDonough St.; architect and builder, W. J. Conway.

Monroe St., s w cor. Throop Ave., four-st'y brown-stone store and tenement, tin roof; owner, builder and architect, same as last.

Atlantic Ave., n e cor. Bedford Ave., 195′ on Atlantic Ave., rear, two-st'y brick skating-rink, fire-proof felt roof; cost, $25,000; owner, Leland Tuttle & Co., on premises; architects, A. B. Ogden & Son.

Wyckoff St., n s, 120′ w Bond St., three-st'y brick tenement, tin roof; cost, $5,600; owner, Patrick Gill, Philadelphia; architect, I. D. Reynolds; builder, P. Nolan.

Pineapple St., s s, 80′ w Fulton St., four-st'y brick apartment-house, tin roof; cost, $25,000; owner, Gordon L. Ford, 97 Clark St.; architect, Carl F. Eisenach; builders, Donlon & Walton and Morris & Selover.

Jefferson St., s s, 125′ w Hamburg Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $3,800; owner, Aug. Keimer, 110 Troutman St.; architect, Geo. Hillenbrand; builders, Leonard Erk and Fred. Stemmler.

Seventeenth St., s s, 100′ e Fifth Ave., three-st'y brick storehouse, tin roof; cost, $3,500; owner, Morris Nason, 627½ Fifth Ave.; architect, W. H. Wirth; builder, John Anderson.

Twentieth St., n s, 150′ e Third Ave., 5 three-st'y frame tenements, tin roofs; cost, each, $3,000; owner and builder, J. Mahoney, 1001 Third Ave.; architect, W. H. Wirth.

Nostrand Ave., n e cor. Clifton Place, four-st'y brick store and flats, tin roof; cost, $12,000; owner, A. B. Bossbard, 323 Clifton Place; architect, Chas. Werner; builder, M. Ryan.

Seigel St., No. 161, n s, 200′ w Humboldt St., three-st'y frame (brick filled) tenement, tin roof; cost, $3,700; owner, Margaret Downing, on premises.

North Ninth St., s s, 175′ w Fourth St., 2 four-st'y frame (brick filled) tenements, tin roofs; cost, each, $5,800; owners, Louis Schafer and Franz Roos; architect, L. Schafer; builders, Gately & Smith and John Fallon.

Moore St., No. 28, s s, 125′ w Ewen St., three-st'y frame (brick filled) store and tenement, tin roof; cost, $4,000; owner, August Roeder, 30 Moore St.; architect and builder, Julius J. Smith.

Herkimer St., n s, 138′ e Nostrand Ave., 2 three-st'y brick dwells., mansard, slate and tin roofs; cost, each, $11,000; owner and builder, Andrew Miller, Pacific St.; architect, A. Hill.

North Eighth St., s s, 175′ w First St., two-st'y and cellar brick shop, gravel roof; cost, $6,000; owners, Dick & Meyer; builder, J. Rodwell.

Sumpter St., n w cor. Patchen Ave., three-st'y Trenton brick store and tenement, tin roof; cost, $6,000; owner, John Quell, cor. Sumpter and Patchen Aves.; builders, Ernst Sutterline and Jacob Pirrung.

Fourth Ave., e s, 75′ n Twenty-eighth St., three-st'y frame tenement, tin roof, cost, $3,500; owner, A. Stockman, 795 Fourth Ave.; architect, —— Skinner; builders, Daniel Fitzgerald and —— Skinner.

Humboldt St., e s, 100′ n Withers St., 2 three-st'y frame (brick filled) tenements, tin roof; cost, each, $3,700; owner, Daniel Keefe, 551 Grand St.; architect, A. Herbert; builder, Christian Buchheit.

ALTERATIONS. — *Broadway, No.* 281, add two stories, tin roof; cost, $4,000; owner, W. F. Quade; architect, R. Thomas.

Chicago.

BUILDING PERMITS. — The Board of Education, school-house, 125 Courtland St.; cost, $40,000; architect, J. J. Flanders; builder, J. Oleson.

The Presbyterian Theo. Seminary, 7 two-st'y dwells., Belden and Fremont Sts.; cost, $30,000; architect, A. M. T. Cotton; builder, L. Weick.

A. Hayden, three-st'y store and flats, 483 West Twelfth St.; cost, $11,000; architect, A. York; builder, J. Hayden.

A. Row, two-st'y dwell., 378 West Adams St.; cost, $5,000; architect, J. L. Meriam; builder, A. Berner.

D. W. Eldred, two-st'y dwell., 812 West Adams St.; cost, $4,000; architect, J. Ackerman; builder, P. McNally.

McCormick Estate, five-st'y store, 142 and 144 South Water St.; cost, $25,000; architect, A. F. Colton; builders, J. M. Dunphy & Co.

C. M. Swanson, addition, 303 Laughton St.; cost, $3,000.

C. Modson, three-st'y flats, 32 Centre Ave.; cost, $4,500; architect, H. Rehwoldt; builders, Rodgers & Cook.

W. Lester, 3 two-st'y flats, 439 to 443 West Indiana St.; cost, $6,000; architect, H. R. Wilson; builder, A. Burman.

J. W. Reedy, four-st'y addition, 83 Illinois St.; cost, $12,000; builder, C. Moses.

M. Desterriches, 2 three-st'y stores and flats; cost, $10,000; architect, E. C. Rehl; builder, B. Cullen.

M. Cohn, two-st y store and dwell., 777 Milwaukee Ave.; cost, $7,000; architect, H. Kley; builder, A. Delpos.

J. Wolf, three-st'y flats, 532 West Fourteenth St.; cost, $5,000; architect, Reckling.

J. Rutlidge, two-st'y dwell., 541 West Polk St.; cost, $3,000.

J. McAlwee, three-st'y store and dwell., 377 Ogden Ave.; cost, $4,500.

B. Weinocht, three-st'y store and flats, 3834 and 3836 Cottage Grove Ave.; cost, $9,000; builder, H. Apel.

J S. Kirk & Co., five-st'y addition, 368 and 370 North Water St.; cost, $20,000; architects, Edbrooke & Burnham.

J. Slabchoud, three-st'y flats, 1548 Milwaukee Ave.; cost, $6,500; architect, H. Kley.

J. W. Emmick, two-st'y flats, 731 North Wood St.; cost, $5,000; architect, Messener; builder, L. Rankin.

North Chicago City Railway Co., two-st'y barn, 535 and 537 Sedgwick St.; cost, $7,000.

G. Kriggs, two-st'y dwell., 856 South Halsted St.; cost, $2,500.

J. Manavoge, three-st'y flats, 211 Townsend St.; cost, $3,000.

M. Wagman, three-st'y flats, 337 Adams St.; cost, $10,000; architect, J. M. Van Osdel.

B. Titus, 2 three-st'y flats, 3158 and 3160 Forest Ave.; cost, $5,000; architect, R. Ray, Jr.

E. Morton, 7 three-st'y flats, Sebor and Desplanes Sts.; cost, $40,000; architect, F. Felton; builders, Geo. W. Brown & Co.

H. Engel, two-st'y store and dwell., 839 Twenty-first St.; cost, $3,500.

D. Foley, two-st'y dwell., 479 South Wood St.; cost, $2,500.

J. Salomon, three-st'y addition, 236 East Division St.; cost, $4,500.

W. Johnson, three-st'y flats, 184 Carpenter St.; cost, $3,000; architects, Edbrooke & Burnham; builders, Olson & Co.

Dr. Duff, three-st'y flats, 240 Sedgwick St.; cost, $4,500.

M. Hirsh, 2 two-st'y dwells., 261 and 263 Ashland Ave.; cost, $12,000

A. Astrella, three-st'y flats, 222 North Sangamon St.; cost, $5,400; architect, J. P. Bertla.

J. Campbell, three-st'y store and flats, 403 Blue Island Ave.; cost, $6,500; architect, W. Strippelman.

T. Sennott, two-st'y flats, 211 Loomis St.; cost, $7,000; architect, G. Vigant; builders, Geo. Lehman & Co.

J. Hunke, two-st'y dwell., 35 Jay St.; cost, $3,000.

H. C. Morey, three-st'y dwell., 542 Jackson St.; cost, $8,000; architect, J. J. Flanders.

Mrs. M. A. & M. T. McCarthy, two-st'y flats, 75 and 77 Finnell St.; cost, $8,000; architect, J. H. Huber; builders, McCarthy & Co.

L. Staab, one-and-one-half-st'y cottage, 26 Lincoln Pl.; cost, $3,000.

Cincinnati.

Building Permits. — Mr. Schway, two-st'y brick dwell., cor. Coleman St. and Central Ave.; cost, $2,-600.

C. A. Geobrecht, four-st'y brick dwell., cor. Twelfth and Walnut Sts.; cost, $8,000.

Chas. Hess, three-st'y brick dwell., 32 Broome St.; cost, $4,000.

Aug. Hunt, two-st'y frame dwell., cor. Shillito and Highland Sts.; cost, $2,200.

Andy Roesler, ooe-and one-half-st'y frame dwell., cor. Chalhoun St. and Clifton Ave.; cost, $2,000.

Repairs (6 permits); cost, $5,000.

Total permits to date, 596.

Total cost to date, $2,408,355.

New York.

Church, — On the n s of One Hundred and Fiftieth St., bet. Third and Fourth Ave., a Roman Catholic Church, 102′ x 144′, of granite, is to be built, from designs of Mr. Hy. J. Dudley.

Stable. — Stable, brick and terra-cotta, One Hundred and Twenty-fifth St.; owner, Benjamin F. Spink; architects, Gilbert & Thompson.

Store. — On the s w cor. of Fulton and Front Sts., a five-st'y office aod store-building, 53′ x 56′, of Philadelphia brick with stone finish, is to be built by Mr. B. Sive, at a cost of $5,000; from designs of Mr. Wm. Graul.

Flats. — Three five-st'y brick and brown-stone flats, with stores, 25′ x 60′, each, are to be built on the e s of Eighth Ave., s of One Hundred Twenty-third St., for Mr. Lorentz Weiher, at a cost of $33,000; from designs of Mr. J. F. Burrows.

Two five-st'y brown-stone flats are to be built, for Mr. S. Haberman, on One Hundred and Thirteenth St., 130′ w of Fourth Ave.; from designs of Mr. Hy. J. Dudley.

At Nos. 511–517 West Sixty-first St., 4 five-st'y brick and brown-stone flats, 25′ x 85′, each, are to be built for Mr. Louis Reichart, at a cost of about $70,-000; from plans of Mr. Julius Kastner.

On the s e cor. of One Hundred and Thirteenth St. and Fourth Ave., 7 five-st'y brick and brown-stone flats with stores, 26′ x 84′, each, are to be built for Mr. Wm. Henderson, at a cost of $120,000; from designs of Mr. John C. Burne.

At Nos. 410 and 412 West Seventeenth St., 2 five-st'y brown-stone flats with stores, 25′ x 80′, each, are to be built for Mr. E. Seitz, at a cost of $35,000; from designs of Mr. John Brandt.

At Nos. 442 and 444 West Fifty-fourth St., 2 five-st'y brick and brown-stone flats with stores, 25′ x 82′, are to be built at a cost of $34,000; from designs of Mr. Julius Kastner, for Mr. Louis Reichart.

Building Permits. — *Forsyth St., No.* 124, five-st'y brick tenement and store, tin roof; cost, $16,000; owner, Barbara Fuhrback, 935 Second Ave.; architect, Wm. Graul.

Fifty-fifth St., Nos. 147 *and* 149, n s, 125′ e Seventh Ave., there-st'y brick and stone stable, gravel roof; cost, $16,000; owner, A. H. Barney, 101 East Thirty-eighth St.; architect, C. H. Thompson; builder, J. C. Miller.

Tenth Ave., s w cor. Forty-eighth St., four-st'y brick store and tenement, tin roof; cost, $20,000; owner, Mrs. C. Miller, 449 West Fiftieth St.; architects, A. Afuud & Son.

Eighty-first St., n s, 331′ 6″ e First Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $16,000; owner, Mathias H. Schneider, 1455 Avenue A.; architect, J. Kastner.

One Hundred and Eighteenth St., s s, 655′ e Avenue A, three st'y brick office-building, tin roof; cost, $20,-000; owners, R. H. Wolff & Co., limited, 93 John St.; architects, Schwarzmann & Buchman.

Seventy-sixth St., s s, 123′ e Avenue A, three-st'y brick tenement, tin roof; cost, $5,000; owner, Eva Muller, 446 East Seventy-sixth St.; architect, J. Brandt.

Fifth Ave., n e cor. Ninetieth St., one-st'y brick riding school, metal and tin roof; cost, $20,000; owner, Carl Antorny, Fifth Ave., cor. Ninetieth St.; architect, M. Schroff.

Sixty-sixth St., s s, 325′ e Tenth Ave., five-st'y brick tenement, tin roof; cost, $18,000; owner, Margaret Shannon, 950 Ninth Ave.; builder, Thos. Shannon.

Sedgwick Ave., w s, 175′ s One Hundred and Seventy-seventh St., at Morris Dock, three-st'y frame dwell., slate and tin roof; cost, $6,500; owner, Lydia A. McGinley, Morris Dock; architect, C. Baxter.

Third Ave., n w cor. One Hundred and Thirty-eighth St., three-st'y brick store and tenement, tin roof; cost, $7,000; owner, Bryan Gaffney, on premises; builder, E. Gustaveson.

Alterations. — Alterations and additions to Nos. 5 and 7 East Sixteenth St., for D. R. Lyddy; cost $25,-000; J. M. Merrick, architect.

Broadway, No. 311, build boiler flue, new stairs, elavator and repairs; cost, $10,000; owner, D. Jackson Stewart, 150 Fifth Ave.; architect, Samuel A. Warner.

Eagle Ave., n s, about 50′ w One Hundred and Fifty-sixth St., five-st'y brick and stone extension for malt house, tin roof; cost, $4,000; owners, Ph. & Wm. Ebling, One Hundred and Fifty-sixth St. and St. Ann's Ave.; architects, A. Pfund & Son.

Philadelphia.

Building Permits. — *Queen St., No.* 29, two-st'y dwell., 16′ x 40′; S. E. Hughes, owner.

North Ninth St., No. 1603, three-st'y dwell., 16′ x 42′; W. R. Dougherty, contractor.

Dauphin St., w of Thirty-second St., 10 two-st'y dwells., 16′ x 56′; R. Q. Gibbon, contractor.

Fitzwater St., No. 1314, two-st'y malt-house, 25′ x 31′; Henry Moore, owner.

Twenty-eighth St., cor. Jefferson St., three-st'y store and dwell., 18′ x 60′; W. H. Pole, contractor.

Norris St., e of Fifth St., two-st'y dwell., 15′ x 42′; Bernard Tooker, owner.

High St., bet. Hancock and Morton Sts., two-st'y stone chapel, 28′ 6″ x 50′ 6″; T. W. Wright & Sons, contractors.

Johnson St., bet. Musgrove and Morton Sts., three-st'y stone dwell., 41′ x 48′; T. W. Wright & Sons, contractors.

Seventeenth St., n of Ontario St., 4 three-st'y dwells., 18′ x 41′; H. A. Miller, contractor.

Linwood St., w of Thirty-ninth St., 20 two-st'y dwells., 14′ x 40′; Fred. L. Michaelson, owner.

Filbert St., Nos. 1707 *and* 1709, five-st'y carriage-factory, 40′ x 117′; Kister & Orem, contractors.

Coral St., s of Somerset St., 4 two-st'y dwells., 14′ x 40′; Dickson Bros., contractors.

Garnett St., s of Hart Lane, 2 two-st'y dwells., 18′ x 38′; Dickson Bros., contractors.

Market St., No. 3616, three-st'y club-house, 20′ x 54′; C. F. Purcell, contractor.

Barnwell St., s of Lombard St., two-st'y stable, 32′ x 50′; Jno. Devlin, owner.

Somerset St., cor. Belgrade St., 5 two-st'y dwells., 1, 18′ x 46′; 1, 16′ x 40′; 3, 15′ x 40′; J. R. Pyle, contractor.

Twenty-seventh St., s of Brown St., 3 two-st'y dwells., 14′ x 40′; Wm. Charlton, owner.

East Cumberland St., No. 535, three-st'y dwell., 18′ x 69′; W. C. Haddock.

Barker St., w of Sixteenth St., three-st'y stable, 26′ x 104′; G. S. Corson, contractor.

Green St., cor. Morton St., three-st'y dwell., 32′ 3″ x 51′ 3″; D. M. Blyler, contractor.

Cambria St., cor. Boudin St., 2 three-st'y dwells., 16′ x 38′ and 18′ x 38′; P. A. Gearhardt, contractor.

Chestnut Ave., bet. Thirty-fourth and Thirty-fifth Sts., 2 three-st'y dwells., 34′ x 35′; W. C. Mackle, contractor.

Thirtieth St., n of Highland Ave., 2 three-st'y dwells., 38′ x 45′; W. C. Mackle, contractor.

North Broad St., Nos. 224 *and* 226, five-st'y college building, 70′ x 95′ 3″; Kemp & Garrison, contractors.

Bethlehem Pike, cor. Township Line, three-st'y dwell., 38′ x 72′, and two-st'y stable, 30′ x 43′; Geo. Hearst, contractor.

Chew St., bet. Meehan and Gorgas Sts., 2 three-st'y dwells., 16′ x 43′; Martin Hetzel, contractor.

Fairhill St., No. 2753, two-st'y dwell., 14′ x 30′; E. Smith, contractor.

Fifth St., n of York St., two-st'y dwell., 16′ x 42′; J. L. Evans, contractor.

North Fifth St., No. 2602, three-st'y dwell., 20′ x 48′; W. Bartholomew, contractor.

Fifth St., s of Venango St., 2 two-st'y dwells., 15′ x 44′; J. B. Vanderslice, owner.

South Front St., No. 250, four-st'y store, 19′ x 68′; J. L. Thomas, contractor.

Reed St., bet. Huhn and Jordan Sts., two-st'y stable, 96′ x 166′; Philadelphia Traction Co., owners.

Cambridge St., bet. Orrianna and Third St., 10 two-st'y dwells., 1, 15′ x 35′; 3, 14′ x 35′; 6, 12′ 3″ x 35′; J. I. McDuffee, owner.

Ninth St., cor. Jefferson St., four-st'y factory, 40′ x 100′; S. S. Zelley, contractor.

D St., No. 2918, two-st'y dwell., 15′ x 42′; William Bromley, owner.

Pennock St., bet. Parrish and Brown Sts., 7 two-st'y dwells., 2, 16′ x 40′; 5, 15′ x 40′; Jos. July, owner.

Franklin St., n of Berks St., 16 three-st'y dwells., 5, 16′ x 71′; 11, 17′ x 71′; A. M. Zane, owner.

Fourth St., s of Huntington St., two-st'y hall, 36′ x 90′; Lewis Walter, contractor.

Sixth St., cor. Arch St., six-st'y office-building, 24′ x 100′; Knickerbocker Ice Co., owners.

Bowman St., e of Kinnear St., two-st'y shop, 30′ x 30′; Jno. F. Lynch, owner.

Vine St., e of Fifty-fourth St., 2 three-st'y dwells., 18′ x 58′; D. H. Kent, owner.

St. Louis.

Building Permits. — Seventy-one permits have been issued since our last report, nineteen of which are for unimportant frame houses. Those worth $2,500 and over are as follows: —

Charles Braun, two-st'y tenement; cost, $3,750; B. J. Goesse, architect; Aphen & Tranel, contractors.

E. Mitlehuel, 2 adjacent two-st'y tenements; cost, $3,700; B. J. Goesse, architect; Aphen & Tranel, contractors.

J. Monohan, two-st'y tenements; cost, $2,500; Jno. Costello, contractor.

Th. McNeary, two st'y addition to Uhri Cave Hall; cost, $4,000; sub-let.

Pat McGrath, two-st'y dwell.; cost, $1,800; E. Mortimer, architect; G. Neumeister, contractor.

Joseph Kaminski, two-st'y tenements; cost, $3,-000; Beckmeier & Brinckman, contractors.

Mrs. M. Halme, two-st'y tenements; cost, $3,000; H. Bruns, contractor.

Mrs. Helen Mueller, 2 adjacent two-st'y dwells.; cost, $3,500; Steward & Co., architects; sublet.

Chas. Meisenbrinck, two-st'y tenements; cost, $2,-750; Aug. Dieke, contractor.

F. Deister, two-st'y tenements; cost, $3,750; G. M. Roeder, contractor.

Geo. Enger, two-st'y dwell.; cost, $3,000; J. C. Brockmeier, contractor.

S. H. Hoffman, two-st'y dwell.; cost, $9,700; S. H. Hoffmann, contractor.

Jno. Gerst, two-st'y tenements; cost, $7,300; B. J. Goesse; Bothe & Rottermann, contractors.

J. R. Vickry, two-st'y dwell.; cost, $5,000; McCormack, contractor.

Wm. Marris, two-st'y dwell.; cost, $3,000; Jos. Flannery & Bros., contractors.

H. Erbrugger, 2 adjacent two-st'y tenements; cost, $6,000; H. Erbrugger, contractor.

H. Vonder Ahe, 2 adjacent two-st'y tenements; cost, $4,000; Wm. Paul, contractor.

Jno. Payken, 2 adjacent two-st'y dwells.; cost, $7,-000; J. B. Goesse, architect; A. Bauer, contractor.

F. Vollmer, 2 adjacent two-st'y dwells., cost, $6,-800; J. B. Goesse, architect; A. Bauer, contractor.

H. Heidemann, two-st'y stores and tenements, cost, $2,800; H. C. Brinkmeyer, contractor.

Willis Pritchert, 2 adjacent two-st'y dwells.; cost, $3,000; Paules & Weidemueller, contractor.

E. Koenigskrame, 2 adjacent two-st'y tenements; cost, $7,000; H. Heitmann, contractor.

St. Louis Post Graduate School of Medicine, two-st'y brick medical college; cost, $20,000; F. D. Lee, architect; S. M. Ross, contractor.

Mrs. Jane McEvory, two-st'y brick dwell.; cost, $3,000; F. Gray, architect; sub-let.

Dennis Downey, two-st'y double brick dwell.; cost, $3,000; M. Dunn, contractor.

J. F. Murphy, two-st'y stores and tenements; cost, $5,000; A. K. Kireener, architect; Mulcahey, contractor.

Mrs. A. Pomeroy, two-st'y brick dwell.; cost, $5,-000; W. J. Hegle, contractor.

Jno. Cowhoy, 4 adjacent two-st'y tenements; cost, $9,000; W. C. Popp, contractor.

H. Schisler, two st'y dwell.; cost, $2,550; Helm Bros., contractors.

P. Witte, two-st'y dwell.; cost, $3,000. T. H. Terrance, contractor.

T. Wurmb, two-st'y store and dwell.; cost, $3,-000; P. Tieman, contractor.

Jno. Scheider Brew. Co., two-st'y brick stable; cost, $1,000; R. A. Berger & Co., architects.

Stephen Dempsey, two-st'y double brick tenements; cost, $2,800; Jno. Waters, contractor.

Mr W. Noran, two-st'y brick dwell.; cost, $3,000; Jos. J. Wharton, contractor.

Aug. Haase, shop and tenements; cost, $2,700; A. Vosse, contractor.

Dr. Bierwerth, two-st'y brick dwell.; cost, $5,500; A. Beimke & Co., architects; C. H. Poertner, contractor.

Blockmann, two-st'y brick dwell.; cost, $3,650; L. A. Miller, architect; J. B. Asper, contractor.

General Notes.

Kansas City, Mo. — J. C. Dunn, addition to the Centropolis hotel on East Fifth St.; cost, $75,000.

Long Branch, N. J. — Hotel Windemere situated on Ocean Ave.; owner, Jacob Rothschild, 100′ x 275′; architect, J. W. Merrick, New York; cost, $50,000.

Minneapolis, Minn. — A. Cogger, two-st'y frame dwell. on Fourth St., between Twelfth and Thirteenth Aves.; cost, $3,800.

A. C. Loring, two-st'y wooden dwell., e s Fifteenth St., between Yale Pl. and Grant St.; cost, $10,000.

F. A. Dunsmoor, two-st'y wooden store, n s Western Ave., between Royalston and Border Aves.; cost, $7,500.

P. W. DeLancey, two-st'y wooden dwell., 127 Highland Ave., cost, $4,500.

R. S. Palmer, block 4 tenements, brick veneer, Tenth St. and Hawthorne Ave.; cost, $18,000.

T. B. Lindley, two-st'y wooden dwell., 2107 Portland Ave.; cost, $2,800.

Mrs. A. J. Herrick, two-st'y wooden house, w s Third Ave., s, bet. Eighteenth and Nineteenth Sts.; cost, $4,000.

W. W. McNair, two-st'y brick dwell. on Fifteenth St., bet. Hawthorn and Linden Ave.; cost, $6,000.

Bids and Contracts.

Frankfort, Ky. — The following is an abstract of the bids for furnishing iron columns, beams, etc., for the court-house and post-office.

McHose & Lyon, $925.
K. M. Morris, $1,024.06.
Phœnix Iron Co., $1,750.
Thos. H. Brooks, $800.
Snead & Co. Iron Works, $850.
Cleveland Bridge & Iron Co., $1,725.35.
J. P. Walton & Co., $759 (*accepted*).
Heuvelman & Co., $1,238.

Hannibal, Mo. — The following is a synopsis of the bids received for stone and brick work on the basement and superstructnre of the conrt-house and post-office.

Smith & Sargent, sand stone, $24,333; brick, $11,-414.

W. R. & W. Haven, stone, $24,900; brick, $10,450.

Larkworth & Menke, stone, $23,160; brick, $9,775 (*accepted*).

James M. Marshall, stone, $42,500; brick, $12,856.

PROPOSALS.

JOINER'S WORK AND WOOD-FLOORING.

[At Memphis, Tenn.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., August 26, 1884.

Sealed proposals will be received at this office until **2 P.M., on the 23d day of September, 1884,** for furnishing and fixing in place complete all the joiner's work and wood-flooring required for the custom-house and post-office building at Memphis, Tenn., in accordance with drawings and specification, copies of which may be seen, and any additional information obtained on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening, will not be considered.

M. E. BELL,
454 Supervising Architect.

STONE AND BRICKWORK.

[At Syracuse, N. Y.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., August 23, 1884.

Sealed proposals will be received at this office until **2 P. M., on the 19th day of September, 1884,** for furnishing and setting all the stone-work and brick-work required for the superstructure of the post-office etc., at Syracuse, N. Y., in accordance with drawings and specification, copies of which can be seen, and any additional information obtained on application at this office or the office of the local superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
455 Supervising Architect.

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CONTENTS.

A SUIT of much importance to architects has been begun in Tennessee. Mr. W. P. Tinsley, whose name we venture to use, contrary to our usual custom, in order that by means of it the case may be better fixed in the minds of our readers, engaged, not long ago, in a public competition for a court-house for Knox County, in accordance with terms advertised by a building committee of five justices of the County Court, appointed by the full Court, with, as we are told by the Knoxville *Daily Tribune*, full power to act. Seven designs were submitted, and Mr. Tinsley's was adopted by vote of three of the committee; the votes of the two remaining members being divided between two other plans. The majority of the committee having decided upon Mr. Tinsley's design, he was instructed to make certain alterations, and did so, and his work was approved by the committee. At the next term of the Court, the subject of the new court-house was revived, through the efforts, we are told, of the defeated competitors, and attorneys, presumably acting in their interest, were present. At the request of these a report was demanded from the building-committee. The majority of the committee reported, in the name of the whole, that Mr. Tinsley's plan had been adopted, but the two dissentients, who had now agreed upon one of the defeated competitors, presented a minority report, favoring the design of the latter. The Court was then called upon to decide which report should be adopted, and although a large number of the justices refused to vote, on the ground that the committee had been clothed with full power, and that the full court had no right to overrule its action, the question was put, and the minority report adopted by the vote of thirteen justices. This carried with it the adoption of the plan of the competitors formerly defeated, and Mr. Tinsley and his plans were coolly dropped. He has therefore now sued the County for compensation for his labor and expenses in preparing the plans, and in altering them subsequently at the request of the building committee, fixing his claim at fifteen thousand dollars. We forbear to comment on the case until we hear the other side of it; but there can be no harm in saying generally that we regard an attempt on the part of any architect to obtain the setting aside of the result of a competition as a gross breach of professional morality. In case of flagrant bribery of the jury it might be justifiable to expose the crime, and have their award annulled, but no mere incapacity or ignorance on their part can justify an architect who was willing to submit a design to their decision in refusing to accept their award as final.

A DOCUMENT has been issued by a large number of manufacturers and dealers in plumbing materials in and about New York, calling the attention of architects to the agreement prepared by the Executive Committee of the Master-Plumbers' Association, with the dealers' answer to it, all of which, it will be remembered, we reprinted two weeks ago, and adding to these a copy of a circular letter from Mr. Young, the President of the Master-Plumbers' Association, to the chiefs of the local trade-societies, in which, after some rather undignified expressions in regard to the dealers and their reply to the plumbers' proposition, he advises members of the societies "to protest, by every honorable means in their power," against those who signed that reply. To indicate the way in which such a protest could be made effective, Mr. Young "takes pleasure in recommending" to the patronage of his New York constituents the Western manufacturers of plumbing materials, many, if not most of whom, manage their business to the satisfaction of the plumbers who buy from them, and adds the names of several manufacturers and dealers in New York and Brooklyn who have professed their willingness to do the same. As the threat of withdrawing the trade of so influential a body as the National Association of Master-Plumbers entirely from certain dealers is a serious one for those concerned, the paper addressed to architects appeals to them to "kindly guard the interests" of those who sign it, and to "lend their influence to stamp out a spirit of trades-unionism in one of its worst phases," and so on; and the way in which architects are expected to "stamp out trades-unionism" is, it seems, when they specify goods made or sold by any of the firms obnoxious to the plumbers, to see that those goods are furnished, instead of substitutes for them.

CONSIDERING that the New York plumbers, if they fail to bring the refractory dealers to terms, would probably refuse to have anything to do with the appliances sold by them, whether specified or not, and might very possibly refuse to work in any building containing the interdicted articles, it would be worth while for architects to think seriously before making any agreement in relation to the subject. However desirous they may be of "stamping out trades-unionism," or however much they may favor a particular sort of goods, they must reflect that an attempt to "guard the interests" of particular manufacturers, in opposition to the determination of the plumbers, would be likely to involve them and their clients in serious annoyance and expense. If there were any such principles involved as that for which certain contractors fought so well and so successfully in the strikes last year, we should be the last to advise any sacrifice of conviction, but in the present matter it seems to us that the architects are under no obligation whatever to support the interests of the manufacturers. On the contrary, although we cannot approve the demand that manufacturers of plumbing goods should refuse to sell goods to any one not provided with the license of a certain society, we have no fault to find with the general feeling of plumbers, that the dealers from whom they buy should sell to them at a cheaper rate than to persons out of the trade, and so long as plumbers are content with such profits on the materials they furnish as the fair-minded and honorable ones now charge, we are, and always have been, disposed to favor any arrangement by which these profits could be secured to them. The present system, as all good plumbers will admit, does not do this. By the enormous secret discounts from list-prices which form a part of it, the rascals in the trade are afforded at once the temptation and the opportunity for swindling their unsuspecting customers out of twice the value of the materials sold to them, to the injury of the reputation of all their fellows, while the willingness of the dealers to sell goods at the plumber's discount to any one who is sharp enough to find out what that is, and to demand it, puts it in the power of experienced business men to get plumbing work done for prices which do not properly remunerate those who do it for them. For both of these abuses the dealers are mainly responsible. We have the printed testimony of the correspondent of the *Hydraulic and Sanitary Plumber* to the effect that the trade price-lists are "by no means the standard adopted for making charges to customers," and that they are "as much a nuisance to the plumber as they possibly can be," and we can witness that they are ten times more of a nuisance to architects than to any plumbers. The writer in the *Hydraulic and Sanitary Plumber* charitably suggests that the reason of the discrepancy between the printed lists and the selling prices is the expense of preparing new lists to correspond with the fluctuations of the market, but this does not account for the fact that the discount sheets are printed separately and sent only to plumbers, architects being refused copies of them, even on personal request. It would be no more trouble to put discount sheets in all the price-lists than in a part of them, and so long as this is not done the dealers stand simply in the position of sending to one part of those whom they wish to be their customers lists quoting prices for goods which are often more than twice as high as those that another class of customers is expected to pay. We are sorry to say that we have lived too long to believe that this is done by inadvertence, and no explanation has yet satisfied us that the real object of the system is not to attract customers of doubtful honesty, by a show of an opportunity for taking advantage of the unwary. Whether the dealers intend this or not, the result is the same, and we think we speak the opinion of the profession in saying that until they can devise some way of bringing the wholesale and retail prices of their goods into a reasonable relation with each other, and of keeping the persons whose duty it is to certify the correctness of plumber's bills informed as to both these prices, they will do best not to expect much sympathy from architects in their struggles with the plumbers.

A NEW conflict between masters and men has occurred in New York, where, according to the *Evening Post*, the journeymen stone-cutters have left their work for the present. The occasion of the quarrel, according to the *Evening Post's* information, is rather creditable to the men, who, it is said, extended substantial aid to the bricklayers in their recent strike, and were threatened in consequence by the masters, that unless they ceased this support, and withdrew their delegates from the Amalgamated Trades' Union, they would be locked out from the shops in a body. The men, naturally resenting this interference with what they considered their own affair, retaliated in kind, sending committees to inform the masters that unless they severed their connection with the Master Stone-cutters' Association, a strike would be ordered. The masters paying no attention to this proposition, which was little more ridiculous than their own, a meeting of the journeymen was held, and a strike unanimously ordered. Of course, the result will be simply loss and distress to all concerned, but there are indications that grievances had been accumulating on both sides for a long time, and that the silly attempt of each side to interfere with matters in which it was not concerned only served as a pretext for the rupture which was sure to come sooner or later. We trust that the quarrel will soon be over, for the sake of the men, rather than the masters. Winter is approaching, and building is not likely to be very active for a time, so that a prolonged struggle, although profitable to the agitators and orators, to whom it would give importance, must involve privation and distress to the less gifted individuals who depend on the labor of their hands for a living.

THE *Scientific American* contains an account of the corrosion of a water-tank, lined with tinned copper, in use in the New York State Lunatic Asylum at Utica, which is of much interest to architects, householders and plumbers. The tank in question is a very large one, holding about five thousand gallons. The first tank placed in service was set up in July, 1875, and about a month afterward leaked so much that it could not be used, and it was necessary to replace it by one entirely new. On examining the plates of the old tank it was found that the tin coating had peeled off badly, but the copper was not affected except at the joints, where the metal was brought in contact with solder. The trouble seeming to be connected in some way with the defective tinning, the plates for the new tank were thoroughly tested by sample, and an excellent selection made, the tank built of the sheets so chosen having stood for nearly nine years before it was discovered, on clearing it out, that the bottom plates were covered with small circular perforations, each having little grooves radiating from it. The holes, as well as the grooves, were filled with solid carbonate of copper. The natural explanation would be that the perforation of the metal was due to galvanic action, but its irregularity, and the unequal distribution of the corroded spots, were hardly consistent with this theory, and the correspondent of the *Scientific American*, one of the medical staff of the asylum, who examined with a microscope the carbonate of copper deposit in the corroded cavities, found it filled with animalculæ, all of which contained particles of the mineral. From these indications it seemed to him not improbable that the vital operations of these animalculæ might have some obscure connection with the corrosion of the copper over which they moved.

THE New York Steam Company is said to have in contemplation the addition of electric-lighting to their business, and in the trenches now made for laying their steam-pipes a gas-pipe, through which an electric wire or cable can be drawn, is laid also. According to a reporter of the *Evening Post*, the Company has been led to this step by its experience in furnishing steam for dynamo-machines, used by their customers for supplying light. In one building, for instance, the new Mutual Life Insurance Building, on Nassau Street, the Company furnishes steam, not only for heating all the rooms in winter and for driving the elevators, but for maintaining, through the agency of dynamo-machines, eighteen hundred electric lights. On investigating, after the admirable method practised by the Company's engineer, the consumption of steam in the dynamo-machines, and their cost, and that of the apparatus connected with them, it was found that they could be introduced at a profit at prices much less than those charged by the electric-light companies, while the expense to the Steam Company of running them at night would be smaller than to a private individual or to persons using power only for that purpose, since the Steam Company, which is obliged to keep up its fires and maintain a uniform pressure in its pipes day and night, although nearly all the consumption is by day, has, during the greater part of the time that the electric lights would be needed, an immense surplus force, which can be utilized in that way with a small additional consumption of fuel. To make this source of income available, it was necessary to enter into relations with those who control the electric-light patents, and an arrangement has been made with the Sawyer-Mann Company, under which the Steam Company is at liberty to make contracts for lighting buildings of any kind. The district in which the steam-pipes are now being laid extends along Fifth Avenue from Washington Square to the Central Park, and it seems likely that the new light and heat will prove very popular in that part of the city.

A NOTE kindly sent us from the editorial office of the *Nation* informs us that according to the Paris *Polybiblion*, the discovery has recently been made in the archives of the city of Berne, in Switzerland, of the working-drawing of the tower which forms the pride of Strasburg Cathedral. It seems that in 1760 a quantity of ancient drawings were sold by the Chapter of the Cathedral, on account of lack of room for preserving them, and this drawing, dating from the fourteenth century, together with many other curious matters of a similar sort, came into possession of the city of Berne. It would be interesting to follow farther the history of their acquisition, and to inquire how the Bernese authorities should have happened to spend public money in buying old documents from a distant French city, but all the circumstances of the transaction seem to have been forgotten long ago. If the drawing is genuine, as there is hardly any reason to doubt, it must, perhaps, be considered the most valuable object relating to the history of mediæval architecture that has yet been brought to light. We have, in the sketch-book of Wilars de Honecourt, dating from the thirteenth century, and the well-known working drawing of the spire of Cologne Cathedral, two documents of great and peculiar interest, but the Strasburg spire so far excels that of Cologne, or, indeed, any other, in the novelty and intricacy of its design, and the consummate skill with which this is carried out, that the drawing or drawings from which it was executed must have been models of clearness. It is much to be hoped that the Association of the Zurich Polytechnic School, or the Swiss Architectural Union, may be allowed to examine the collection at Berne, and to publish this as well as such other drawings as they may consider of value to the profession.

THE question of the durability of small wrought-iron pipes for conveying water often comes before the architect, but seems to be less frequently considered by those better fitted to obtain definite information on the subject. According to the *Sanitary News*, the superintendent of the Philadelphia water-supply, Colonel Ludlow, recently read a paper before the Engineers' Club of that city, in which he stated, as the result of his experience, that wrought-iron pipe cannot be depended upon, when laid underground, to carry its full volume of water for more than ten or twelve years. In one case, where a service-pipe had been in for about twelve years, the pressure in the main of seventeen pounds to the square inch was reduced in the house, at nearly the same level, to seven pounds, by obstructions in the pipe; and other pipes, when taken up, had been found nearly closed. This agrees with the experience of most others who have used wrought-iron pipe; but Colonel Ludlow is said to have reported that a coating of coal-tar pitch on the inside of the pipe would prevent deposit, but we think the evidence tends to show that, as tarred pipes are generally used, the rusting still goes on at the joints to a serious extent.

A RUSH THROUGH THE HEALTH EXHIBITION, LONDON, ENGLAND.

"From labour health, from health contentment springs."

LONDON, August 21, 1884.

IT is truly said that an exhibition is never complete until its close; but then the exhibits that were ready on the opening day will probably have suffered through the tardy installation of their neighbors, to say nothing of the handling to which they may have been subjected by the crowds of mistrustful or simply inquisitive visitors, in spite of earnest entreaties not to touch. Unless a very minute analysis of an exhibition be undertaken, when each fresh exhibit can be duly noted, the most satisfactory plan is to take an exhibition just in the middle of its career, when all the important objects may reasonably be expected to be placed, and before their gayness and their "gilt are all besmirched."

The International Health Exhibition, which was opened on the 8th day of May, in the grounds at South Kensington belonging to the commissioners of the 1851 exhibition, cannot, even now, more than three months after its inauguration, and presumably within three months of its close, be said to be entirely complete. One of the principal features of the show, consisting of the sanitary and unsanitary houses was only thrown open to the public three weeks ago; and the details, showing inoccuous materials, judicious arrangement, and good workmanship on the one hand, against injurious substances, faulty combinations and scamped work on the other, are still being filled in one after the other. A Siberian log-hut is being put up in the open space to the south of the large food gallery, where but recently an interesting addition was made to the alimentary demonstrations. This is a Tartar encampment, with both men and women in their quaint national costumes, and several Siberian mares, that are milked at intervals in sight of the visitors, so as to afford koumiss, both for tasting and sale. Be it remarked, in passing, that the colts appear much more perfect animals — not all legs — than one is generally accustomed to see. Then the exhibits of the Japanese Government have only just been distributed among the classes to which they relate, and the Siamese exhibits are even now being arranged in the Indian Court.

The present notice is intended rather to give a general idea of the exhibition and its contents, than descriptions of any particular exhibit, which will be reserved for succeeding articles devoted to the classes coming more immediately within the scope of this journal. And indeed, such is the success of the show — the admissions have already exceeded two millions — that the vast crowds render any careful examination impossible, except early in the morning, or on the half-crown (60 cent) Wednesday, the admission on other days being a shilling, or 25 cents. It is not at all likely that a quarter even of the visitors come to worship the Goddess Hygeia; but there are manifold attractions, in the shape of illuminated fountains, military bands, etc., that draw the multitude; and it may be hoped, on the "those that came to scoff remained to pray" principle, that the mere sight-seers may pick up a wrinkle here and there, which shall cause them to do less violence in the future to the principles of sanitary science. Then, there are various feeds, from a Chinese banquet, including the far-famed birds'-nest soup at nearly two dollars, and the club dinner (to which it is the thing to invite one's friends instead of taking them home), down to the thawed Australian chops, the School of Cookery dinners, four courses for 25 cents, and the vegetarian ditto, too literally "a good blow-out," for half that sum. There is also a "*diner à la Duval*," which, however, resembles the popular dinners started by the great Paris butcher only in the mode of making out the bill so as to avoid error on either side. It has been said that all attempts by the Duval Company to found branches away from Paris have proved commercial failures. Now it would have been an interesting and appropriate feature of the exhibition, if the committee had run a real Duval dinner, with imported accessories, *bonnes*, caps and all, guaranteeing the Company against loss. Why, the thing would have been an immense success, for all the world would have gone after business hours to indulge in real French cookery, and air the *quantum* of French, possessed. But let us now leave our material mutton, with the Devonshire cream and junkets, the real Indian tea and curry, Lockhart's cheap cocoa, etc., and return we to our legitimate *moutons*, a run through the exhibition.

In order to carry out its objects systematically, the exhibition is divided into two main sections, Health and Education, which are again subdivided into eight principal groups, viz.: 1. Food; 2. Dress; 3. The Dwelling House; 3a. Ambulance; 4. The School; 5. The Workshop; 5a. Meteorology in its Relation to the Study of Public Health: 6. Educational Works and Appliances. The buildings are those of corrugated-iron, put up last year for the Fisheries Exhibition, with many additions on account of the large number of applications for space, — three times the amount at disposal. The permanent galleries, the upper portion of the Albert Hall, and the new Technical College of the City and Guilds of London have been thrown into the Exhibition. The special objects of this year's demonstration are "to illustrate as vividly, and in as practical a manner as possible, food, dress, the dwelling, the school and the workshop as affecting the conditions of healthful life; and also to bring into public notice the most recent appliances for elementary school teaching, and instruction in applied science, art, and the handicrafts."

Making our way into the building by the main entrance in Exhition Road, we find ourselves in the vestibule, the walls of which show how advertisements may be treated artistically, so as to serve for mural decoration. This leads to the large south gallery devoted to food, with the dining-rooms and model-dairies on the left, and the bees and improved bakeries on the right, drainage and meteorology being in the immediate neighborhood. Between the south gallery and the south central galleries, the principal portion of which is taken up with various apartments, dining, drawing and bedrooms, and a smoking-room, formed of materials said to be brought over from Cairo, there are: the machinery and apparatus for the electric-lighting of the buildings; the pavilion in which the water supplied by the eight companies of London is brought together for comparison, together with full-sized sections of the filter beds, etc.; and the special pavilion of the Native Guano Co., for illustrating the A. B. C. process for preventing the pollution of rivers. Here, too, is the Prince of Wales's Pavilions, executed by Gillow & Co., that formed so great an attraction last year; and here is the reproduction of the old London street, peopled with shopkeepers, artisans, and apprentices, clad in the costume of two hundred years ago, that is proving the great attraction of the present Exhibition. So admirably is the work done, and so skilfully is the appearance of age given, that your correspondent on seeing it for the first time was quite deceived. He was expecting to see the usual painted canvas stretched on timber framework, the unreality of which is as painfully manifest as that of a theatrical scene by daylight, and he said to himself on approaching: "Well, at any rate, they have built up the entrance gate with solid stones and mortar." There is, indeed, an appearance of reality and old-worldishness about the reproductions, that is only spoiled by the visitors in their modern attire, and by the conducting wires, that lead the electric-light into the old horn lanterns, or rather *lanthorns*, that are hung out from the houses. The original intention was to reproduce old Cheapside; but this was found impossible on account of there being extant no sufficiently accurate representation of that famous old street. Accordingly, Mr George Birch, A.R.I.B.A., has designed a representative street, with a bend about the middle of its length, for giving greater character, and for breaking a perspective that would have been too long for artistic effect. Every house is a faithful reproduction, with such modifications only as were necessary to secure the *ensemble*, of actual edifices, most of them historical, that existed before the Great Fire of 1666.

The middle and main portion of the central gallery is devoted to the designs of pupils in the Government schools of art, and to objects manufactured in accordance with their designs. The west end is occupied by the India collection, where the Siamese exhibits are now being installed; and the eastern end to objects for internal decorations of the house. Between this gallery and the south central galleries, proceeding from east to west, are wall-decorations, including wall-papers both non-poisonous and washable; and furniture, bath and sanitary appliances; fittings and furniture for the dwellings and the school; means for fire-prevention, and the sanitary and unsanitary houses side by side. In the same direction, after crossing the central avenue, which runs north and south, are some foreign courts, of which the French is the largest and most important, and the American bar, very popular, as it was last year. Leaving, for the moment, the large department of machinery in motion, and crossing the aquarium which was last year constructed and stocked with fish in the incredibly short space of six weeks, and is now replenished with various species of edible fishes, we reach the newly erected Queen's Gate Annex, which, with the exception of the southern end, devoted to aid for the sick and injured both in war and peace, is wholly taken up with the Belgian exhibits. This little country, with its five millions of population, huddled together in a small area, is like a hive of bees ready to swarm; but Belgians are averse to seeking "fresh fields and pastures new," so they go on making the most of their natural resources, and eagerly seizing upon every opportunity of creating fresh markets. It is thus that Belgium is always largely and creditably represented at exhibitions; and the present occasion forms no exception to the rule. Besides food and hygienic appliances, Belgium especially distinguishes herself in the departments of primary and technical education, of which there are many exhibits.

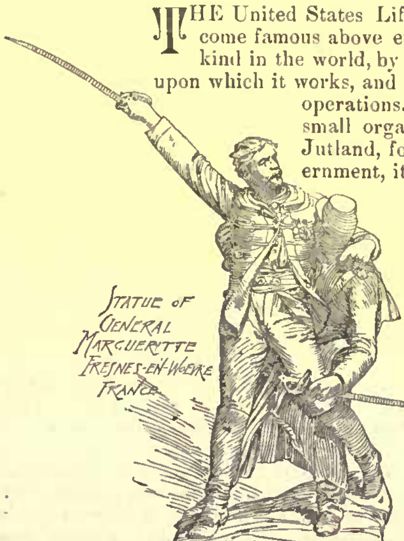
On the opposite or east side of the whole block of buildings is the City and Guilds of London Technical Institution, which, at the close of the Exhibition will be thrown open for furthering the cause of technical education among artisans, and this in the most practical way possible, not by theoretical lectures, but by actual practice in the workshop. The Institution retains three rooms for showing its apparatus, and the work turned out by the pupils of its Finsbury College, which, indeed, are highly creditable to all concerned. In the basement is a large collection of the educational plant and text-books of Japan, which is in all probability the most complete that has ever left that country. The English National Schools, the School Board of Glasgow, and some foreign educational bodies are also represented; among them is illustrated a method for teaching the deaf to speak by means of ordinary speech. It appears that great success has been achieved by the pupils copying the movements of the mouth during careful articulation; and it is a remarkable circumstance that the most successful teacher wears a heavy moustache.

In the department of machinery in motion are shown: the refrigerating of meat for export, Palmer's candle-making, hatting, machine boot and shoe making, cigar and cigarette making, preserve, confectionery and chocolate making, ærated-water production and mechanical laundries. Opposite to this department is the large Chinese court and pavilion alongside, the latter constructed and decorated entirely in Chinese style.

It now only remains to notice the permanent galleries of the Exhibition Commissioners. The west quadrant, set apart for historical dress. contains full-sized wax figures arrayed in the successive costumes of the various epochs, from William the Conqueror to the Prince Regent, a period of 750 years. Each of the nineteen cases contains figures of a lady and gentleman of the esquire class, and also those of a peasant woman and artisan of the same period. There is another series of figures clad in armor, and in the successive uniforms of the British Army, and a few examples of the uniforms of other countries. The east quadrant is devoted to modern dress, with the "divided skirt" or ladies' dress of the future. There are also diagrams and plaster casts illustrating the baneful effects of submitting to the torturings of fashion; some good examples of hygienic dress for permitting ladies to take part in sundry healthful sports and pastimes; and fireproof (asbestos) as well as water-proof clothing. Ladies underclothing, hygienic of course, finds a place in the amphitheatre of the Albert Hall, as also the library containing works relating to the various classes of the Exhibition. The walls of the library are lined with a light *écru* material, drawn in small pleats, which produces a good effect, as well as deadens the sound. Photographs of the principal health resorts are shown, as well as a table of comparative mortality in the various trades and professions in England, from which it appears that clergymen are, as a body, the longest-lived, gardeners and then farmers next, and that potters are even shorter lived than the Sheffield grinders. The topmost gallery of the Albert Hall is occupied by English school-furniture, and educational appliances.

Whether from a sense of duty, a desire to get their full shilling's worth, or real interest in the subject, the vast crowds do most religiously pass through the collections, and appear to examine them. May the toilers, with their toil lightened and brightened by the teachings of this Exhibition, take heart of grace, and comfort themselves with the line quoted in the catalogue, and reproduced at the head of this cursory notice. J. W. P.

THE LIFE-SAVING SERVICE.



THE United States Life-Saving Service has become famous above every other service of the kind in the world, by the magnitude of the scale upon which it works, and the immense success of its operations. With the exception of a small organization on the island of Jutland, formed by the Danish Government, it is the only governmental life-saving institution in Christendom, all the others being private societies, of which the Royal National Life-Boat Institution of Great Britain is the chief and model. The frequency of shipwrecks on our coasts led, early in the century, to several more or less crude and ephemeral efforts to mitigate their distresses. These efforts were mainly ineffectual, and marine fatalities continued to be numerous and terrible. Finally, in 1848, the Hon. William A. Newell succeeded by a vigorous appeal in securing an appropriation of $10,000 from Congress for providing means to avert similar calamities. This was the inception of the American Life-Saving Service. With the money thus voted eight buildings were erected at different points, and equipped with surf-boats and other life-saving appliances. Subsequent Congressional appropriations, between that date and 1853 increased the number of these houses on the coasts of New Jersey, Long Island and Rhode Island, and life-boats were also placed at various points on the Atlantic and Lake coasts. The efficiency of these means proved only partial, and the frightful wreck of the "Powhatan" on the New Jersey coast, with loss of three hundred lives, electrified public sentiment, and caused Congress, in 1854, to pass a bill for the improvement and repair of the existing stations. In 1869, the Hon. S. S. Cox succeeded in getting Congress to pass a bill employing crews at alternate stations, the absence of regular crews being the weak point of the whole life-saving movement of that period. But it was not until 1871 that the service began to be of real efficiency. made to Congress, an appropriation was obtained of $200,000 for At that date, proper representations on the subject having been setting the service on its feet. Mr. Sumner I. Kimball, who was then in charge, took hold and effected the organization of the present system, the success of which has been absolute. It was perfected by the passage of a bill in 1878, originally introduced by the Hon. Mr. Cox, formally organizing the service in its present shape.

Under this organization the entire Ocean, Gulf and Lake coasts of the United States are divided into twelve life-saving districts. Each of these is presided over by a local superintendent, who is in effect the governor of the district; over all is a general superintendent (Mr. S. I. Kimball), and an assistant general superintendent, (Mr. W. D. O'Connor), whose headquarters are at Washington. Officers of the revenue marine are detailed as inspectors of the several districts, and the same service furnishes a general inspector of the stations (Capt. J. H. Merryman). These stations are houses, specially designed for the purpose, containing six, and, in some cases, seven rooms. They have each a keeper and a crew of eight surf-men, who are required to be professional surf-men and salvors, and are selected on the sole ground of being the best of their kind, no notice whatever being taken in choosing them of any political or other considerations. The object in view is simply to save the lives of seafarers, and the choice of agents is therefore made, single-eyed, from the prime adepts in surf and beach craft. The stations are furnished with every known appliance that can aid in saving life; life-boats, surf-boats, life-cars, breeches-buoys, improved wreck ordnance (the Lyle gun) for effecting line communication with wrecks, hawsers, hauling-lines, etc. The bravery and skill of the life-saving crews, armed with these means, are attested by the results as shown in the report of the service. It appears that of 18,764 persons on board imperilled vessels during the eleven years of the present system, 18,338 were saved, and only 426 lost, the latter figure representing cases beyond human aid. The contrast is striking between this showing and the dreadful fatalities of the old years before the present life-saving organization, when it was a matter of common occurrence for several groups ranging from forty or fifty or to two and three hundred persons each to perish annually before the very eyes of the gazers on our beaches.

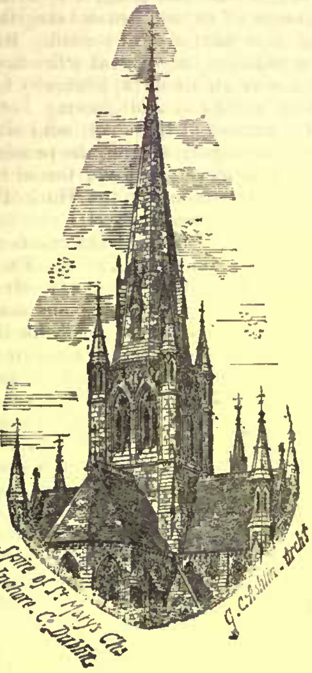
The amount of marine property saved during these eleven years is also remarkable, reaching a value of over twenty-six millions of dollars against some thirty-six millions involved. Not less important than the heroic daring of the life-saving crews is their admirable vigilance in patrolling the beaches, a task which is performed nightly along the whole extent of our continuous coast, and daily during thick weather, in an unremitting watch for endangered vessels, to the end that they may be discovered, and those on board saved before the sea has time to work its wild will upon them. The stations are situated, on the Atlantic beaches especially, at intervals of about five miles apart, and the patrols march the space between, equipped with lanterns and Coston signals, until they meet, when they exchange metal checks, suitably inscribed, as vouchers of their intercommunication. In the event of a wreck being descried upon the way, the patrolman fires a red Coston light to let the people on board know that help is at hand, then puts back with all speed to the station, and brings the crew. If the breakers are at all within bounds they bear with them the boat, boat-service being always preferred for despatch, though always perilous; the wreck ordnance and lines for effecting communication with the stranded vessels, and hauling home her company in the life-car or breeches-buoy, being resorted to only in cases of extremity.

The stations now in commission number about two hundred. They exist in several classes, though all having a general similarity. Those on the Atlantic and Gulf coasts are distinguished by the use of the surf-boat, which can readily be drawn from the boat-room on its carriage and launched by hand into the shallow surf of the flat beaches. On the coast of Maine, however, and on the Pacific coast, as well as from the piers of the Lake harbors, the self-righting and self-bailing life-boat is in general use, and as it is very heavy, the stations are constructed with reference to it, being provided with an inclined plane furnished with rollers, on which the boat rests, and is let to slide into the water by machinery. On the coast of Florida, the stations are simply provisioned houses of refuge, severally in charge of a keeper, the peculiarity of the beach enabling mariners to land rather easily from wrecks without assistance, and their main danger being of death from hunger and thirst after landing, the region being for the most part uninhabited and desolate.

The illustration, published elsewhere, of the Bay Head Life-Saving Station, on the coast of New Jersey, designed by Mr. Paul J. Pelz, affords a conception of the description of edifice preferred for the neighborhood of towns. In this particular instance, the watch-tower is utilized to contain the town-clock, which the community of Bay Head proposes to furnish.

The cost of a station of this design under ordinary conditions, not too far from a building-material market, has been found to be about $5,600.

ON THE PURIFICATION OF WATER BY IRON ON A LARGE SCALE.[1]



IN January, 1883, in a paper on the Antwerp Water-works, read at the Institution of Civil Engineers, I described the application of Professor Bischof's method of filtration, through a mixture of spongy iron and gravel, to the purification of the waters of the River Nethe. The eighteen months' additional experience gained has shown that, so far as the purification of the water is concerned, Professor Bischof's process leaves little to be desired, but the working of the system has been costly, and the area of land required, as well as the quantity of iron necessary has, in the case of the Antwerp water at any rate, proved very much beyond the inventor's expectations.

The increased demands of the town rendered it necessary to extend the arrangements for purifying the water, and it became my duty to advise the directors of the company on the best means of doing this.

The extension of Professor Bischof's method would have involved so great an outlay, that after trying, unsuccessfully, many experiments on direct filtration through unmixed iron at high rates of flow, I determined to adopt a plan first suggested to me, some years ago, by our chairman, Sir Frederick Abel, of agitating the water to be purified with iron instead of attempting to filter it. The object, in either case, was to expose the water as much as possible to an extended surface of iron, consequently any plan by which the iron could be made to keep itself clean by rubbing against itself continually, would seem to be a more rational way of attaining this object, than of trusting to a partial filtration through a more or less spongy material.

The obstacle to trying Sir Frederick Abel's method at a much earlier date, was the belief entertained by Professor Bischof that a contact of about forty-five minutes was necessary to ensure complete purification, and any such time would be fatal to mechanical means of performing the work. The late Professor Way, and Mr. Ogston, it is true, had shown that with very finely divided iron, the effect was much more rapid, but there was still a doubt about its permanence.

In the autumn of last year, a revolving cylinder, four feet six inches in diameter, and five feet six inches long, was adapted to try Sir Frederick Abel's system. It was fitted with inlet and outlet pipes, and with shelves or ledges for scooping up the iron, raising it to the top of the cylinder, and then letting it fall through the water.

At first I began to run water through at twelve gallons per minute, which gave a contact of about forty-five minutes; but I found that at this rate the water was very heavily charged with iron; I gradually increased the quantity to thirty gallons per minute, and then found that 1.20 grains of iron were dissolved per gallon, or about twelve times more than experience at Antwerp showed to be necessary. The flow was increased to sixty gallons, and even then 0.9 grains per gallon were dissolved.

The experiment looked so hopeful that I fitted much larger pipes to the apparatus, and having made some other dispositions connected with maintaining a uniform distribution of iron in the cylinder, and preventing it being washed away by the comparatively rapid current that would be possible, I sent the "Revolver," as it came to be called, to Antwerp, where it was put to work at the end of last February, and has continued to operate ever since.

The head available for forcing the water through the "Revolver," is, at Antwerp, limited to five feet, but by fitting very large pipes, I have managed to get one hundred and sixty-six gallons per minute through; this gives a contact of about three and a half minutes, and is so amply sufficient, that I feel sure that, even for the waters of the Nethe, much less time will be adequate.

The charge of iron is about 500 lbs., and the quantity taken up by the water, including impurities and very fine iron washed away, during a run of thirty-three days, was 0.176 grains per gallon.

By making suitable arrangements, and choosing a favorable time with respect to the demands of the town, we were able to obtain samples of water that have been purified by the "Revolver" only, and after proper exposure to the air, followed by filtration through one of the large sand filters, the result obtained has been that the color was very little different from distilled water, the free ammonia was reduced from 0.032 grains per gallon to 0.001, and the albumenoid ammonia from 0.013 grains to 0.0045.

The "Revolver" turns at the rate of about one-third revolution per minute, and requires scarcely appreciable power. The area occupied by apparatus for dealing with 2,000,000 gallons per day is 24′ x 29′, and it can be introduced into any existing system of filters, for by enlarging the in and outlet pipes to a suitable diameter, a head of some twelve inches will suffice to pass the water through.

It can easily be arranged so as to be used or not, as the state of the water to be purified may warrant, and the consumption of iron being only about twenty lbs. per million gallons, is quite an insignificant expense. It will be found to remove all color from water, whether caused by peat or clay, and will facilitate the action of sand filters by the peculiar curdling effect the iron has on the impurities.

During the experiments made at Erith, it was noticed that considerable quantities of gas collected in the upper part of the "Revolver." On collecting this gas, it was found to extinguish a lighted taper instantly, and on analysis was found to contain only eight per cent of oxygen.

It was observed from the first, that the animal and vegetable life which was so abundant and troublesome in the natural waters of the Nethe, lying over the spongy iron filters, had quite disappeared in the water, otherwise in exactly the same circumstances lying over the sand filters, and I always supposed that this was due chiefly to mechanical filtration through the spongy iron having separated all the germs, spores, and seeds which come to life above it. But during the recent hot weather it has been found that the water from the "Revolver," though it contains all the impurities of the natural water, has been modified by the action of iron to such an extent that neither animal nor vegetable life is apparent over the sand filters. Without presuming to draw very wide inferences from this fact with reference to the action of iron upon organisms connected with disease, it may, at least, be pointed out that the absence of visible life in water treated by iron on a large scale confirms, in a great measure, the experiments of Dr. Frankland, Dr. Voelcker, Mr. Hatton, Professor Bischof, and others. It is due to the last-named gentlemen to state that to his persistent advocacy the introduction of iron as a purifier is mainly due. It must be borne in mind that the system does not depend on filtration only; but, first, on a process of exposure to iron, which decomposes the organic matter, and kills living organisms; and secondly, on simple filtration, which merely separates the noxious matters which had been previously attacked by the iron. The waters of the Nethe are exceptionally bad, and heavily charged with impurities, so that the test both of Professor Bischof's and Sir Frederick Abel's systems has been very severe.

[1] A paper by W. Anderson, M. Inst. C. E., published in the *Journal of the Society of Arts.*

PROCESSES FOR COPYING DRAWINGS AND TRACINGS.

OF the various processes commonly used by draughtsmen and others for producing duplicates of drawings, tracings, etc., the following are probably the most common: Blue process, negative, producing white lines on blue ground; positive, having blue lines on white ground; black lines on white ground, Dandy process; white lines on brownish ground, silver process.

Of all these processes the ordinary blue negative system is most used, as being the cheapest, the easiest to work, and as yielding results which fulfill all necessary requirements. To make ordinary blue prints there is necessary some good blue-print solution, a good quality of white paper, such as Weston's drawing-paper, a sponge free from grit, a printing frame, such as photographers use, and a dish or tank depending on the size of the prints, as does also the frame. But for convenience, we will suppose the prints will be under 14″ x 17″ in size.

There are a good many formulas floating around for a blue-print solution, but the one which I have found to be the best is as follows:

One ounce ammonia citrate of iron, one ounce of red prussiate of potash; dissolve the red prussiate in seven ounces of water, and, separately, the ammonia citrate of iron in five ounces of water; mix these two solutions, and the solution is ready to be applied. To apply the solution, lay the paper down flat, and pour a small quantity in the centre of the sheet, and spread it with the sponge uniformly, going over the whole sheet twice to be sure no spot has been missed or unevenly coated. Hang up in a dark place to dry, and when dry spread the tracing over the blue paper, ink side from, and put in the frame, being sure the tracing and sheet are in contact. Expose to sun or in the light until the paper becomes a greenish mouse-color, when the print may be taken out and washed in running water. As the time of exposure varies with the intensity of the light, no rule can be given; the beginner had better keep a strip of paper outside of the frame, and tear small samples off, and wash from time to time, and when the desired blue color is reached take the print out. A little practice will enable any one to tell when the print is done. After the print is removed from the frame, it must be washed in clean water on both face and back, and should, when sufficiently washed be of that bright blue characteristic of Prussian blue, and the lines should be clean, white lines.

This process, from its yielding a negative picture, is known as the Ferro Negative Process to distinguish it from similar processes, giving blue lines on a white ground known as the Ferro Positive Process.

The latter is much more difficult of manipulation, and requires more apparatus, so while the beauty of the process strongly commends it, these difficulties, and the fact that the cheaper and easier worked negative processes furnishes copies that answer every purpose in the shop and in the drawing-room, have limited its use. The paper is now prepared, and offered for sale by the roll, directions accompanying each roll. The final outlay makes experimenting rather more expensive than one would believe on seeing the advertisements, which are usually not very explicit in directions.

This ferro-positive is scientifically known as Pellet's process, being discovered by H. Pellet, of Paris, and his formula if as follows:

Per-chloride of iron,	10 parts.
Water,	100 "
Citric acid,	5 "

The paper used should be the best, and should be sensitized either by floating on a bath of the above, or this is applied with a sponge as before described for negative blue paper. Of course this should be made in a dark room. To manipulate the prints there is necessary in addition to the water-dish or tank, two other tanks, one to contain the developing solution, consisting of

Yellow prussiate of potash,	24 parts.
Water,	100 "

And another for intensifying solutions of

Hydrochloric acid,	1 part.
Water,	10 "

The time for exposing this paper varies from forty seconds to one half hour, depending on the light. When properly exposed the image should be a light canary on an orange ground.

The print, after remaining in the solution of yellow prussiate of potash, should have light blue lines on a white ground. On immersing in the acid solution, the blue lines become more intense.

Print may now be taken out and washed, and should have a clean white ground with sharp blue lines.

The care necessary to get good results with this process puts its practice beyond the average manipulator.

There are several other processes slightly used, such as silver and chromium, for copying drawings, etc., but they possess no striking advantage over those already mentioned. There is one, however, which might be mentioned as coming into favor, the Davy process, black lines on a white ground.

The prints are made as in blue process printing, with one development. For this process, however, I am unable to furnish formula. —*R. M., in Journal of Railway Appliances.*

THE ILLUSTRATIONS.

PALACE OF JUSTICE AT ROUEN.[1]

THE building here figured was, from its foundation, devoted to the purpose of the administration of justice, and, notwithstanding the many mutilations to which it has at different times been exposed, it still remains an interesting, and, in the city of Rouen, almost a unique specimen of the sumptuous taste of the age in which it was erected.

Down to as late a period as the year 1499, there existed in Normandy no stationary court of judicature; but the execution of the laws was confided to an ambulatory tribunal, established, according to the chroniclers, by Rollo himself, and known by the name of the "Exchequer." The sittings of this Norman exchequer were commonly held twice a year, in spring and autumn, after the manner of the ancient parliaments of the French kings, the places of session depending upon the pleasure of the sovereign, or being determined in general, like the English *Aula Regia*, by his presence. The inconveniences attendant upon such a mode of administering justice became, of course, the more heavily felt in proportion as the country increased in population and civilization. Accordingly, the States-General of the province, assembled in the last year of the fifteenth century, under the presidency of the Cardinal d'Amboise, petitioned Louis XII, who was then upon the throne, to appoint in the metropolis of the duchy a permanent judicature, in the same manner as had been previously done in others of the principal cities of the realm. The king was graciously pleased to accede to their request, and, by words of the royal edict, not only was the exchequer rendered permanent in the good city of Rouen, but permission was also granted to the members to hold their sittings in the great hall of the castle till such time as a suitable place should be prepared for their reception.

It was on this occasion that the Palace of Justice was built. A piece of ground was selected for the purpose, that had been known by the name of Jews' Close from the time when Philip Augustus expelled the Children of Israel from France, and the foundations of the new structure were laid within a few months after obtaining the royal sanction. The progress, however, of the work was not commensurate, in point of rapidity, with the haste with which it was undertaken, and even in 1506 the labors were not brought to a conclusion, though in that year the exchequer was installed by the king in person, with great pomp, in the new palace. The sitting will long be memorable in the Norman annals, not only as being the first, but as having been selected by the sovereign as an opportunity for bestowing various important favors upon the city and duchy.

The palace in its present state is composed of three distinct buildings, erected at different times, and forming collectively three sides of a parallelogram, whose fourth side is merely a wall; the court thus inclosed is spacious. One of these buildings (the front in the plate) goes by the name of the *Salle des Procureurs.* Its erection was six years anterior to that of the right-hand building, more properly called the *Palais de Justice*, and the object in raising it was, according to the edict of the bailiff upon the occasion, to serve as an exchange to the merchants, and put a stop to the impious practice of assembling, even upon feast days, in the cathedral, for the purposes of business. At a subsequent time, this hall was added to the Palace of Justice, and there was then built to it a chapel, now destroyed, in which mass was regularly celebrated twice a year: upon the anniversary of the feast of St. Martin, the day of the meeting of Parliament, and upon Ascension Day.

The service on the first of these days went by the name of *la messe rouge*, because the members always attended in their scarlet robes; on the second and more important occasion it was called *la messe de la fierté*, being performed in commemoration of the deliverance of the prisoner, by virtue of the privilege of St. Romain. The exterior of the *Salle des Procureurs* is comparatively simple; the most highly decorated part of it is the gable, which is flanked by two octangular turrets, ornamented with crocketed pinnacles and flying-buttresses. Within it consists of a noble hall, one hundred and sixty French feet in length and fifty in width, with a covered roof of timber, plain and bold, and destitute either of the open tie-beams and arches or the knot-work and cross-timber that usually adorn the old English roofs. Below the hall is a prison.

The southern building, erected exclusively for the sittings of the exchequer, is far more sumptuous in its decoration, both without and within. The lucarne windows may even vie with those in the house in the Place de la Pucelle. Those below them find almost exact counterparts in the château at Fontaine-le-Henri. To use the language of the French critics, this front, which is more than two hundred feet in width, "*est decorée de tout ce que l'architecture de ce temps-là présente de plus délicat et de plus riche.*" The oriel or tower of enriched workmanship, which, by projecting into the court, breaks the uniformity of the elevation, is perhaps the part that more than any other merits such encomium. But it is only half the front that has been allowed to continue in its original state; the other half has been degraded by alterations or stripped of its ornaments. The room in which the parliament formerly met, and which is now employed for the trial of criminal causes, still remains comparatively uninjured. Its ceiling of oak, nearly as black as ebony, divided into numerous compartments, and covered with a profusion of carving and of gilt ornaments, not only affords a gorgeous example of the taste of the time, but immediately strikes the stranger as well suited to the dignity of the purpose to which the apartment was appropriated. But the open-work bosses of this ceiling are gone, as are the doors enriched with sculpture, and the ancient chimney, and the escutcheons charged with sacred devices, and the great painting by which, before the Revolution, witnesses were made to swear.

The building that fronts the *Salle des Procureurs* and forms the third side of the court, was not erected till after the year 1700. Its front is an imitation of the Ionic order, a style which harmonizes so ill with the rest of the quadrangle as to produce an unfavorable effect. An accident which happened to the wood-work of the upper part of this front, on the first of April, 1812, unfortunately involved the destruction of a painting held in the highest estimation: the representation of Jupiter hurling his thunderbolts at Vice, executed by Juvenet, upon the ceiling of an apartment called *la second Chambre des Enquêtes.* Jouvenet, who commonly passes under the name of the Michelagnolo of France, was born at Rouen, in 1664.

[1] From Cotman's "*Antiquities of Normandy.*"

U. S. LIFE-SAVING STATION, BAY HEAD, N. J. MR. PAUL J. PELZ, ARCHITECT, WASHINGTON, D. C.

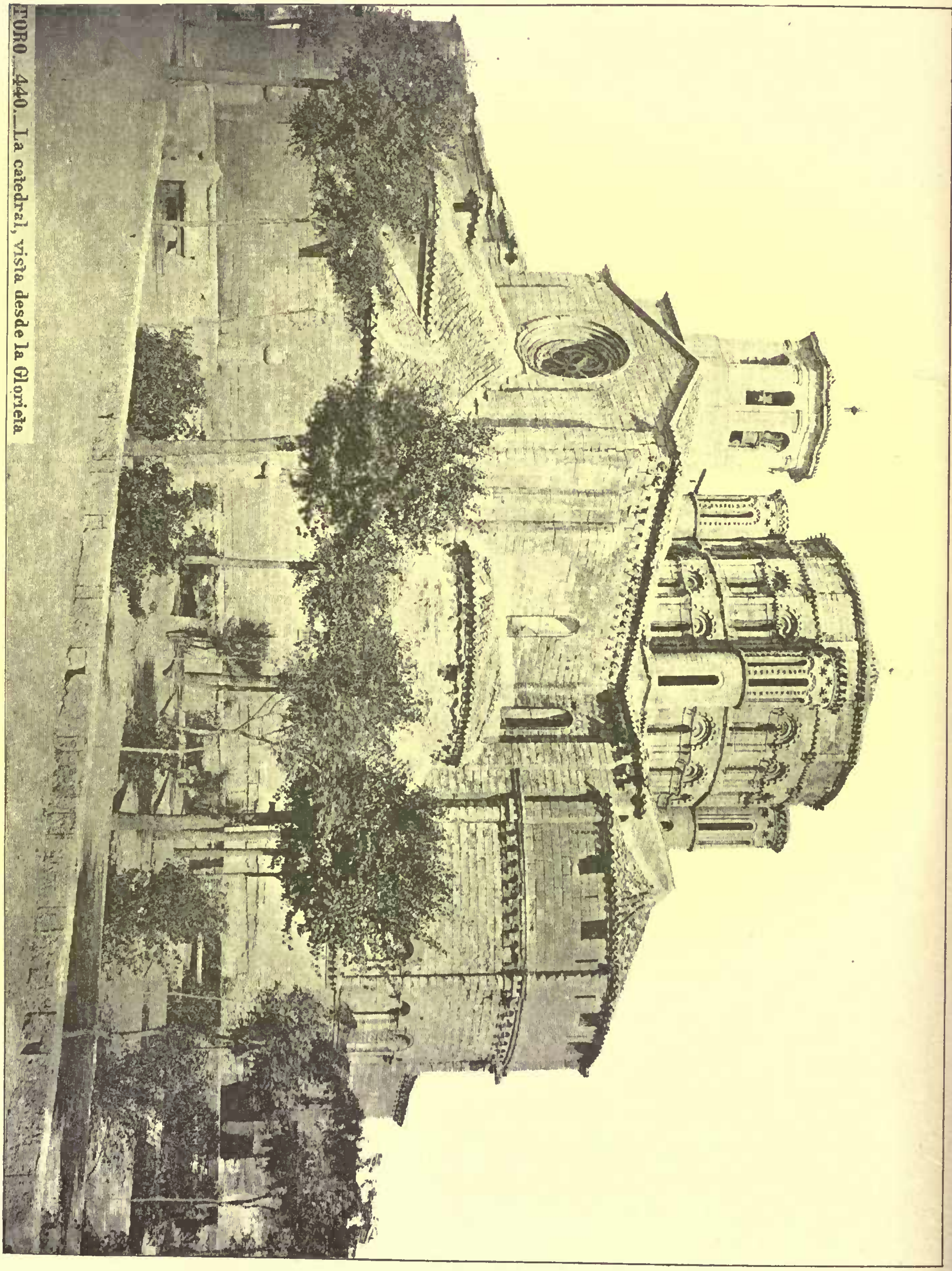
SEE article on the "Life-Saving Service."

THE CATHEDRAL, TORO, SPAIN.

IT may be interesting to compare this print with the sketch of the same building published in our issue for May 10, last.

HOUSE FOR G. A. MCBETH, ESQ., PITTSBURGH, PA. MESSRS. BARTBERGER & DIETRICH, ARCHITECTS, PITTSBURGH, PA.

THIS house is to be completed October 1, 1884; the contract price is $8,500. The first story is built of a very pretty red sandstone from the quarry of Messrs. Cunningham & Fair, Blairsville, Indiana County, Pa., with a dark-gray stone around the window jambs, sills and lintels; the stone contractor is Mr. Beggs. The second story and

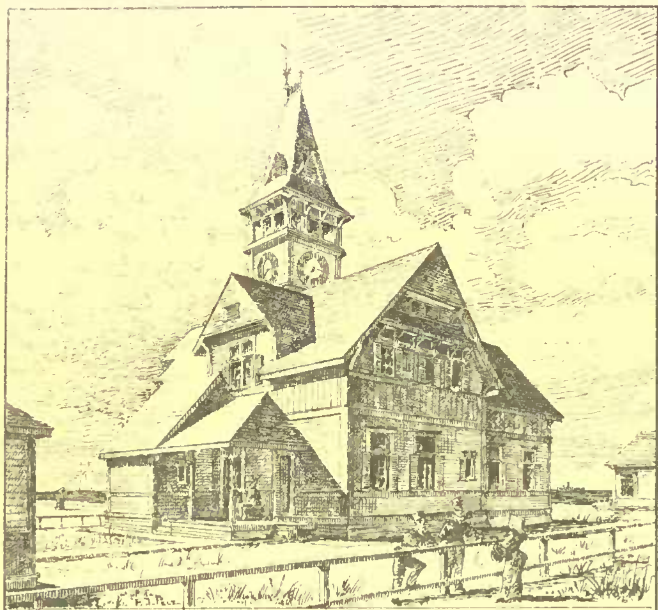


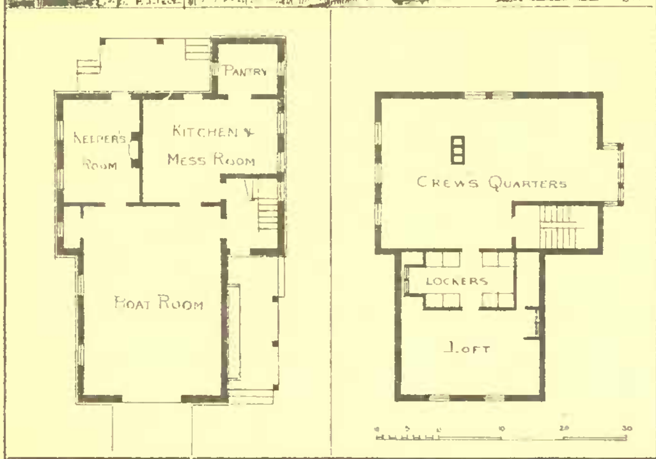
TORO. 440.—La catedral, vista desde la Glorieta

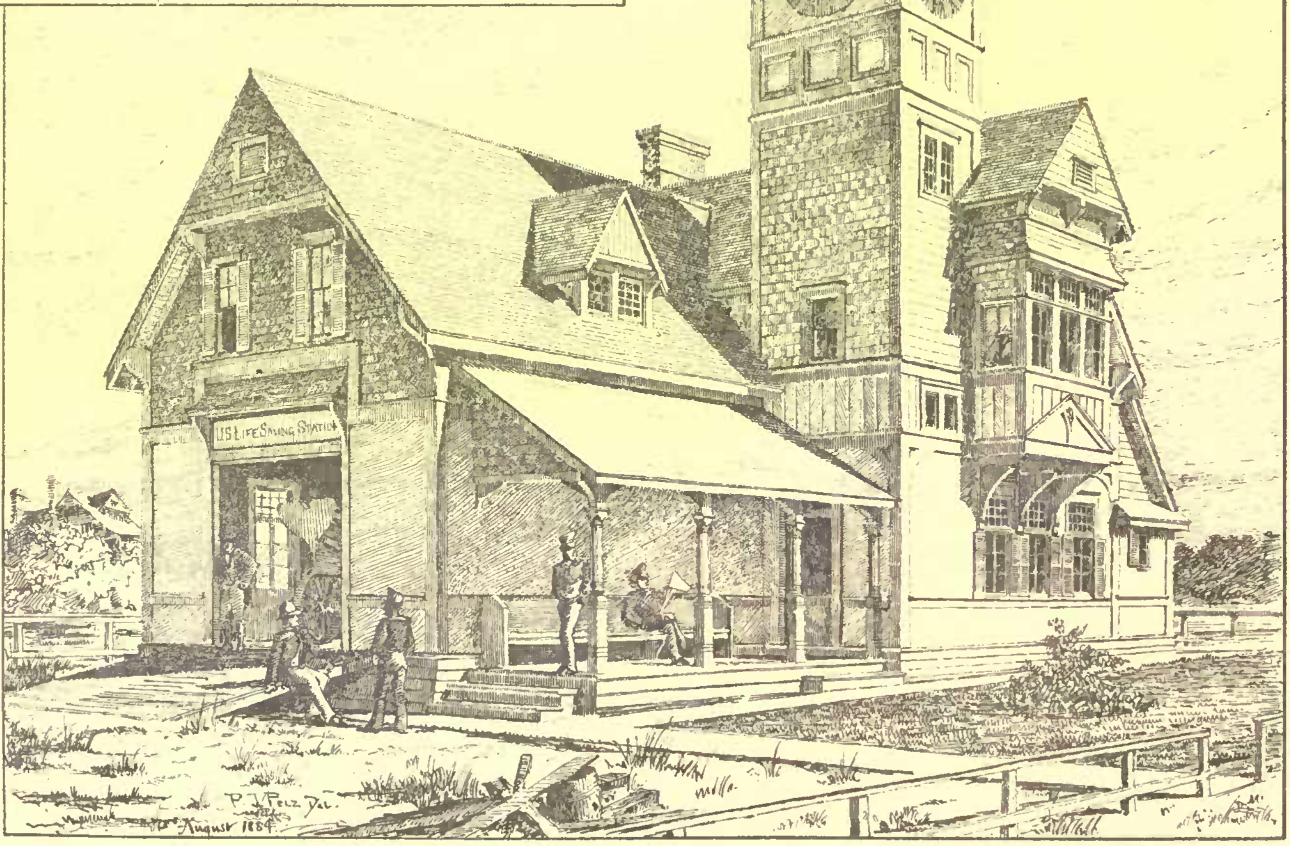
PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

U. S. Life Saving Station at Bay-Head N. J.

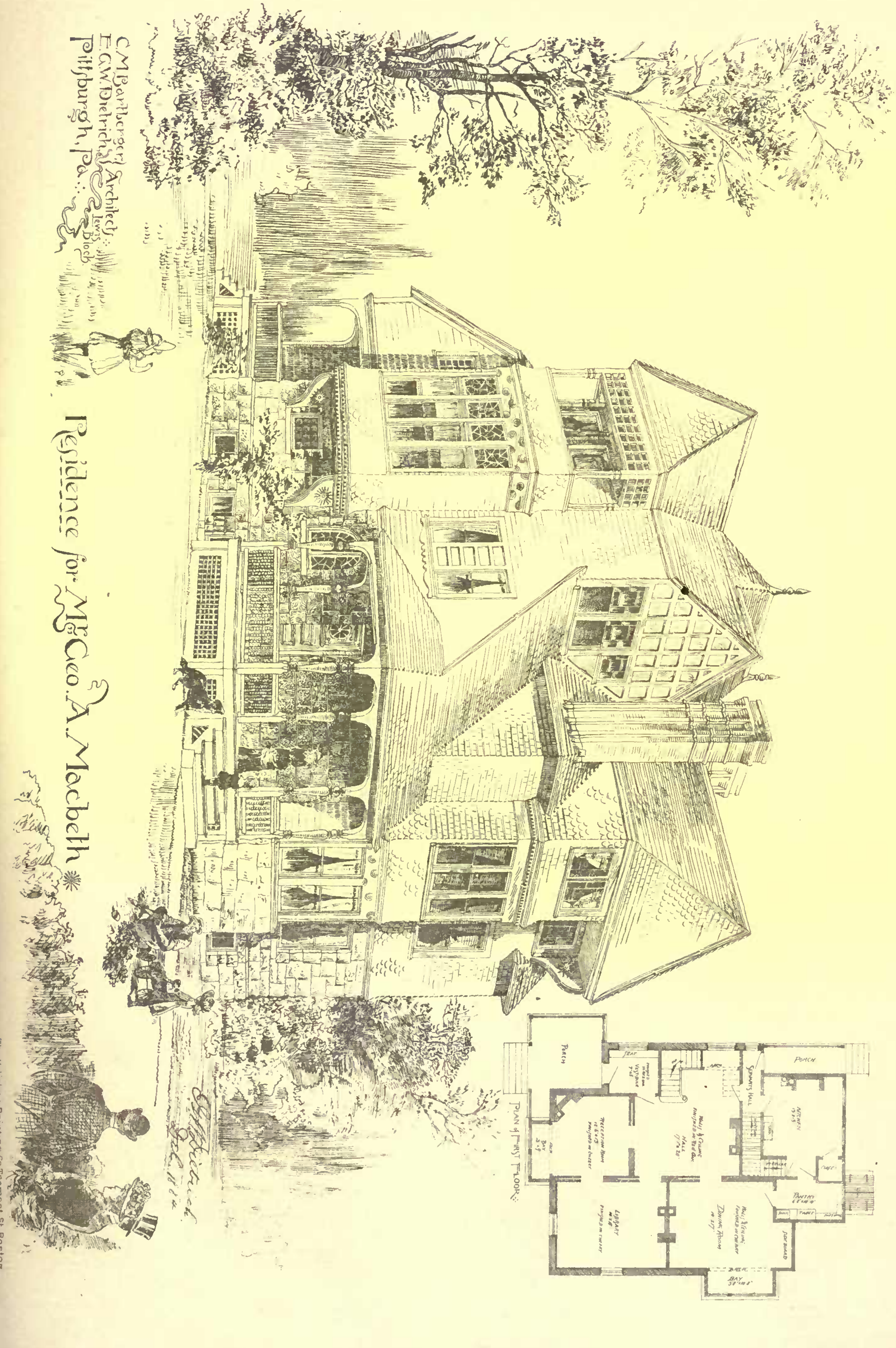
Paul J. Pelz, Architect.

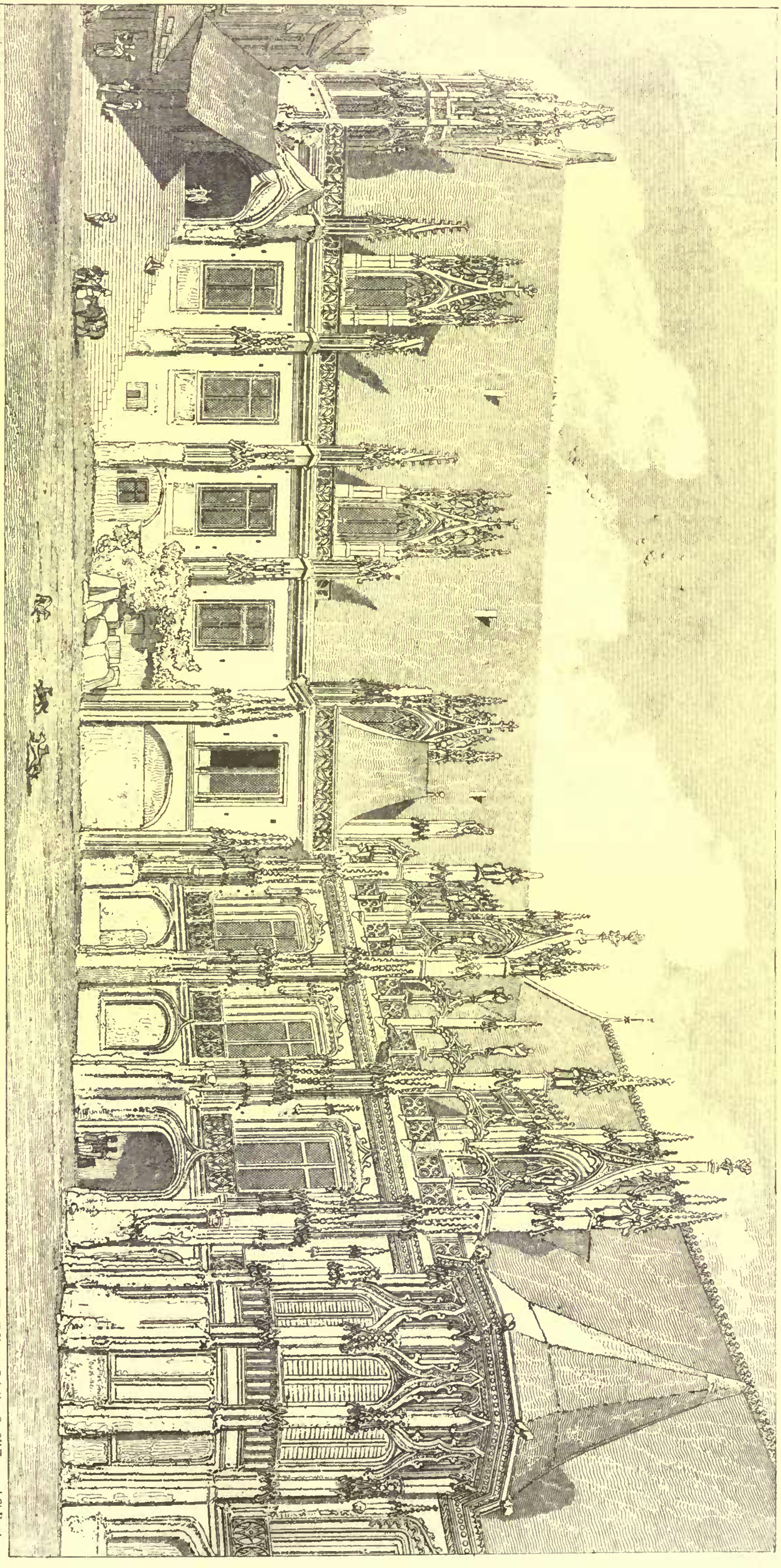






The Heliotype Printing Co. Tremont St. Boston


C. M. Bartberger, E. C. W. Dietrich, Architects, Lewis Block, Pittsburgh, Pa.
Residence for Mr Geo. A. Macbeth
Plan of First Floor
Porch
Vestibule
Hall
Library
Dining Room
Kitchen
Pantry
Servants Hall
Bay
The Heliotype Printing Co. Tremont St. Boston.



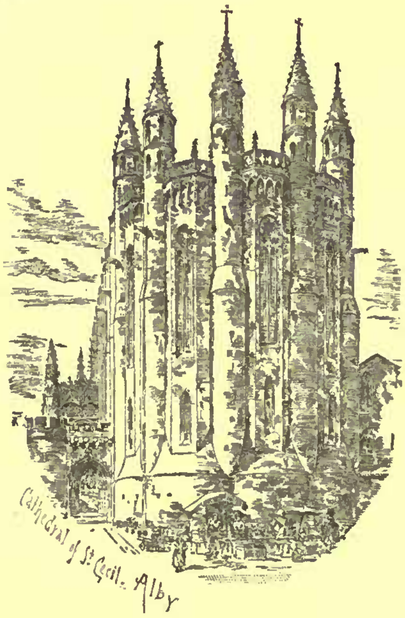
PALACE OF JUSTICE, AT ROUEN.

The Heliotype Printing Co. 211 Tremont St. Boston.

gables are covered with plain and cut shingles in bands; the roof is covered with Peach Bottom slate, by Messrs. W. B. Lupton & Co.; the cellar extends under the entire house, and is divided into laundry, servants' water-closet, furnace-room, coal-room and vegetable-cellar, For the arrangement of first floor see plan. The hall has no plastering, the entire wall and ceilings are panelled in red oak; the dining-room walls and ceiling are panelled in cherry, the balance of the first story is finished in hard woods, as indicated on plan, with cornices of same wood, excepting kitchen and pantry, which are finished in natural pine. The second story contains three large bedrooms, sewing-room, dressing-room, bath-room and trunk-room; each bedroom has a closet large enough to place a trunk in and have ample space left for hanging clothes; each room has a wash-stand with hot and cold water; the attic contains two servants' rooms, and a large billiard-room. The sides of the fireplaces in first and second story are tiled, furnished by the Star Encaustic Tile Co., of Pittsburgh. The general contractor is Mr. Hervey Shent.

THE NEW ADMIRALTY AND WAR OFFICES.

LONDON, August, 1884.



THE latest great competition of the century is at an end; the awards have been published, and the designs submitted in the second stage of the competition are now on view at 18 Spring Gardens. So far everything has been conducted with that business-like capacity which is characteristic of the present First Commissioner of Her Majesty's Works and Public Buildings. The public are now invited to contemplate the result. In order to understand the position, it is necessary to recapitulate in outline the steps that have led up to it. The competition has been conducted in two parts: The First consisting of sketch designs, and open to all the world, was subject to the conditions laid down in the instructions issued in September, 1883. By the first of March, of this year, one hundred and twenty-eight designs were submitted — of course under mottoes — of these, the judges were empowered to select not more than ten for the final stage. They actually selected only nine, and the matured designs were sent in on the 21st of June. The official award is dated July 26, and declares that "Messrs. Leeming & Leeming (of Halifax) have produced the best design," and that, subject to the approval of Parliament, the judges recommend that "Messrs. Leeming & Leeming be employed as architects for the new building."

The drawings of the nine selected architects, both in the first and second stages of the competition, are now on view, and after a careful inspection of the designs, the first question which naturally arises is why was the number limited to nine? It is almost impossible to believe that men like Waterhouse, and Jackson, and Sedding and others who were known to be in the first stages of the competition could have turned out anything so poor in comparison with what we see here in the exhibition, as to be such a bad "tenth" that it could not be added to the selected list. And the second question which comes up equally forcibly, is how on earth two or three of these designs ever got into the selected list at all. We look through the names of the judges for some clue to the drift of their award, and we find Mr. Shaw Lefevre, the First Commissioner himself, Mr. Childers, the present Chancellor of the Exchequer, and Mr. W. H. Smith, the first Lord of the Admiralty under the late Government, all presumably good business men. Then we have the professional element represented by Mr. Ewan Christian, architect to the Ecclesiastical Commissions and present President of the Royal Institute of British Architects, and Mr. P. C. Hardwick, official architect to the Bank of England. Considering that it was generally understood that the architecture of the new building would be some phase of Classic — nay, more, it was an "instruction" that they should in some measure harmonize or lead down to Kent's Classic Horse Guards — the last two names are instructive. Mr. Christian is a Gothicist, pure and simple, and has all his life been mainly engaged in the erection of new or the restoration of old churches, a training hardly likely to qualify him for the necessity of thoroughly understanding a great Classic public building. Mr. Hardwick, on the contrary, is a Classicist in his practice, and presumably, therefore, knows more of the spirit of the style than his brother professional.

As a result, eight out of the nine designs are in some version of Classic, only one being Gothic, and to this tribunal they had to submit. The Gothic design is one of those we referred to in wondering why it found a place in the second heat at all, and we find ourselves wondering still more what could possibly have been wrong with either Mr. Waterhouse's plans or elevations that they were adjudged worse than this. That he is one of the most skilful planners of the day is admitted by every one; that he possesses a greater knowledge and mastery of Gothic, especially as applied to great public buildings, than the authors of this design, is apparent to the merest tyro. Gothic, however, as we have seen, was out of running from the first, and on the productions of a great Classic building the architectural interest of the competition mainly centres. It will be the greatest Classic pile since the erection of Somerset House, a hundred years ago. The site is one of the finest in London, with one front to Whitehall and the others to St. James Park and the Horse Guards Parade; it is an opportunity that only occurs about once in a century; therefore, it was with no little interest or anxiety the result of the competition was awaited. Most of the great names in the profession of late years had passed away; amongst the rising and younger men in its ranks, would a great genius come to the front? It must be confessed the publication of the names of the nine selected for the final competition came with something like a shock. Most of them were comparatively unknown men; none of them had done anything to justify public confidence in their ability to carry out a great work like this. The folly of an unlimited competition of anybody and everybody was loudly asserted, not one of the men in the first ranks of the profession in the list: several of them, of course, would never think of going into a fight of this kind. The designs in the first or sketch competition were never exhibited, so nothing could be said as to the merits of the selections as such. It was little wonder, therefore, the result was awaited with many misgivings, hope in the advent of the heaven-born genius being considerably dimmed by the knowledge that all the best men were out of it. Here we have had two or three Classic competitions of late years, viz.: The Oratory Church at Brompton, where several of the designs were of a very high order of merit, if not of genius; the Municipal building at Glasgow, which has resulted in a very grand monumental pile, as well as other designs which ran it very close in the race; but it was felt that this was a much more important occasion than either of these, and the question was boldly asked, does there exist among us enough of the tradition or knowledge of Classic art to insure the production of a great Classic work? Query, has not the Gothic revivals and vagaries of Queen Anne swept away the training necessary for the preservation of the one or the acquirement of the other? Let us look to the designs for the new building for the answer.

It is difficult, perhaps, to convey an adequate idea of the designs without illustrations, so that a comparative rather than a detailed criticism seems most advisable under the circumstances. Moreover, most if not all of the designs will be illustrated in the various professional journals which have a considerable circulation in the United States, so that reference can be made to these as they appear.

In making their award the judges selected three designs, which they have placed in the following order of merit: 1. Messrs. Leeming & Leeming, Halifax; 2. Verity & Hunt, London; 3. Aston Webb & Bell, London. These, with a fourth by Messrs. Hall & Powell of London, comprise the best of the lot; indeed, in many respects the last seems to us worthy of a place among the first three.

Without a much more intimate knowledge of the requirements of the various departments than any outsider can pretend to, it is almost impossible to decide on the relative merits of the above as regards their plans. The shape of the site was in some respects a difficult one to treat symmetrically, but this only gives an additional interest to the problem. As a rule, a large quadrangle with several smaller courts is the basis of all, and what may be described as the double-corridor arrangement is the prevailing feature of three out of the above four. Messrs. Webb & Bell's differs from the others in that the quadrangle is in the form of a Greek cross, and the corridors are simple as a rule rather than doubled, as in the others. Though the quadrangle and many of the points in the arrangement of the offices around it are eminently picturesque, still we are bound to admit that the general idea followed by the others seems more preferable.

Between the Messrs. Leeming's and Messrs. Hall & Powell's plans there is a striking resemblance: both have their great court-yards running east and west, with the entrance from Whitehall forming the central feature. The former is about 220′ x 80′, and the latter 240′ x 100′. The War Offices are on the south side of the quadrangle and the Admiralty on the north. In Messrs. Leeming's the principal entrance to each is immediately under the archway from Whitehall, in Messrs. Hall & Powell's it is from the centre of the court-yard. From these entrance halls, double corridors, lighted from inner courts, connect with other entrances all round the quadrangles, and give ample and easy access to the numberless offices opening out of them. The arrangement is very simple, more particularly in the selected design, which undoubtedly shows a grasp of the subject and a knowledge of the requirements only to be attained by weeks and months of study of a very complicated problem.

Messrs. Verity & Hunt again, though still retaining the double-corridor arrangement have planned a better proportioned court-yard, perhaps. It is about 130′ x 100′, with the entrances, one from Whitehall, and one from Spring Gardens placed in the angles. The general arrangement of halls and corridors is more architectural in its treatment than in either of the others; indeed, this is one of the strongest points in the plan, and is certainly most admirably managed. The great court-yard in the selected design is not at all well proportioned; in execution it would look long and narrow; in Messrs. Verity & Hunt's, on the other hand, there is great stateliness in the planning, with the exception of the entrances to the quadrangle being in the angles instead of the centre, which we think is to be regretted, especially in the Whitehall front, where, instead of being the main feature it sinks into quite secondary importance, from being pushed to one side, so to speak.

In all cases the rooms of the chiefs of the two great departments are on the first floor fronting the park. Those for the Secretary of State for War, the Commander-in-Chief, etc., being in the south-west angle, or nearest the Horse Guards; while those for the First Lord of the Admiralty and the Naval Lords are to the north-west, with the Board-room quite between. On the many nice points of arrangement and detail, which may have influenced the decision as regards the plan, it is, as we have said, impossible to speak without full knowledge; but there seems no doubt the selected design is, in this respect, most ably considered and thoroughly well worked out. It also fairly holds its own against its rivals; if it fails in some points, it has decidedly the advantage in others, so that there seems to be no reason to doubt that it should fulfil all expectations in regard to plan, and this is most certainly one of the chief points of the problem.

When we come to consider the architectural character of the four designs we have mentioned, or indeed of the others also, for the matter of that, it is with a feeling of disappointment and dismay, that after all the months of thought and anxious work, and the hundred and odd brains originally engaged in the struggle, the one word, "commonplace," may be written across all we have been permitted to see. The glorious tradition of English Classic as handed down by Inigo Jones, and Wren, and Chambers, and Barry, and Cockerell, and other well-known names is here lost in a medley as bewildering as it is saddening. Verily the forebodings which were expressed when the nine names were published have been more than justified; any of them, or all of them if one likes, might make respectable hotels or grain warehouses; but for the State Departments of a great country like England in the zenith of her power and splendor, not one of them comes within a measurable distance of the occasion; not one of them bears the impress of the great artist it was fondly hoped the competition would call forth. It is very humbling to have to admit this, and one has only to walk from this exhibition to Somerset House to feel how true it is. We may be told how very difficult it is to judge between drawings and executed work; perhaps so, to those unacquainted with both; but we are left in no manner of doubt as to how most of them would be carried out. Large sheets of detail drawings proclaim only too plainly how little their authors know of the true spirit of Classic art, English Classic more particularly. Anything more utterly weak and commonplace than the details of the elected design it has rarely been our lot to see, and this, too, in spite of the admirable draughtsmanship, for all Messrs. Leeming's drawings are beautifully executed, perfect marvels of neatness and mechanical skill; but there the praise must end. They do not seem even to be under the influence of the Classic spirit. The elevations have got two passable towers at the angles of the Park front, and a somewhat graceful campanile next the Horse Guards in Whitehall, just where it is not wanted, and never likely to be built; but otherwise they are more or less a general jumble of Classical forms, with little towers and roofs breaking the sky-line here and there, without any special meaning whatever, and all as lifeless as the detail is poor and spiritless. There is no grasp of the subject in an artistic sense, no rising to the demands of a great public work. As in general features, so also in matters of detail. The principal fronts of the court-yard are enriched with attached Corinthian columns, standing on a rusticated basement. This basement is broken round every column like a great pedestal the whole height of the ground floor. The columns rise through the next two stories with their entablatures broken over them again, and so on through an attic above, with cornice and balustrade again broken, till they terminate in a vase of the most ordinary type; the whole thing producing more the effect of a series of buttresses, which with their strong vertical lines are totally destructive of that breadth of effect, which is one of the most impressive features of Classic work, and losing also the strong band of shade so easily obtained by keeping the entablature out to the face of the columns in a continuous line. Then again, between these buttress columns are the poorest of windows of the warehouse type. The columns themselves are badly proportioned, and the attic above is quite out of character with the style of work below it.

At intervals, but for no particular reason on the plan, the fronts are broken by slightly projecting piers, surmounted by towerlets. These towerlets are coupled together above the attic by an open arch, backed by a mansard roof, in about as high a style of art as the grand hotel at Charing Cross, and not a bit better in detail. On these piers the first and second floor windows are united in one composition by a wretched little balcony, which would be simply amusing were it not a great national work we are considering. Nowhere throughout the whole treatment does the design ever rise above the most commonplace work. Indeed its continual cutting up by strong vertical lines shows more than anything the effect of the architectural chaos English art has been passing through in recent years, till, as we have said, the great Classic traditions have become lost or obscured; and the authors of this design, whatever may be their ability, have obviously never had the advantage of the training necessary for them to produce such a work as this of the highest class. Perhaps they are not to be altogether blamed for this; the means of obtaining it probably do not now exist in England. A few years ago it is almost certain this building would have been Gothic of some kind or another; but that has passed away, and as yet we have apparently no knowledge of what to put in its place. Be that as it may, it is perfectly certain we have a right to expect in our public monuments, something very much higher in art, and nobler in design than anything this competition has as yet produced.

Messrs. Verity & Hunt's design comes nearer the ideal public building than that of Messrs. Leeming, and yet it, too, falls off in the most lamentable fashion. The Whitehall front is symmetrically arranged as far as the centre and wings are concerned; but to get this, as we have already pointed out, the great entrance to the court-yard is obliged to be placed on one side, so that the doorway in the centre becomes quite of secondary importance, and insignificant by the side of the archways to the quadrangle. This centre and the wings have detached Doric columns running through the first and second floors. The former is crowned with a small dome, far too unimportant for its position; and the wings are finished with pyramidal attics, very French in feeling, as indeed are several other features in this design; for instance, the archways to the court-yard from Whitehall. The figures with outstretched arms, and wreaths, remind one of the Louvre, while the whole treatment of the attic recalls French work rather than English. This Whitehall front, however, is the best portion of the design; the Classic is of a severer type than the selected design, and shows its authors have a far better knowledge of detail, and the spirit in which it should be carried out.

When we come round to the park front, the tone maintained in Whitehall falls sadly away, the greater extent of the composition seems to have been beyond the grasp of its authors. It is, in consequence, cut up in the most meaningless fashion; the return of the front to the Horse Guards parade alone being distinguished by any force of design or intention. The face toward the Park is very weak, while the return wing joining on to the Horse Guards looks as if it belonged to quite another building altogether. Moreover, the sky-line broken up as it is with little attics here and there is flat, stale, and unprofitable. All this is very disappointing as there is notwithstanding, a better classical feeling about the work than probably in any of the other designs in the room. The slope of the ground also towards the south-west angle is anything but happily managed; the treatment of the basement floor giving a sense of weakness just where, of all places, strength seem required; and which is certainly not assisted by the number of little breaks at the angle itself. In spite therefore of its purer style, the design as a whole fails from its tendency to straggle, and from the useless variety of its parts, while the dome as seen from the Park looks more insignificant than ever.

IMPERMEABLE CONSTRUCTION.[1]

GROUND air is the superincumbent pressure of the external atmosphere, which passes through the earth subjected to its pressure, to find its escape in the direction of the least resistance, which direction is commonly that forming the site of a house. The resistance to this external pressure is much reduced by the temperature of the air within the house, which is usually much higher, and consequently much lighter; so that there is every inducement from natural causes for a stream of ground air to be continually passing through the basement or lowest floor, from without, unless steps are taken to construct an impervious flooring, the resistance to the passage of the air through which shall be greater than the pressure.

When the earth is clean and the house is pure, there may be no great harm in allowing this process to go on, but for one consideration, viz., the humidity of the air so passing during wet seasons. But in populous places, where the earth is fouled by innumerable accumulations of refuse of all kinds, and where defective drainage has rendered pestiferous the very soil on which the house stands, and leaky gas-pipes have rendered the external soil black and reeking with gaseous deposits, etc., I say under these circumstances it becomes a matter of enormous moment that the house itself shall not be made the safety-valve for the reception and accumulation of all these abominable impurities in the form of imperceptible "ground air."

There are two ways of overcoming this evil; the one is by forming an impervious flooring, and the other is by constructing channels under the floor leading to the kitchen chimney-flue. These channels should be of porous materials, and should be six feet apart, and by being carried to the kitchen chimney, the ground air will be drawn off with the heated air and smoke of the chimney, and tend to increase the draught in the flue at one and the same time. This was accidentally discovered by Dr. Renk, during his experiments at Munich; for, being unable to account for the difference of ground-air pressure in different parts of the basement upon which he was operating, he

[1] From a paper by E. C. Robins, F. S. A., read at the Architects' Conference at the Health Exhibition.

excavated the floor, and found that one of the air-flues from the chemical laboratory passed under the basement floor to the foul-air extract shaft, drawing with it the ground air in its immediate vicinity, thus relieving the pressure upon a certain area, and giving the confirmatory exception to the rule he was formulating. The ordinary materials for paving basement floors are all of a very porous character, and where boarded floors are provided, no attempt used to be made to cover the soil at all, till the last amendment of the act governing these matters required a thin layer of lime concrete to be laid over the earth under the floors generally. The experiments made on various materials show that hydraulic cement is almost impermeable, and a layer of cement concrete covered with pure cement, or an asphalt surface, or concrete formed of Portland cement mixed with granite or slag chippings, and finished with a smooth surface, will answer the purpose desired. But for the sake of comfort and warmth to the feet, it is often desirable that wood should be the covering. This is equally well secured by the adoption of one or other of the many excellent wood-block floorings exhibited in this great International Health Exhibition, to be laid on six inches of cement concrete. The blocks need not be more than two inches thick, and should not be less than one and one-half inches thick, and three inches wide by six inches long. They should be dovetail grooved at the bottom, burnetized before using, and bedded in cement. Powdered cement should be brushed into the interstices after the laying is complete, and the surface well washed with pure water and left clean. Deal, pine, pitch-pine, oak, walnut, teak — most kinds of wood will do, which may be planed or polished, and laid in any variety of pattern, equivalent in beauty to a parquet floor. Where there are no basements, it would be better that all the rooms should be thus paved, the difference in the purpose of the rooms being expressed by the character of the design and the quality of the material used. Vitreous porcelain tiles are best for passages, being both impermeable and not slippery on the surface; but excellent tiles of every kind are now available for the purpose, and are most easily kept clean.

In the second place, let us consider briefly the case of the inclosing walls of a building. The impermeable qualities of terra-cotta give it a foremost place in the decorative construction desirable in all buildings. Mr. Waterhouse has proved its value as a material for use in the metropolis. The National History Museum has the exceptional advantage of being, as it were, cased in terra-cotta. In the erection of buildings of the ordinary porous materials, however, precautions may be taken to achieve a similar result. There are a variety of systems for forming hollow walls, the inner and outer casing being connected with strips of bent iron, galvanized. But hollow walls are not always efficient, and are rarely perfectly well done, and of course leave a space in which bad air can accumulate, and vermin may some day find their way and be unable to get out, and die, and thus fumigate the building. The system is costly, too, and covers a larger area than solid walls.

There is another system which makes a wall at once air and water proof so far as it extends, leaving nothing but the crevices in the ill-fitting of the joiner's work of doors and windows, which only good workmanship can eliminate. It consists of an asphalt bond between the inner and outer casing, applied in the following manner: let us suppose a fourteen-and-one-half-inch wall, on one side nine inches of brickwork, on the other four and one-half inches, with one-inch division between, the opposite joints being left free of mortar for about three-quarters of an inch each. At every two or three courses the heated asphalt is poured in, and the crevices all filled up with this impervious material, and the result is a wall much stronger than the ordinary wall, occupying no more space, and perfectly wind and weather proof. Impermeable water-tanks may thus be constructed, an example of which may be seen in the Parkes Museum. The asphalt must not only be applied vertically but also horizontally at the foot of the wall and at the level of the lowest floor adjoining. In fact, the asphalt may be continued at the level of the under side of the wood-block basement flooring, and so seal up the walls and floor. This horizontal course in walls is called a damp-course, and is usually applied, but when it is absent the result is that damp rises in the walls, forced up by the pressure of the ground air by the variations of temperature, by capillary attraction, etc., and the plaster becomes demoralized and falls off the walls, and considerable discomfort and expense is the consequence.

This system is a valuable accessory, but the preservation of the surface of the stone will not be secured. I invariably specify that the stone-work shall receive, when in a dry state, two coats of a solution, the effect of which is to render the surface of the stone comparatively impermeable, at all events, till such a time as the stone has had time to weather and form its own skin and natural protector from the weather. In fact, wax and gum are dissolved in a spirit, and the solution is applied with a brush on dry stone-work; the spirit volatilizes, and the congealing of the rest forms a skin as thick as the stone is impregnated: two coats are usually sufficient. At Hanover Church, Regent Street, may be seen three different processes, none of which have as yet shown signs of failure. The building had become perfectly black, but very few signs of decay had taken place except in the towers, and I was desirous of removing the soot without taking away the weathered surface of the stone, and this I achieved by the use of the wet steam-jet. I also discovered that the portions which had been treated with linseed oil when first erected, fifty years ago, had not decayed to any extent, while the rest was so far gone that the greater part of the stones had to be replaced. Of course a great deal of the defective stone we see arises from injudicious selection. There is good and bad stone of every kind, and unless pains are taken not only to select the quarry itself, but to mark the approved stones at the quarry, and then to see that they lie in the building on the same bed as in the quarry, disappointment must ensue, whatever the solution you employ. Solutions should only be used to preserve good stone, not to make bad stone pass muster.

Flat roofs of fire-proof construction, and covered with impermeable materials of various kinds, are rarely required, and when wanted only need to be well executed to answer the purpose intended. But the ordinary house-roof is a thing that forms a hat to a building; it may or it may not have projecting eaves, or a brim to the hat, but it is always presumed to rise above the greater part of the topmost rooms, and to form an air-space protective to the inmates from the extremes of heat and cold. That this is but a presumption is in many cases only too true, and the cruelty of putting servants in slate or even metal covered attics, within a few inches of the outer air, is often forgotten alike by the builder who sells, and the master who buys his family residence. The ordinary speculative house-builder gets the thinnest slates, often absorbent of moisture and permeable by the sun and wind, and he fixed these with common nails to sappy battens, secured to light rafters at the least available gauge, instead of making every third slate lap the first at least three inches, and be fastened with two copper nails to each slate to inch rough boarding, through which the snow may be further prevented from finding its way by putting an intermediate layer of inodorous felt, and thus keep back the heat and the cold and the rain and the snow, and form a sound external covering to the house. Zinc does not last above a dozen years in the English climate as a rule, but if used it should be put on with laps, and without soldered seams or anything to hinder its free expansion or contraction, and should be put in much thicker than is customary — not less than No. 15 gauge. Lead forms the best and most durable roof covering, properly laid, of sufficient thickness, — say five pounds' weight for the square foot for ridges and flashings; seven pounds for gutters and flats. But nothing is more effective than tiles, and nothing, when well done, warmer in winter or cooler in summer. The Broseley tiles are admirable in color and hardness. Projecting eaves are a great protection to the walls, and the projections on the face of the walls, for cornices, labels, strings, should all be well under-cut, not only because of the good effect of a sharp shadow, but because the water is thus prevented from running down the face of a building and disfiguring it and making it damp.

THE MASTER-PLUMBERS AND THE MANUFACTURERS.

NEW YORK, September 3, 1884.

TO THE ARCHITECTS OF THE UNITED STATES: —

Gentlemen, — On the following pages we present the demands of the Master-Plumbers' Association for trade protection, and our reply to same [these documents were printed in the *American Architect* for August 30]; also, copy of a letter without date, but evidently written by Mr. Young since his return to Chicago. We place these documents before you with the following remarks: First, their demands, as characterized in our answer, are so unbusinesslike and impracticable, and we may add, so outrageous, that we feel justified in calling your attention specially in this manner, in order that you may fully understand the situation. We think it is due to you and to ourselves, as well as to the more intelligent and conservative members of the craft, that such an apparent effort to combine for the purpose of extorting from the public more than fair and reasonable prices for materials used in the business should be thoroughly comprehended; also, that the few who endorse the sentiments expressed in their demands should not be allowed to injure the reputation of the many leading and responsible Master-Plumbers, who we feel well assured, do not hold the opinions or endorse the business principles as laid down in these demands. Still, in view of Mr. Young's later epistle, and considering its communistic and vindictive tone, it may be well to remind you that some of the less thoughtful and more impulsive men may not use, or in some way may misrepresent our goods when specified by you; hence, we ask that you kindly guard our interests, and lend us your influence to stamp out a spirit of trades-unionism in one of its worst phases — a spirit not only opposed to all well-established business laws, but one that is directly antagonistic to the freedom of our laws and the spirit of our institutions. We ask this in view of the stand we have been compelled to take, which is, in our opinion, the only one that could be taken by upright and honorable business men.

Signed for the Manufacturers,

J. D. FRASER, *Chairman.*
S. F. SNIFFEN, *Secretary.*

[FROM the following statements, and from the statement of the *Hydraulic and Sanitary Plumber*, it appears that at the New York meeting both the "Baltimore resolutions" and the "New York and Brooklyn resolutions" were submitted to the manufacturers, who, perhaps, believing they were identical or, more likely, feeling that the last-mentioned resolutions most needed rebuke, aimed their reply at them, but by a blunder addressed it to Mr. Young, who had only asked them to consider the "Baltimore resolutions." It seems to us that Mr. Young would have helped his cause most by simply pointing out the mistake, and respectfully urging the manufacturers to consider "the previous question," rather than by indulging in the following diatribe, which leads one to suspect that the object of the movement is to fasten a quarrel on certain manufacturers as much as anything. For Brown, *who knows the circumstances perfectly*, to lose his temper, and write an angry reply to Smith because the latter had addressed a letter of rebuke to him for statements made by Jones, is highly ridiculous. — Eds. American Architect.]

(Copy of letter from Mr. Young.)

To the Vice-Presidents of the States and Presidents of local Associations: —

Gentlemen, — Having been made aware of the fact that the rights of the Trade were being ignored by the manufacturers of New York and vicinity, and being desirous of presenting for their consideration and acceptance the protection resolutions unanimously adopted by the Nationat Body at Baltimore, a meeting was called of the Manufacturers and Dealers at the United States Hotel, in New York, on Thursday, August 14, 1884. On taking the chair, I informed the gentlemen present that our organizations in the West were working under, and in compliance with the Baltimore resolutions; that our relations with our Manufacturers and Dealers were all that could be desired, and I earnestly urged upon them the acceptance of the same. Upon motion, the Baltimore resolutions were read to the meeting. At the conclusion of the reading a committee representing the New York and Brooklyn Associations asked for the privilege of reading some resolutions of a local character, which was granted. I, at the same time, called the attention of the meeting to the fact that all matters relating to protection must be based on, and in conformity with, the resolutions of the National Association. Pending action on the local resolutions, I called Vice-President J. A. McDonald, of New York, to the chair, who conducted the meeting to its close. Upon motion, the resolutions were referred to the Manufacturers, and the meeting adjourned until Thursday, August 21, giving them reasonable time for consultation and action. On Thursday, the 21st, the following remarkable answer was made to the wisdom that framed your resolutions, and to the intelligence that unanimously adopted them at your National meeting: —

Mr. A. Young, President National Association Master-Plumbers of the United States: —

Dear Sir, — We much regret the receiving from your Association the set of resolutions which we now most respectfully return. We regret it for the simple reason that we do not like to feel that a document so untenable, so unbusinesslike, so opposed to all the established laws of commerce and trade, both written and unwritten, should have emanated from your body; and which, were it possible to carry into effect, would not only, in our opinion, be ruinous to your business, dishonorable to yourselves, but would place you in the very unenviable light of extortionists, before the eye of the public. To say that we cannot give it any consideration seems almost like reiteration; nor can we yet believe that it represents the intelligence, or that it is the result of the thoughtful and deliberate majority of your craft.

We further regret the position you have placed us in, as we are most desirous of furthering the interests of the plumbing trade, recognizing how largely our interests are mutual. Why you, as intelligent men, do not see and appreciate this fact, we are at a loss to explain; it cannot be possible that you so underrate our business ability and common sense that you imagine we cannot see that the most friendly and intimate relations with the plumbing trade is to be desired by us above all things. *Furthermore, we must embrace this opportunity of stating most distinctly that we find no just cause for any special protection other than that which the usual and accepted laws of commerce accord alike to all.* That misunderstandings do occur, that there should be friction sometimes, is only in the nature of all human things, and no set of resolutions can make it otherwise, but why these matters cannot be adjusted by the usual business methods in the future, as they have been in the past, we fail to see.

Finally, let us ask you, and believe that we do so in the most friendly spirit, do nothing rashly, confer with the less impulsive and conservative members of your Association; also, remember that a great deal of good may result from mutual confidence and friendly intercourse, while combinations, threats, and such like, will only tend to provoke opposition. And let each one, whether buyer, maker or dealer, look to a well-earned reputation for upright and honorable dealing as the only lasting and safe protection of their interests.

Respectfully yours,

Fred Adee & Co.,	David Morrison,
Abendroth Bros.,	The Le Roy Shot and Lead M'f'g Co.,
Myers Sanitary Depot,	Hunter Keller M'f'g Co.,
Tatham & Brothers,	Bird, Faulkner & Co.,
The J. L. Mott Iron Works,	T. R. McMann & Bro.,
McNab & Harlin M'f'g Co., Limited,	J. C. Bryan,
Mayor, Lane & Co.,	James Bulger, Jr.,
Chas. Harrison & Co.,	Theodore Susemihl,
Miller & Coates,	L. Brandeis & Son,
Ronalds & Co.,	John Trageser Steam Copper Works,
Henry Steeger & Co.,	Colwell Lead Co.,
Jochum & Jetter,	Durham House Drainage Co.,
L. Waefelaer Co., Limited,	Wm. H. Hussey,
Geo. D. Kimber & Son,	Staats & Dillmeier,
Cassidy & Adler,	Henry Huber & Co.,
Jamer, Jacobs & Co.,	Williamsburgh Lead Pipe Works,
Thomas Maddock & Sons,	The E. G. Blakslee M'f'g Co.,
Peck Bros., & Co.,	The Meyer, Sniffen Co., Limited.

The first part of their reply is a deliberate insult to the men comprising your late convention, inasmuch as it flatly states that the Baltimore resolutions could not be the thoughtful and deliberate action of that body.

Again, they state in their reply that they regret the position in which they are placed, as they are most desirous of furthering the interest of the plumbing trade. Philanthropists, every one of them! When and where have the Eastern manufacturers made a concession in the interests of our trade, save on an enforced demand? or point out a concession voluntarily made? They have made agreements only to break them, and I have the undeniable and unimpeachable proof of their bad faith in the handwriting of some of the Honorable (?) Gentlemen, whose signatures are attached to the reply. But after their fulsome regrets that they should differ with us in this matter, *we come to the only honest expression contained in their reply.* They say, furthermore, we must embrace this opportunity of stating most distinctly that we find no just cause for any special protection other than that which the usual laws of commerce accord alike to all. This is the answer from men whose wealth and prosperity are the result of combinations — men who are the pirates of your mechanical skill — men you have enriched and made what they are. This is our answer. *Ponder on it; act on it, like men.* There is not an article in your demands worthy of their consideration. "The right of petition is granted to every man in this broad world of ours, except to you," say the autocrats of our trade. I commend to them for their guidance the last two lines of their reply.

And now, one word with some of the manufacturers who signed that reply. Why were the Protection Resolutions of the National Association kept in the background and not brought before your meeting? Mr. Fraser, of Abendroth Brothers, one of your committee, states that they were not brought up for your consideration. And why? Because the artful dodger who framed your reply knew that if they were brought before you for consideration, you would not have fallen into the trap so skilfully prepared by him. You can now understand why the local resolutions were given prominence to the exclusion of the real business of the conference. It is right that our trade should know that manufacturers and dealers were threatened with boycotting by the leading manufacturers, unless they affixed their signatures to the reply as presented to me.

In conclusion, I need not tell the men of our trade what action they will, or should, take in this matter. *Your duty is plain, as is mine,* to protest, by every honorable means in our power, against these men who would deprive us of the name we bear as Master-Plumbers.

I take pleasure in recommending to your patronage the manufacturers of the West and in your own vicinity, Renton Brothers, 105 East Ninth Street, New York City; Wm. McShane & Co., 1344 Broadway, New York City; H. McShane, 52 Myrtle Avenue, Brooklyn, N. Y.; H. McShane, Baltimore, Md., and H. McShane, Washington, D. C.

A list of manufacturers and dealers in the United States who are in sympathy with us, will be forwarded to the State Vice-President at an early day.

Respectfully yours,

A. Young,

President National Association of Master-Plumbers of the U. S.

[We trust that we, too, may be furnished with the list of dealers who propose to support the demands of the Master-Plumbers, as we know that architects will find it very important to their clients' interests that they should know what dealers are for and against this movement.—Eds. American Architect.]

TURKISH-BATH FOR HORSES.

Bath, Md., August 25, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Will you please tell me the number of the *Builder* which contains a description of Turkish baths for horses? You mention it in *American Architect*, No. 444, June 28, 1884. Where can I get it, and how much does it (a single copy) cost?

Very respectfully, A. H. Beiler.

[Vol. XLVI, No. 2156, May 31, 1884. A. Brentano, 39 Union Square, New York, sometimes has back numbers of the *Builder*, or the publishers, at 46 Catherine St., Covent Garden, London, are generally able to supply single back numbers on receipt of postal order for the price and postage, about twelve cents. — Eds. American Architect.]

MONUMENT DESIGNING

Burlington, Io., September 5, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Allow the writer to make a few remarks upon the designing of monuments. The remarks are drawn out by Mr. Keller's design for the Garfield monument, which you publish. Why it should be made to look like a light-house is impossible for me to tell. What did Garfield ever do as a mariner, except to ride the horse on the banks of the canal between Cleveland and Columbus? Now what is there in its architecture that embodies anything of the life of him whom it is to commemorate?

Daniel Webster's simple monument embodies the character of the man. Henry Clay's the opposite, for he was the most ornate orator of the age, and why should he have that simple Doric column? He certainly was not Greek. J. C. Calhoun, the most classical man of all, has an elaborate monument in the Renaissance, contradictory to the principal characteristics of the man. The friends of Calhoun and Clay should exchange, and then the applied architecture would tell a story of truth, now it lies. The much-abused Washington monument is of a more truthful character than it is given the credit of. The simplicity of its outlines expresses the form of our Constitution, and the lives of the leading minds who founded this Government. Its immense size and height, the massive grandeur of our country, and its Government. The writer fails to find any such comparative application in Mr. Keller's design for the Garfield monument, but thinks that it will often be taken by the sailors on Lake Erie as the port light-house, and may cause serious disasters.

Very respectfully, C. A. Dunham.

P. S. Its Gothic architecture may express the English ancestry of the Garfield family, but even this is doubtful.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

304,291. PAINT-PAIL. — James T. Brien, Hoosick Falls, N. Y.
304,294. DOOR FOR ELEVATOR-WELLS. — N. Porter Cleaves, Boston, Mass.
304,310. COMBINED FIRE-PROOF ELEVATOR AND VENTILATING-SHAFT. — Charles Carroll Gilman, Eldora, Iowa.
304,316. HYDRAULIC COCK. — Albert Hallowell, Lowell, Mass.
304,339. VAULT AND SEWER GRATING. — Jas. T. McHugh, Pittsburgh, Pa.
304,350. PAINT-CAN. — Edwin Norton, Chicago, Ill.
304,353. WATER-CLOSET AND TRAP. — John A. O'Brien, New York, N. Y.
304,357. SCAFFOLD-SUPPORT.— E. Bascom Powell and Richard Ervin, Slater, Mo.
304,359. FITTING FOR DRAIN, SOIL AND WASTE PIPES. — Jas. J. Wade, Chicago, Ill.
304,380. SPRING-HINGE. — Geo. W. Warner, Freeport, Ill.
304,381. AUTOMATIC HATCH-CLOSER. — Warren Warner, Cincinnati, O.
304,396. SAW-HANDLE. — John D. Abbott, Reading, Mich.
304,409. VENEERING WOOD, ETC. — Geo. O. Boynton, Boston, Mass.
304,414. PAINTING COMPOSITION. — Seymour H. Dickinson and James Allie, Middlebury, Ind.
304,425. EAVES-TROUGH HANGER. — Warren H. Gould, Manchester, N. H.
304,439. FIRE-EXTINGUISHER.— Jas. McGwin, Fulton, Mo.
304,469. SHINGLE-MACHINE. — Charles Auguste Tarragon, Portland, Oreg.
304,485. FAUCET. — Arthur Allwood, Fall River, Mass.
304,492. MANUFACTURE OF WALL-PAPER. — Geo. K. Birge, Buffalo, N. Y.
304,515. MAN-HOLE VAULT-COVER. — Charles E. Emery, Brooklyn, N. Y.
304,519. BIT-BRACE. — John S. Fray, Bridgeport, Conn.
304,521. DRAWING-INSTRUMENT FOR SECTION-LINING. — Jos. Gardam, Brooklyn, N. Y.
304,531. PORTABLE HOUSE. — Earl Lee, Corona, N. Y.
304,532. METHOD OF SEATING AUDITORIUMS. — Leon H. Lempert, Rochester, N. Y.
304,542. RATCHET-WRENCH. — Darwin V. Miller, Weedsport, N. Y.
304,545. OPERATING STORM-DOORS. — George H. Newell, Woodsville, N. H.
304,584. FLOORING, WAINSCOTING, ETC. — Henry Clay Tunis, Baltimore, Md.
304,596. FIRE-ESCAPE. — John Batten, Detroit, Mich.
304,601. COMBINED SQUARE, LEVEL AND TRIANGLE. — F. W. Gustav Boettcher, Milwaukee, Wis.
304,603. FIRE-ESCAPE. — Samuel Bott, Birmingham, County of Warwick, England.
304,619. BOILER FOR HEATING BUILDINGS. — William H. Byram, New York, N. Y.
304,611. PIPE-COUPLING. — John Willem Call, Little Rock, Ark.
304,612. ROOFING-COMPOSITION. — Wm. H. Camp, Petersburg, Va.
304,617. POINT OR STRAINER FOR DRIVE-WELLS. — August D. Cook, Lawrenceburg, Ind.
304,619. FIRE-ESCAPE. — William Fields Cullen, Logansport, Ind.
304,633. LEVEL. — Richard I. Frambes, Bakersville, N. J.
304,653. CONNECTION BETWEEN BASINS AND SEWERS. — Chas. I. Kane, New York, N. Y.
304,658. SHUTTER-WORKER. — Egbert E. Masters and Lavirgne J. Kimball, Sacramento, Cal.
304,666. HOT-AIR FURNACE. — Dwight S. Richardson, Brooklyn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since our last report thirty-one permits have been granted, the more important of which are the following: —
Henry Westphalt, 9 two-st'y brick buildings, e s Gould Lane, s of Barney St.
A. L. Black, 5 three-st'y brick buildings, s s Chase St., between Concord and Barclay Sts.
Morgan & Bro., 2 two-st'y brick buildings, s s Hamburg St., between Charles and Hanover Sts.
Joshua Regester, 2 two-st'y brick buildings, e s Aisquith St., s of Townsend St.
Andrew Wirth, three-st'y brick building, n w cor. Pennsylvania Ave. and Pitcher St.
Chas. Gantz, 6 two-st'y brick buildings, s s Holbrook St., between Hoffman and Preston Sts.
Ellen Shelton, three-st'y brick building (square), w s Park Ave., n of Richmond St.
J. H. Frisby, 11 two-st'y brick buildings, w s Woodyear Alley, n of Lanvale St.
A. S. & J. F. Dindall, 2 three-st'y brick buildings, e s Chase St., n of Valley St.

Boston.

BUILDING PERMITS.—*Washington St., No.* 3144, Ward 23, for Chas. Curless, store-house, 15' x 26', flat, Chas. Curless, builder.
Dorchester Ave., near Dorchester St., Ward 15, for Patrick Campbell, 2 stables, 21' x 28' flat; Delano & Little, builder.
East Fourth St., No. 594, Ward 14, for Lyman Locke, 2 dwells., 20' x 29', flat; Lyman Locke, builder.
South St., near Poplar St., Ward 23, for Henry A. Wood, stable, 22' x 35', pitch; Henry A. Wood, builder.
Unnamed Pl., s s School St., Ward 25, for M. Murphy, 2 dwells., 12' 6" x 13' and 15' x 18', pitch; J. W. Berry, builder.
Crescent Ave., near Newport St., Ward 24, for P. P. Holbrook, dwell., 12' x 14' and 33' x 41', pitch; E. Downing, builder.
Athens St., No. 352, Ward 14, for Hilton & Grover, stable, 32' x 43', mansard; E. Downing, builder.
Sumner St., No. 222, Ward 2, for D. V. Feltz, dwell. and store, 17' 6" x 36', flat: A. J. McLavin, builder.
Poplar St., s s, w of Hilborn St., Ward 23, for A. Rogers, dwell., 7' x 18' and 26' x 28', pitch; A. Rogers, builder.
Bumsted Lane, w s, Ward 22, 2 dwells., 18' x 40', flat; McDonald & Tobin, builders.
Munroe St., No. 75, Ward 21, for J. W. Dadmun, dwell., 21' x 21' 4" and 21' x 36', pitch; Thos. Clune, builder.
Porter St., near Boylston Ave., Ward 23, for Chas. Payder, dwell., 23' x 38', flat; B. Teller, builder.
B St., near West First St., Ward 13, for Boston Cooperage Co., sheds, 35' x 40', flat; Boston Cooperage Co., builder.
Bumsted Lane, ws, Ward 22, 2 dwells., 18' x 46', flat; McDonald & Tobin, builders.
Ashford St., n s East Linden St., Ward 25, for Larkin Dutton, 3 dwells., 19' x 43', pitch; McDonald & Tobin, builders.
Duckins St., n s, w Clayton St., Ward 24, for W. C. B. Fifield, 3 dwells., 23' 9" x 37', pitch; Jas. Bacon, builder.

Brooklyn.

BUILDING PERMITS. — *Columbia Heights*, e s, 75' n Orange St., five-st'y brown-stone apartment-house, tin roof; cost, about $23,000; owner, James Lane, 103 Columbia Heights; architect, Samuel Curtiss; builder, not selected.
Kosciusko Pl., s s, 100' e Broadway, 3 three-st'y brick tenements, tin roofs, wooden cornices; cost, each, $5,000; owner and architect, Ferdinand Wiegand, Kosciusko Pl.; builders, Ernst Loerch and John Rueger.
Middleton St., s s, 200' w Harrison Ave., one and two st'y brick engine and boiler room, gravel roof; cost, $5,000; owners, E. Greenfield's Son & Co., Middleton St., between Marcy and Harrison Aves.; architect, E. F. Gaylor; builders, Matthew Smith and R. B. Ferguson.
Herkimer St., n s, 150' w Hopkinson Ave., two-st'y frame store and tenement, tin roof; cost, $3,000; owner, D. Von Merenke, 2134 Atlantic Ave.; architect, M. Walsh; builders, Peter & Fohrenty.
Harrison Ave., e s, 76' n Middleton St., three-st'y frame (brick-filled) store and tenement, tin roof; cost, $4,800; owner, Jacob Bossert, 233 Lynch St.; architect, John Platte; builder, Jacob Rauth.
Harrison Ave., e s, 40' n Middleton St., 2 three-st'y frame (brick-filled) tenements, tin roofs; cost, each, $3,500; owner, Jacob Bossert, 233 Lynch St.; architect, John Platte; builder, Jacob Rauth.
Van Cott Ave., n s, 62' w Russell St., three-st'y frame tenement, tin roof; cost, $5,000; owner, Owen Donnelly, 102 North Third St.; architect, E. F. Gaylor; mason, Nath. Smith; carpenter, not selected.
Tenth St., n s, 160' 9" w Fifth Ave., 11 two-st'y brick dwells., tin roofs; cost, each, $3,500; owner, Frank H. Bush, 253 Fourteenth St.; architect, A. V. B. Bush.
Pacific St., s s, 80' e Albany Ave.; also, *Dean St.*, n s, 80' e Albany Ave., 22 (11 on each street) four-st'y frame (brick-filled) dwells., gravel roofs; cost, each, $4,000; owner, Samuel Hilliard, cor. One Hundred and Fifty-eighth St. and Mott Ave., New York; architect, R. M. Veitch.
Prospect Ave., s s, 100' w Seventh Ave., 9 two-st'y frame dwells., tin roofs; cost, each, $2,000; owners, architects and builders, Grogan & Baulch, 157 Prospect Ave. and 290 Eleventh St.
Linden St., n s, 100' e Wyckoff Ave., 4 two-st'y frame dwells., tin roofs; cost, each, $1,200; owner, Thomas Mullen, 178 Graham St.; architects, J. A. Hanley and Mr. Raner.
Columbia Heights, e s, 285' s Clark St., two-st'y brick stable and dwell., asphalt and gravel roof; cost, $9,000; owner, S. V. White, 210 Columbia Heights; builders, Burns & McCann and Bogart Bros.
Noble St., No. 129, four-st'y brown-stone dwell., gravel roof; cost, $2,500; owner, Chas. H. Reynolds, 111 Noble St.; architect, F. Webber; builder, J. B. Woodruff.
ALTERATIONS. — *Broadway, No.* 281, add two stories, tin roof; cost, $4,000; owner, W. F. Quade; architect, R. Thomas.
Wythe Ave., No. 158, add two stories; cost, $3,000; owner, P. Comerford, 67 Rodney St.; builder, Chas. Collins.

Chicago.

BUILDING PERMITS. — L. Strube, two-st'y dwell., 366 Henry St.; cost, $3,200; architect, A. Bessler; builder, F. Hilderman.
A. Sheckar, two-st'y store and dwell., 3427 South Halsted St.; cost, $6,000; architects, Furst & Rudolph; builder, W. Zuelsdorff.
J. A. Oliver, two-st'y dwell., 1206 West Monroe St.; cost, $4,000; architect, H. R. Wilson; builder, Lehman.
M. Koesell, two-st'y dwell., 3518 Prairie Ave.; cost, $3,500.
H. Watermas, two-st'y dwell., 3132 Fifth Ave.; cost, $3,000.
J. Enert, three-st'y dwell., 423 Oak St.; cost, $8,000; architect, W. Thomas; builder, D. H. Hays.
T. McNichols, two-st'y flats, 284 Loomis St.; cost, $3,000.
A. Rehwenkel, two-st'y dwell., 484 Morgan St.; cost, $3,500; architect, P. W. Ruehl; builder, P. J. Renter.
D. D. Evans, two-st'y dwell., Cicero St.; cost, $3,000.
L. Pilkington, two-st'y dwell., 23 Campbell Park Ave.; cost, $2,800.
E. Kaehler, three-st'y store and flats, 190-192 North Ave.; cost, $8,000; architect, C. H. Cottig; builder, G. Wolff.
C. Busch, two-st'y dwell., 2945 South Park Ave.; cost, $5,000; architect, J. Frank; builder, W. Merten.
H. Gantzer, three-st'y shop, 151-157 North May St.; cost, $4,000; architect, L. Berg; builders, T. Tobiason & Co.
Estate of B. Heeney, three-st'y flats, 15 Aberdeen St.; cost, $6,000; architect, J. J. Flanders; builder, J. J. Riner.
W. Mueller, two-st'y flats, 689 Dixon St.; cost, $2,700.
F. Vileta, two-st'y dwell., 649 West Eighteenth St.; cost, $3,000.
Stafford & Murphy, two-st'y livery stable, 172-176 Wells St.; cost, $20,000; architect, Speyer; builders, J. M. Dunphy & Co.
J. Clark, 2 two-st'y flats, 375-377 Marsbfield Ave.; cost, $5,000; architect, J. Besley; builder, F. Heppe.
J. Becker, two-st'y dwell., 160 Napoleon Pl.; cost, $2,700.
C. Seefust, two-st'y dwell., 15 Crittenan St.; cost, $2,500.
Mrs. L. Roessler, two-st'y flats, 496 West North Ave.; cost, $3,500.
C. H. Blair, three-st'y dwell., 1911 Indiana Ave.; cost, $12,000; architect, E. Bauman; builder, J. Griffiths.
C. H. Blair, three-st'y dwell., 2645 Michigan Ave.; cost, $13,000.
Geo. Deppish, 5 three-st'y flats, 131-139 Libbey St.; cost, $21,000; architect and builder, Geo. Deppish.
H. Sweet, three-st'y store and flats, 1461 Milwaukee Ave.; cost, $4,500.
D. Foley, two-st'y dwell., 477 South Wood St.; cost, $2,500.
P. O'Donnell, three-st'y store and flats, 869 West Van Buren St.; cost, $7,000; architect, Wilson; builders, Dunphy & Wakeman.
City of Chicago, two-st'y engine-house, 524 South Halsted St.; cost, $10,000.
City of Chicago, two-st'y engine-house, 19 South St.; cost, $10,000.
S. Ostley, two-st'y dwell., 105 Evergreen Ave.; cost, $4,000.
C. Lusk, two-st'y dwell., 109 Evergreen Ave.; cost, $3,500.
J. W. McGenniss, two-st'y dwell., 1913 Indiana Ave.; cost, $9,000; architect, F. L. Charnley; builder, J. Griffiths.
C. Wagner, two-st'y store and dwell., 652 West Twenty-first St.; cost, $4,600.
Mary H. Hyde, three-st'y store and flats, 615 Ogden Ave.; cost, $4,000.
Church of the Assumption, church, Illinois St.; cost, $20,000; architect, C. H. Alexander; builders, C. H. Dunphy & Co.
P. C. Hauford, two-st'y barn, 2010 Calumet Ave.; cost, $3,500.
N. Bertel, three-st'y store and flats, 184 Dekoven St.; cost, $6,000.
T. Ritchie, 2 three-st'y dwells., 135-137 Sedgwick St.; cost, $4,000; builder, A. Lindgran.

Cincinnati.

BUILDING PERMITS. — J. G. Guenther, addition 148 Wade St.; cost, $2,000.
J. H. Luskeu, three-st'y frame dwell., Third St., bet. Collard and Whittaker Sts.; cost, $2,700.
Wm. Boeh, two-st'y brick dwell., n e cor. Parradome and Parallax Sts.; cost, $5,000.
Busch, Klax & Schmidt, two-and-one-half-st'y brick dwell., Nixen St., near Carthage Pike; cost, $3,500.
A. Wissen, three-st'y brick dwell., n s of Blackford St., bet. Halmot and Dalton Aves.; cost, $2,100.
Lydia Kussner, two-st'y brick dwell., Walnut Hills; cost, $2,000.
Mike Metz, two-and-one-half-st'y brick dwell., s s of Curry St.; cost, $3,000.
Fred Shultz, two-and one-half-st'y brick dwell., s s of Molitor St.; w of Euclid Ave.; cost, $2,850.
Wm. Neubauer, two-and-one-half-st'y brick dwell., s s of Molitor St., w of Euclid Ave.; cost, $2,850.
J. Moeller, two-and-one-half-st'y brick dwell., s s of Molitor St., w of Euclid Ave.; cost, $2,850.
Barbara Smith, two-st'y frame dwell., n s of Ford Ave.; cost, $2,000.
J. Lahmann, two-st'y brick dwell., e s of Centre St. and Second Ave.; cost, $3,000.
Jacob Knauber, three-st'y brick dwell., Marshall Ave. and Canal Colerain Pike; cost, $4,500.
F. Rottler, three-st'y brick dwell., w s of Colerain Pike, bet. Straight and Addison St.; cost, $5,000.
H. Hattersley, two-and-one-half-st'y frame dwell., w s of Kenton St.; cost, $2,200.
Additions and repairs; cost, $9,350.
Total cost, $54,900.

New York.

STRIKES.—The bricklayers strike drags along a weary existence, men and bosses both from time to time claiming the advantage. Some men are working nine hours, some ten; but one thing is unfortunately definitely settled, that being that a large amount of proposed business has been abandoned.
STORES.—At Nos. 41 and 43 Maiden Lane, 2 brick store buildings, with frontages of about 21' each, are to be built for Mr. Chas. Knapp; from designs of Messrs. T. De Lemos and A. W. Cordes.
APARTMENT-HOUSES. — On Fifty-third and Fifty-fourth Sts., near Second Ave., 2 apartment-houses, 19' x 74' and 25' x 77', respectively, are to be built at a cost of $35,000, for Messrs. Kerbs & Spies; from designs of Messrs. D. & J. Jardine.
BUILDING PERMITS.—*East Seventy-sixth St., Nos.* 408-412, two-st'y brick stable; tin roof; cost, $——; owner, Herman Harjes, 408 East Seventy-sixth St.
Thirty-third St., s s, 200' e First Ave., six-st'y brick warehouse, tin roof; cost, $25,000; owner, Fred. C. Linde, 164 Ross St., Brooklyn; architects,

Schwarzmann & Buchman; builders, Robinson & Wallace.

One Hundred and Thirty-first St., s s, 80′ e Madison Ave., 2 five-st'y brown-stone front tenements, tin roofs; cost, each, $16,000; owner, Frank M. Clemens, 1632 Second Ave.; architect, John Brandt.

First Ave., e s, 27′ n Eighty-third St., 3 five-st'y brick tenements and stores, tin roofs; cost, each, $16,500; owner, Philip Braender, Avenue A, bet. Eighty-fourth and Eighty-fifth Sts.; architect, John Brandt.

Eighty-third St., n s, 85′ e First Ave., five-st'y brick tenement, tin roof; cost, $18,500; owner and architect, same as last.

First Ave., n e cor. Eighty-third St., five-st'y brick tenement and store, tin roof; cost, $20,000; owner and architect, same as last.

West Fifty-fourth St., *Nos.* 442 *and* 444, 2 five-st'y brick tenements, tin roofs; cost, each, $15,000; owner, Louis Reichardt, 941 Second Ave.; architect, Julius Kastner.

West Sixty-first St., *Nos.* 511, 513, 515, *and* 517, 4 five-st'y brick tenements, tin roofs; cost, each, $15,000; owner and architect, same as last.

One Hundred and Fifty-fifth St., s s, 100′ e Courtland Ave., two-st'y frame dwell., tin roof; cost, $2,-900; owner, Bernard Egbert, 661 East One Hundred and Fifty-seventh St.; builders, Fred. Schwab and John Deibl.

East One Hundred and Twenty-fifth St., *No.* 12, one-and-a-half-st'y brick stable, slate and tin roof; cost, $1,700; owner, Benj. F. Spink, 14 East One Hundred and Twenty-fifth St.

Eighth Ave., *No.* 786, five st'y brick flat and store, tin roof; cost, $19,000; owner, Richard Mock, 742 Eighth Ave.; architect, C. F. Ridder, Jr.

One Hundred and Thirteenth St., s s, 130′ w Fourth Ave., 4 five-st'y brown-stone front tenements, tin roofs, cost, each, $15,000; owner, Simon Haberman, Belleville, N. J.; architect, Henry J. Dudley.

Alterations. — *West Fortieth St.*, *No.* 61, two-st'y brick extension, tin roof; cost, $3,000; owner, E. K. Henschel, 120 West Forty-second St.; architect and carpenter, James Shanks; masons, Power Bros.

West Fifty-fifth St., *No.* 134, two-st'y brick extension, tin roof; cost, $3,000; owner, Geo. H. Martin; builder, James Shanks.

Philadelphia.

Mower St., s of Mt. Pleasant Ave., three-st'y dwell., 17′ x 30′; E. J. Gallagher, owner.

Brown St., *Nos.* 4116 *and* 4118, 2 three-st'y dwells., 16′ x 42′ and 18′ x 42′; E. J. Lynch, contractor.

Snyder Ave., w of Sixth St., 5 two-st'y dwells., 15′ x 40′; J. P. McGonigle, owner.

Snyder Ave., w of Seventh St., 2 two-st'y dwells., 15′ x 40′; J. P. McGonigle, owner.

Fifth St., n of Cumberland St., 2 three-st'y dwells., 15′ x 45′; C. O. Krouglowrez, contractor.

Stenton Ave., s of Fisher's Lane, two-st'y stone stable, 27′ x 42′; Wm. Garvin, contractor.

Eighth St., cor. Cumberland St., 2 stores and dwells., and 12 dwells., 3, 16′ 6″ x 52′; 10, 15′ x 40′; A. M. Housekeeper, owner.

Allegheny Ave., w of Frankford Ave., one-st'y chapel, 40′ x 60′; G. L. Horn, contractor.

Broad St., cor. Butler St., two-st'y church, 74′ x 142′; Wm. A. McLaughlin, pastor.

Cedar St., bet. Manayunk Ave. and Terrace Sts., 2 two-st'y dwells., 16′ x 44′; J. H. Boone, owner.

Mather St., s of Tioga St., two-st'y dwell., 15′ x 40′; J. S. Tomlinson, contractor.

Elm St., w of Thirty-seventh St., 2 three-st'y dwells., 16′ 8″ x 47′; Jno. Sullivan, contractor.

Wayne St., cor. Walnut Lane, three-st'y dwell., 64′ x 68′; George Hearst, contractor.

Lyceum Ave., w of Tower St., 2 two-st'y dwells., 16′ x 40′; Edward Haugh, owner.

East Dauphin St., *No.* 615, three-st'y dwell., 16′ x 54′; Dan'l Lentz, owner.

Bridge St., cor. of James St., two-st'y store and dwell., 36′ x 43′; Wm. Keas, contractor.

James St., cor. of Scattergood St., 2 two-st'y dwells., 16′ x 30′; J. S. Taylor, contractor.

Allegheny Ave., w of Jasper St., two-st'y dwell., 18′ x 30′; Wm. Johnson, contractor.

Broad St., w s, n of Hamilton St., four-st'y factory; Baldwin Locomotive Works, owners.

Springfield, Ill.

Apartment-House. — *Monroe St.*, cor. Second St., two-st'y flats; I. B. Curran, owner; Wm. White, architect and builder.

Association Building. — *Fifth St.*, cor. Cap. Ave., Y. M. C. A. Building, 50′ x 157′, three-st'y brick; cost, $20,000; S. A. Bullard, architect; Jno. T. Rhodes, builder.

Church. — *South Fifth St.*, First M. E. Church, 80′ x 120′, Grafton, (Ill.) stone; cost, $60,000; George H. Helmle, architect; Wm. D. Richardson, builder.

Hotel Alteration. — *Fourth St.*, cor. Jefferson St., addition to St. Nicholas Hotel; cost, $6,000; A. P. Lyon, Chicago, architect; C. F. Gehlman, builder.

School-Houses. — *West Edwards St.*, addition to school-house, 2 rooms; cost, $3,500; Geo. H. Helmle, architect; J. C. Beam, builder.

North Eighth St., addition to school-house, 4 rooms; cost, $6,500; Geo. H. Helmle, architect; D. P. Hopping, builder.

South Twelfth St., Catholic school-house, two-st'y brick; cost, $5,000; William White, architect and builder.

Store. — *Monroe St.*, near Fifth St., brick and stone store-building, 4′ x 60′; cost, $8,000; Matthews & Mendonhall, owners; Geo. H. Helmle, architect; Burk & McKee, builders.

Houses. — *Fifth St.*, cor. Edwards St., two-st'y brick and frame dwell.; cost, $9,000; Fred. L. Matthews, owner; W. S. Matthews, of Nashville, Tenn., architect; Jno. T. Rhodes, builder.

Fifth St., cor. Allen St., three-st'y brick and stone dwell.; cost, $12,000; John Schoeneman, owner; Geo. H. Helmle, architect; H. Bellenhaus, builder.

South Fifth St., two-st'y frame dwell.; cost, $4,500; Jno. T. Capps, owner; Geo. H. Helmle, architect; H. Bellenhaus, builder.

South Second St., two-st'y frame dwell.; cost, $2,-800; J. B. Perkins, owner; C. W. Shinn, architect.

South Second St., two-st'y frame dwell.; cost, $3,-000; C. P. Kane, owner; S. Bullard, architect; J. L. Powell, builder.

South Second St., two-st'y frame dwell., cost, $3,-3,000; H. A. Bell, owner; George H. Helmle, architect.

North Fifth St., two-st'y frame dwell.; cost, $3,-000; J. C. Sutton, owner and architect.

South Sixth St., two-st'y frame dwell.; cost, $2,-800; J. N. Dixon, owner; S. Bullard, architect; J. L. Powell, builder.

Ninth St., cor. Cook St., two-st'y frame dwell., cost, $2,500; F. C. Dodds, owner; George H. Helmle, architect; D. P. Hopping, builder.

St. Louis.

Building Permits. — Sixty-one permits have been issued since our last report, seventeen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Chas. E. Bradley, two-st'y frame dwell., cost, $2,-600; sub-let.

Mrs. L. Candler, two-st'y brick dwell.; cost, $3,900; J. Gamache, architect; Jno. Parks, contractor.

B. Quinn, two-st'y brick dwell.; cost, $3,000; B. Proetz, contractor.

B. Proetz, two-st'y brick dwell.; cost, $3,000; B. Proetz, contractor.

W. Prufrock, two-st'y brick office; cost, $2,500; Biermann & Ahring, contractors.

St. Louis Mutual House Building Co., 4 adjacent two-st'y tenements; cost, $7,500; E. Mortimer, architect; J. V. Mayors, contractor.

F. C. Bousack, two-st'y mansard roof dwell.; cost, $7,000; F. C. Bousack, contractor.

Mary A. Sickel, two-st'y stores and dwell.; cost, $2,700; D. Davis, contractor.

Scharfer Bros. & Powell, two-st'y brick warehouse; cost, $12,000; Nick Risse, contractor.

A. P. Ghio, three-st'y stores and tenements; cost, $5,000; I. Taylor, architect; H. Bruns, contractor.

Chas. Richter, 2 adjacent two-st'y dwells.; cost, $3,700; F. W. Loffhagen, contractor.

D. I. G. Steedman, 2 adjacent two-st'y dwells.; cost, $16,000; Z. T. Knott, contractor.

Mamie Duke, two-st'y dwell.; cost, $4,800; sub-let.

A. H. Helfer, two-st'y dwell.; cost, $3,800; H. Eblermann, contractor.

Jno. O. Leary, 2 adjacent two-st'y tenements; cost, $2,500; J. Q. Reed, contractor.

Anton Lambrecht, 2 adjacent three-st'y tenements; cost, $4,400; Bothe & Rattermann, contractor.

B. Lange, 3 adjacent brick tenements; cost, $6,-000; W. J. Hegel, contractor.

Charles Peters, two-st'y brick dwell.; cost, $3,500; Jos. Stander, contractor.

Con Pfeifer, 2 adjacent two-st'y stores and tenements; cost, $4,500; Jos. Stander, contractor.

Mary Schaefer, 3 adjacent two-st'y tenements; cost, $7,000; A. Brinke & Co., architects; Ph. Richers, contractor.

H. Mauermann, two-st'y brick dwell.; cost, $2,600; W. Whitney, contractor.

Jno. M. Allyn, two-st y brick dwell.; cost, $4,800; A. P. Rodgers, contractor.

J. J. Steffins, two-st'y brick dwell.; cost, $4,800; J. J. Steffins, contractor.

E. Kerns, 2 adjacent two-st'y brick tenements; cost, $4,800; J. J. Wharton, contractor.

Thos. Easgrove, 2 adjacent two-st'y brick tenements; cost, $4,500; W. J. Baker, contractor.

G. Ringwald, two-st'y brick dwell.; cost, $4,800; J. Schenck, contractor.

Jno. Butter, 2 adjacent two-st'y tenements; cost, $3,000.

Gaus & Son, two-st'y brick box shop; cost, $4,000; Paulus & Weidemuller, contractors.

C. Gulath, 3 adjacent brick stores and rooms above; cost, $14,000; Charles Webking, contractor.

Wm. McNeary, two-st'y brick dwell.; cost, $2,500; A. Beinke & Co., architects; sub-let.

Jacob Huber, two-st'y brick dwell.; cost, $2,500; O. Koenig, architect; Jno. C. Hecker, contractor.

Fred Kroeger, 2 adjacent two-st'y brick tenements; cost, $5,000; Henry Rocklage, contractor.

Geo. Wolf, two-st'y brick dwell.; cost, $2,500; I. Taylor, architect; S. C. McCormack & Son, contractors.

H. Juergens, 2 adjacent two-st'y brick tenements; cost, $1,400; Chas. May, architect; Ph. Tiemann, contractor.

General Notes.

Bangor, Me. — The following buildings are being built in this vicinity; from plans by W. E. Mansur, Bangor, Me.

Hotel at Dedham for T. N. Egery, 30′ x 45′, three-st'y wood.

Double house for Morse & Co., in this city, wood; cost, about $3,500.

Station at West Cove, Moosehead Lake, for B. & P. R. R., 25′ x 60′, two-st'y wood.

Frame dwell., for Fred Johnson, in this city; cost, about $4,000.

Carlisle, Pa. — Houses for J. B. Cramer; architects, Gilbert & Thompson, N. Y.

Kansas City, Mo. — J. W. Norton, double brick residence on lot 12, block 1, Rice's addition; cost, $3,500.

Mamaroneck, N. Y. — Boat-house; owners, Oriental Boat Club; architects, Gilbert & Thompson, New York.

Minneapolis, Minn. — B. Aaronson, three-st'y triple-brick store and flats, 31, 33, and 35 Central Ave.; cost, $15,000.

Minneapolis Glass Co., factory and furnace building, Fort Ave., bet. Thirty-fifth and Thirty-sixth Sts. s; cost, $40,000.

Davison, two-st'y addition to wooden dwell., Portland Ave., near Twenty-third St.; cost, $3,300.

C. W. Prouty, two-st'y wooden dwell., Pleasant Ave., bet. Twenty seventh and Twenty-eighth St.; cost, $2,800.

J. A. Kennedy, two-st'y wooden double tenement, s e Fifth Ave., bet. Second and Third St.; cost, $6,-000.

McCollum & Kahn Bros., three-st'y brick, triple store and 6 flats, w cor. Washington Ave. and Ninth Ave., s; cost, $25,000.

David Bradley & Co., cor. of Fifth St. and Third Ave., n; four-st'y warehouse, to cost $20,000,

L. F. Menage, three-st'y brick double store and tenements, Sixth Ave., bet. Tenth and Twelfth Sts., n; cost, $1,000.

Sisters of St. Joseph, school-building on Fourth St., bet. Sixth and Seventh Aves., n; three-st'y; cost, $8,000.

St. Augustine, Fla. — Mr. Chas. D. Marvin, of New York, has drawn plans for remodelling a house for hotel purposes; cost, $15,000.

St. Paul, Minn. — Moritz Watter, two-st'y brick veneered double dwell., s e side of Pleasant Ave., bet. Third and Chestnut Sts.; cost, $5,500.

Walter Mann, alteration of the three-st'y stone building s e cor. of Robert and Third Sts.; cost, $3,-000.

James H. McDonald, one-st'y brick building of 3 stores, n s of Seventh St., bet. Wabasha and Cedar Sts.; cost, $5,000.

Michael Roche, two-st'y frame double dwell., s s of Fifteenth St., bet. Jackson and Canada Sts.; cost, $4,000.

H. Dwyer, two-st'y brick store and dwell., e s of Rice St., bet. Viola and Bianca Sts.; cost, $3,000.

Greenleaf Clark, three-st'y brick block of dwells., 52′ x 60′, cor. Fifth and Oak Sts.; cost, $12,500.

Jacob Arnold, two-st'y frame dwell., 22′ x 48′ n s Ellen St., between Kent and Mackubin Sts.; cost, $3,000.

H. P. Hall, four-st'y brick printing-office, 25′ x 100′, s s Fourth St., between Wabasha and St. Peter Sts.; cost, $12,000.

William C. Cunningham, three-st'y brick printing-office, 25′ x 85′, s s Fourth St., between St. Peter and Wabasha Sts.; cost, $7,000.

A. Kiefer, one-st'y double frame store, 40′ x 48′, n s Minnehaha St., between Mendota and Arcade Sts.; cost, $2,490.

F. L. D. Harbaugh, two-st'y frame dwell., e s of Western Ave., between Ashland and Holly Aves.; cost, $3,000.

A. B. Stickney, three-st'y and basement stone dwelling-house, s s of Summit Ave., bet. Western Ave. and Walnut Sts.; cost, $10,000.

Robinson & Carey, three-st'y frame warehouse, e s of the railroad bet. Third and Fourth Sts.; cost, $4,-200.

PROPOSALS.

COURT-HOUSE AND JAIL.

[At St. Clairsville, O.]

Auditor's Office, Belmont County,
St. Clairsville, O., September 4, 1884.

Sealed proposals will be received at the auditor's office, Belmont County, Ohio, from the 4th day of September, to the 6th day of October, 1884, inclusive, **until 1 o'clock**, P. M., of the day last mentioned, for furnishing materials and performing the necessary labor for the erection of a court-house and jail, at St. Clairsville, O.

Each class of work and materials to be separately bid upon, to which may be added a bid for the entire work including materials.

Plans, specifications and bills of material may be seen at the auditor's office, in said county on and after the 4th day of September, 1884, and at the office of J. W. Yost, Architect, 67 South High St., Columbus, O. Each bid must be accompanied with bond equal to 25 per cent of the amount of the bid as a guaranty that, if awarded, the contract will be completed, and proper bond given for its completion.

The right to reject any or all bids is reserved.

Blanks will be furnished bidders on request.

458 R. R. BARRETT, Auditor.

EXCAVATING, CONCRETE FOUNDATIONS, STONE AND BRICK WORK.

[At Erie, Pa.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., September 3, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 24th day of September, 1884**, for all the excavating, concrete foundations, and stone and brick masonry of the basement and area walls of the court-house, post-office, etc., at Erie, Pa., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,

Supervising Architect.

IRON-WORK FOR ROOFS.

[At Washington, D. C.]

Office of Supervising Engineer and
Architect, New Pension Building,
Washington, D. C., September 5, 1884.

Sealed bids are invited for building and erecting the iron roofs over eighty thousand square feet, of the new Pension Building, in Washington, D.C. Specifications and plans can be obtained on application in person or by letter to this office.

All bids received will be opened in this office **at 12 o'clock, noon, on the 25th day of September, 1884.** M. C. MEIGS,

456 Supervising Engineer and Architect.

STONE.

[Near Mt. Carmel, Ill.]

U. S. Engineer Office,
82 West Third St.,
Cincinnati, O., August 30, 1884.

Sealed proposals in triplicate, will be received at this office **until noon on Tuesday, the 30th day of September, 1884**, for furnishing stone for the construction of a lock in the Wabash River, near Mount Carmel, Ill.

Approximate quantity of stone required, 7,245 cubic yards, or as much thereof as the present available funds ($30,000) will permit.

Specifications and printed forms for proposals will be furnished on application to the undersigned.

Requests for blank forms should be indorsed on the envelope "Official Business."

458 JAMES C. POST, Capt. of Engineers.

The American Architect and Building News.

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SEPTEMBER 20, 1884.

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A GREAT deal has been said in the newspapers of late about a scheme of the American Art Association of New York, for encouraging the art of painting in this country. The encouragement is to take the form of the offer of prizes, which are to be awarded in March next in a competition, open to all American painters. Six prizes, of twenty-five hundred dollars each, are to be given, and the competing pictures are to be exhibited, first at the rooms of the Art Association, 940 Broadway, New York, where the jury will view them and make its award, and subsequently in all the principal cities of the country. The pictures adjudged worthy of the prizes will become the property of the Association, which agrees to distribute them by lot among the museums of those towns whose citizens have shown the greatest interest in the "enterprise" by subscribing most liberally toward the fund to be raised for guaranteeing the payment of the prizes. The names of thirty gentlemen who have already signed the subscription list are published, and it must be acknowledged that these names carry with them associations of responsibility and intelligent benevolence which lend unusual attractions to what would, under other auspices, strike the unimaginative observer as a shrewd money-making scheme. Reduced to its briefest form, the programme of "encouragement" simply sets forth that the promoters hope to get together, without any outlay or risk, a large and very interesting collection of pictures; to secure, also without expense, the exclusive privilege of exhibiting the whole collection for an undetermined period, in any part of the country where such an exhibition would be profitable, and finally to buy the six best pictures at rather a low price, and present them to certain well-frequented museums, in return for the advertising which the association would receive from the card, which the museums receiving them are obliged to attach to them, recounting the circumstances under which they were obtained.

THAT this sort of a view of the matter is probably a mistaken and discreditable one we are quite willing to admit, if necessary, and we hold ourselves ready to receive with rejoicing the incontestable evidence that this competition, unlike nearly all the others of the kind which have taken place in this country, is sure to result in stimulating a large number of enthusiastic and able painters to put forth their highest efforts; in rewarding, to the satisfaction of all, the very best among them, and in consoling the unsuccessful competitors with the consciousness that they have been fairly defeated in a struggle which did them all honor. That it is possible to have such competitions as this, every one who has studied the history of art knows; but every one who has observed the course of contemporary art in this country knows that they are indeed rare here, their place being almost invariably occupied by snarling scrambles, from which nothing results to all concerned but loss of time, temper, reputation and money. One or two exceptions to the usual American rule of artistic competitions will occur to some of our readers, in those carried out by Messrs. Fuller, Warren & Company, for the purpose of obtaining new designs in wall-papers, and later, in the Christmas and Easter card competitions. In all these the object was purely commercial: those who devised them, and who paid the prizes, did so with the single idea of profiting by them, and yet they have not only brought credit to all who took part in them, but have, particularly in the case of the wall-papers, developed, in the Wheeler and Tiffany designs, a novelty and imaginativeness of treatment which has never been surpassed, and which give prophecy of the most brilliant results when the long suffering plant of art shall have fairly taken root in the rich American soil; while the philanthropic and patriotic competitions have, without a single exception that we remember, ended in exasperating, if not in defrauding, the artists who took part in them, and in securing results for art which it is charitable to call mediocre. To those who take pains to watch the conduct of such affairs, the reason of the difference in success between the two kinds is plain. To sum it up in one sentence, in the successful and creditable competitions the judges are professional artists, in the other kind they are not. In this single item lies the whole secret of the advancement of art by competition. We are told, we hope incorrectly, that the jury in the competition for the American Association's six prizes is to consist of ten persons selected from the subscribers to the guarantee fund, these being, so far as the list is published, all rich men, merchants, bankers, and manufacturers, most of them being also collectors of pictures. If this plan is carried out, whatever may be the good or bad faith of the management, we predict that the enterprise will totally fail in encouraging any kind of art, American or otherwise, that deserves encouragement. We know well enough that millionnaires generally consider themselves excellent judges of painting, and value themselves upon the skill with which they distinguish the works of various masters; but whatever they may think, the fact remains unchanged that neither they nor any others out of the profession are fit judges of painting, or have in matters of the kind a discrimination which has the slightest value in comparison with that of a thoroughly trained artist. Even if a layman were found capable of acting on such a jury, his award would command no respect among painters, and few good ones would condescend to submit their work to his judgment. The greater the ability of an artist, the more strongly he feels that the applause of his rivals is the only sure test of merit, and the more scornfully does he leave for quacks and humbugs the devices by which the suffrages of unprofessional persons are to be won. If the American Art Association wishes to engage in its contest the men and women through whom the development of painting in this country must come, if it comes at all, the only way to accomplish its wish is to give up at once the idea of setting editors and brokers to decide upon technical merit, and employ as its sole jury one or more of the most eminent painters who can be induced to act in that capacity. If such an artist as Millais, Burne-Jones, Whistler, Sir Frederick Leighton, Duran, Bastien-Lepage, Gérome, Meissonier, or a dozen others equally famous would serve, there would be no need of more than one. The idea of appearing before such a judge would have a two-fold influence for good, eliminating the conscious humbugs, who would carefully shun any contest which seemed likely to end in reducing their reputation to its true level, and stimulating modest ambition by the prospect, dear to every one who earnestly endeavors to improve, of learning the exact truth regarding the success or failure of his efforts.

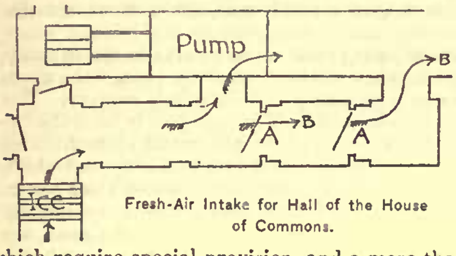
THE *Sanitary News* gives us a little information concerning the present condition of that most interesting enterprise, the Pullman sewage-farm. Some months ago a discussion took place in Boston in regard to the merits of various systems of sewage disposal, in the course of which some one quoted the example of the Pullman farm as an illustration of the possibility, which is generally denied by engineers, of utilizing drainage liquid with some pecuniary as well as sanitary advantage, but the effect of his remarks was completely destroyed by the announcement, made in the meeting, that the Pullman sewage-farm was soon to be abandoned, and that works were already in progress for discharging the town drainage into the lake. We suppose that hundreds of persons were, like ourselves, surprised and disappointed at hearing in this way of the failure of the most important experiment in sanitation ever undertaken, and we imagine that some of them shared our indignation at learning, some time afterward, that the statement was false, and that the sewage-farm, so far from being abandoned, had yielded a return for the past year quite equal to what had been anticipated from it, while hopes were entertained of carrying it on during the next season with still greater success. These hopes, according to the *Sanitary News*, are in a fair way to be realized, the results of the present year promising to be far better than those of the last. We should be glad to learn fuller details of the season's management, but it is interesting to know, as the *Sanitary News* informs us, that one hundred and seventy acres of land have been laid out in gardens, while three hundred and twenty acres have been utilized for pasturage, and four hundred for oats, corn and grass. Among the garden-crops in cultivation are three hundred thousand cabbages in a single bed, and five hundred thousand celery plants in another. We suppose that the whole tract is to a greater or less extent fertilized by sewage, but at all events the management of the farm seems to justify the opinion we have before expressed, that both pecuniary and sanitary success in sewage utilization must be sought in the extension of such works on a much larger area, in proportion to the amount of waste waters to be disposed of, than has hitherto been customary, in order that the ground intended to be fertilized by them might be fed with just as much as it requires, and no more, instead of being drowned in a deluge of sewage, which only a few rank-growing crops can flourish in. According to these figures, the Pullman sewage-farm has eight hundred and ninety acres in cultivation, or about one acre to every ten inhabitants of the town. This is a very different thing from the English sewage-farms, in some of which the land is flooded with from fifty to one hundred times as much liquid as at Pullman, and the result shows the great superiority of the Pullman system. Of course, the first cost of providing half an acre of land for purifying the drainage of every house in a large city would be very great, unless the sewage were carried a long distance, but if trials on a small scale, like that at Pullman, should prove that in this way a moderate interest on the cost of the land could be secured, there would be no further difficulty about the general adoption of the system.

THE *Revue Industrielle* gives an interesting account of some experiments made to determine the resistance of fire-proof floors of iron beams with concrete between, as compared with those filled in with brick arches. Until within a few years the subject of concrete floors supported by iron beams has been misunderstood, nearly all writers, in the early days of concrete construction, claiming that a slab of hardened cement and sand between two iron beams was held up by the strength of the "contained arch," this being explained to be formed by particles of sand, which, under the influence of a vertical pressure, arranged themselves in the form of the arch best adapted for resisting that pressure. At this day the idea of holding up a floor on arches of sand would be laughed at, but the theory was once readily accepted, and concrete used to span wide spaces was always moulded in the arch shape. In building the Metropolitan Railway through London, a considerable portion of the road was covered with arches of the Dennett concrete, of about twenty feet span, and it was not until an examination showed these wide arches to be entirely without thrust that the former idea was abandoned and they came to be regarded by engineers in their true light, as curved lintels. As the best and strongest form of lintel is totally different from that of an arch used under the same circumstances, the correction of the theory ought naturally to have led to a modification in the forms under which concrete is used, but the influence of the old notion still shows itself in practice, leading, every year, to the waste of thousands of dollars' worth of good cement and sand, which serve no purpose except to burden the floor-beams which hold them up.

EVEN a useless weight of material has not always made concrete floors as strong as they should be, and sudden shocks, particularly, have often caused serious damage, so that the designer of a certain warehouse in Germany, unable to find definite data of the resistance of such floors, resolved to make trials for his own information, and incidentally for that of his professional brethren. The warehouse was of immense size, covering nearly an acre of ground, and was intended for the storage, among other things, of heavy pieces of metal, the handling of which often involved considerable shocks to the floors. The whole building was fire-proof, part of the flooring being of brick arches in cement, between iron beams, and part of concrete slabs supported in the same way. Five trial floor-arches were built, each forty-four inches in span, of which the first consisted of concrete, made with one part Portland cement to five parts of gravel, while the second was of hard bricks in Portland cement mixed with three parts of sand, and was covered with a coat of asphalt three-quarters of an inch thick; the third was of softer brick, in mortar containing one-half as much lime as cement, and four parts sand; the fourth was of the same brick, in equal parts of lime and cement, and five parts sand; and the fifth was of the same brick, in cement alone, mixed with four parts sand. These last floors were finished with a coat of cement, three-quarters of an inch thick or more. Fifty-four days after their completion, each floor was loaded with pig-iron to the amount of two hundred pounds to the square foot. This weight had no effect, and two days later the concrete arch was tested by letting fall upon it an iron ball of sixty pounds' weight. This, dropped from a height of five feet, did no harm, and another ball, of one hundred and thirty-five pounds' weight, was let fall from the same height. The first blow produced no effect, but by dropping the ball repeatedly on the same spot a crack was started at the fourth blow, and the eighth broke a hole entirely through the floor, the opening being four inches in diameter at the top, and twenty-four inches at the under side. Thirty days later the same test was applied to another part of the floor, and a hole of the same size and shape was broken through at the ninth blow of the ball. The thickness of the concrete in the middle of the span was four inches. Trials were made of the brick floors in the same way. The first, of hard brick in strong cement mortar, stood forty-eight blows of the heavy ball before it was pierced; the second, of softer brick, with lime added to the mortar, gave way at the tenth blow; the third, at the seventh blow; and the last, of soft brick in sandy cement mortar, without lime, at the tenth. In all these cases the hole broken through was much larger at the intrados than at the extrados. A new floor was then built of soft brick, in mortar made with two parts lime to three of cement and ten of sand, and covered with a layer of concrete, of equal parts of cement and sand, two inches thick. After this had set, the floor required seventy-one blows of the one hundred and thirty-five pound weight to break it through. This protective effect of the thick layer of concrete over bricks is very curious, but aside from this, the result of the tests was decidedly in favor of the brick arching.

THE *Iron Age* contains a lively letter from a working-man who has recently removed from the model town of Pullman, unable to endure any longer the paternal, not to say inquisitorial system of administration by which the admirable municipal regulations of that town are carried into effect. According to the writer, who ought to know what he is talking about, and certainly seems intelligent enough to have understood the rules he was obliged to live under, all the houses in the city of Pullman are the property of the Pullman Land Association, and must be hired from the Association. The rent, according to the regulations of the Association, is paid monthly, in advance, by the employer of the tenant, who deducts the amount from the wages due him. No repairs or improvements of any kind are allowed to be made by the tenant. Even the putting up of a clothes-hook must be done by the agents of the Association, upon the petition of the tenant, and the bill for the service is sent to the employer, who deducts the amount from the wages due. The sanitary inspection is, indeed, thorough, but it is made so by requiring the tenant to admit the inspectors at any and all times to all parts of the house, so that his household is constantly in the condition of a Russian family suspected of revolutionary sentiments. The advantages of living in Pullman did not seem, to this sensitive individual, to counterbalance the annoyances. Although a part of a house, with hall and cellar in common with another family, and no bath-room, could be had at a price varying from twelve to seventeen dollars a month, the cheapest whole house, with bath-room, that he could find was rented at twenty-five dollars a month, with water extra. This house was out on the prairie, twenty minutes' walk from the post-office, and after living in it a year, with, as the writer says, "a burden on his conscience all the time" at the surveillance to which he was subjected, he left the place altogether, and returned to a less scientific, but more congenial mode of living.

THE HEATING AND VENTILATION OF THE HOUSES OF PARLIAMENT, LONDON.



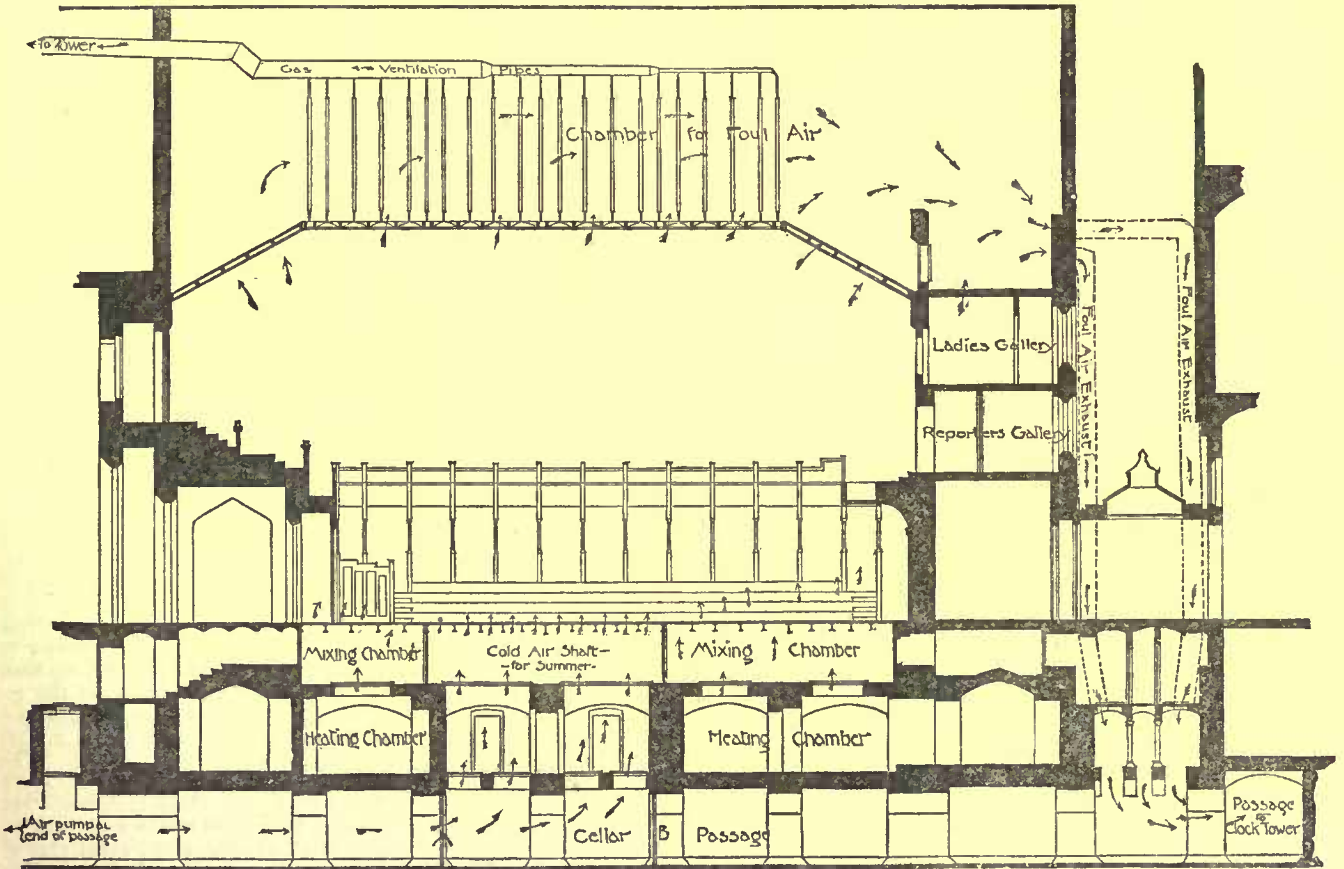
Fresh-Air Intake for Hall of the House of Commons.

IN the heating and ventilation of the halls occupied by the British Houses of Parliament, there are many complications which would never occur in connection with an ordinary assembly-hall or theatre, and which require special provision, and a more than ordinary control of the working apparatus. The Houses rarely meet until late in the afternoon, and the sittings are frequently prolonged until morning. The House will sometimes be crowded full, and within five minutes will empty itself of all but twenty-five or thirty members, the number swelling again as quickly when an interesting subject is announced. Naturally the heating required for thirty persons would be much greater than that necessary for a thousand, and special devices have to be resorted to in order that the change in the number present may at once be accompanied by a corresponding change in the amount of heat supplied. Again a system which would work to a charm with the outside temperature at 40°, might fail entirely when the temperature rose to 90°; and accordingly the heating and ventilation of the Houses of Parliament can be said to follow no particular system, but to combine a number of schemes, with some special arrangements of its own.

The portion of the building occupied by the House of Lords is open on each side to inner courts, the hall being in the main story some twenty-five feet above the ground. The fresh air is taken in at the basement from either court, depending upon the direction of the wind at the time; and receives a proper degree of moisture from a number of fine sprays of water which are continually in operation in the arcades opening from the court. The air enters the building through large blinds with movable slats, and is made to pass through a strainer of fine canvas into a low chamber, the size of the hall above. From this chamber the air rises into a second room immediately over, which serves as a mixing-chamber, where the temperature of the air is thoroughly equalized. Thence it ascends directly into the hall through the floor, which is entirely made of a heavy iron grating, resting on light iron beams, and covered with wire netting. The carpet is made with a very open mesh, which allows the air to pass freely.

The incoming air is not cooled here any further than by the sprays of water before mentioned, which will reduce the temperature about four degrees. This is found to be sufficient, as the House of Lords is not a large body, and the hall is only 45′ x 90′, and about forty-five feet high.

The air is warmed in cold weather by steam-pipes placed in the lower air-chamber. These pipes are not in coils, but are laid in horizontal sections about five feet long, crossing the chamber lengthwise in four lines, each section is made of a length of two-inch iron-pipe, tinned on the outside, and passing through a series of eight-by-twelve-inch zinc plates, one-quarter inch thick, which are placed three-quarters of an inch apart, and soldered to the pipe. These plates rapidly take up the heat from the pipe, and it is claimed that a great deal is thrown off from them at a low temperature, so that the air in passing over them never acquires any burnt smell, such as is so often noticed about pipes highly heated by steam. But the great advantage of this arrangement is that the amount of heat supplied to the room above can be suddenly increased or diminished at will. Attendants are always on hand below when the House is sitting, and when for any reason less heat is required, the radiators are simply covered with cloths, which are always kept in place beside each section. This confines the heat in the spaces between the plates, and as the degree of radiation is not great, the confined air will become quite highly heated before any heat passes through the cloths. Of course, if the room above is to be crowded for some time, the supply of steam can be stopped; but the cloths serve perfectly to suddenly lessen the amount of heat supplied, and the chief engineer has assured me that by using them and admitting more or less cold air, he has always been able to control the supply of heat, so that in the coldest weather, or in the most sudden changes of requirements the temperature of the hall will not vary half a degree from 63°, the normal temperature.



Longitudinal Section of the House of Commons Westminster-Palace
showing the System of Ventilation

Arrangement is also made for adding moisture to the air in cold, dry weather, when the sprays of water would not be suitable. At first water was slowly evaporated from long leaden troughs placed in the lower chamber; but this was accompanied by bad odors, and did not give enough moisture. The present method is very simple. A one-and-a-half-inch brass steam-pipe is run around just inside of the canvas screen. Immediately over this pipe is a one-half inch brass-pipe, from which water is allowed to drip through pin holes at regular intervals. The water drops on to the hot steam-pipe, is vaporized, and passes off into the air. Any surplus water is carried off in a trough which runs beneath. The lower pipe is tinned to prevent oxidization. Hygrometers are placed in various parts of the hall, and by increasing or diminishing the supply of water, the proper state of humidity can be maintained. The chief engineer tells me that this system of supplying moisture to the air, has been used by him in connection with the heating of private mansions, especially at the residence of Krupp, the gun-maker. There the supply of water to the drip-pipe is automatically controlled by an electric current in connection with an hygrometer, so that any desired degree of humidity can be maintained without requiring constant attention.

The House of Commons is subject to greater fluctuations in attendance than the House of Lords, besides meeting oftener and sitting later than its neighbor. Consequently the problem of ventilation becomes somewhat more complicated.

In winter, the arrangement is essentially the same as that used in heating the upper House, the air entering the basement at the sides, passing through canvas screens into the lower chamber, rising into the mixing-chamber, and from thence passing into the hall through the floor, which is entirely composed of cast-iron grating, covered by wire netting. In the aisles and where members stand when speaking, the floor is covered by a coarse matting. Everywhere else the air is free to rise. Provision is made for very cold weather by placing four radiator-pipes with plates, one above the other, at the intake just outside the canvas screen. The drip and steam pipes for supplying moisture to the air are also placed outside the screen.

In summer weather, and whenever cool air is to be brought into the hall, the arrangement is different. Air is taken from the river terrace, which has the advantage of being easily kept clean, and free from dust; besides it is on the cool side of the building, the sun having passed to the west before the House is assembled. There is a single large duct in the cellar for the intake, the air being moistened by spray jets, and sifted through canvas in the same manner as when drawn from the courts. The air is also cooled when necessary by being passed over ice, which is piled loosely on large wooden racks, so that the air circulates freely about it. Practically very little ice is used, as at most times the spray jets are found to sufficiently reduce the temperature, and London has but few days of excessively warm weather during the sittings of Parliament.

After leaving the ice the air is led through wide passages, and rises into the centre of the hall, by means of a large shaft running up through the heating and mixing chambers. This shaft is separated from the air-chambers by partitions, with doors at each end, and has gratings at each floor level. In winter when air is drawn from the courts, as previously described, these gratings are covered, so that no air passes up unless desired.

To help the upward draught of cold air, a large air-pump is used, which is arranged with double-acting valves, so that fresh air is forced along with each movement of the piston; the capacity of the pump being 1000 cubic feet per stroke. It is usually run at the rate of fifteen strokes per minute. The sketch-plan above shows the arrangement of the pumps and ducts. The two gates at A, are opened, and the air follows the direction of the arrow B, when the pump is not working.

The manner in which the foul air is extracted from the hall is as thorough as the way in which the pure air is introduced. The accompanying section will serve to illustrate this. The ceiling is filled-in with glass panels which are raised, and left quite open all around so that the air can rise freely. Above this ceiling are sixty-four Argand gas-burners which light the hall through the glass. Each burner consumes sixteen feet of gas per hour. The products of combustion are all led off in pipes joining into two main flues which are carried into a high ventilating-shaft at the south-west corner of the room. This shaft has a furnace at the bottom to help the draught, as besides receiving the gas ventilation-pipes, it also ventilates the Reading-Room, the Tea-Room, and the Common's Lobby. All these gas-burners serve to ventilate the House to quite a considerable extent, though they are not relied upon as entirely sufficient for the purpose. The whole of the space immediately over the hall is used as a foul-air chamber. This chamber is connected at the north end to four large shafts, through which the air is led down into the cellar, and along through a wide passage to the base of the clock-tower, whence it passes up and escapes into the atmosphere at a height of about 330 feet. The draught is forced, and regulated by a large coal fire, which is kept burning all the time at the bottom of the tower.

The course of the ventilation can be readily followed by reference to the longitudinal section, the arrows indicating the direction of the current. The air-pump is at the end of the cellar passage to the left. At A is a gate which can be closed when required. The gate at B is closed when the cold air is entering the hall. From this second gate a large pipe carries fresh air along the cellar passage, and up to the reporter's gallery. The four down-cast shafts for foul air are shown at the right by dotted lines, being located at the corners of a large well just to the north of the hall of the House of Commons.

It will be seen that the present ceiling of the Commons has a wide splay all around. The original ceiling was level, but was found to have a bad influence on the acoustic properties. The greater part of the present system of ventilation was put in at the time the change in the ceiling was made. In the House of Lords the ceiling is still level, but the removal of the vitiated air is effected in the same manner, the exhaust-pipes being led into the Victoria Tower.

To prevent any sudden draughts in the hall, a very ingenious device has been resorted to. The fresh air arising from the heating-chamber enters the mixing-chamber through large circular openings, which are covered with iron gratings. Immediately below the grating is hung a cylinder of canvas, like a bag without a bottom, extending down three feet into the lower chamber. When a sudden gust of wind blows into the heating-chamber, or a sudden draught is caused by opening a door or a window, the canvas immediately collapses, closing the orifice, and preventing the draught from being felt in the House, the bag straightening out again as soon as the disturbance has passed. This device has been found to act as a regulator to the air-supply, the canvas contracting more or less, to follow changes in the draught, so that a nearly constant current is maintained.

The House sometimes adjourns from seven to nine in the evening, for dinner. Advantage is taken of this to entirely change the air in the hall, which is done in a very easy and thorough manner. The gate in front of the air-pump is closed. The gate just beyond the up-cast shaft is opened, and the windows of the hall are all opened. This reverses the current, the air coming down into the up-cast shaft, and passing through the cellar-ways directly into the clock-tower. (See the longitudinal section). A few minutes suffice to completely change the air in the hall in this manner, after which the gates are arranged as before, and fresh air, cooled or warmed according to the season, is pumped into the room until the proper temperature is reached.

While the House is sitting men are stationed in various parts of the hall, who keep careful note of the temperature, making written reports every hour which are submitted to the engineer, and preserved for reference. Men are also stationed below in the mixing-chamber, where they can hear everything that goes on in the House, and be ready at any moment to supply more heat or cooler air if necessary. The air in the House is changed from three to six times an hour, according to the need. A thermometer and an anemometer are hung over the openings between the two air-chambers, and are carefully watched, and every precaution taken to prevent sudden changes.

Every thing connected with the ventilation is kept in perfect order. The vaults are always perfectly neat and clean, there are no obscure corners for rats or rubbish; tobacco is never allowed to be used in any form by any of the attendants; the walls and ceilings are thoroughly whitewashed twice a year; the canvas-air screens are washed every week, and indeed every care is taken that thought and money can devise to keep the air-supply perfect in all its ways.

The resident engineer, W. J. Prim, Esq., has a staff of about fifty men constantly employed in attending to the heating, ventilating, and lighting.

C. H. Blackall.

THE NEW ADMIRALTY AND WAR OFFICES.[1]— II.

London, August, 1884.

Monument to the Duke of Wellington, St. Paul's Cathedral, London.— [illegible]

RESUMING our notice of this competition, with the design by Messrs. Aston Webb & Bell placed third by the judges, we find it quite different in character from any of the others, both in plan and architectural style. As remarked in our former notice, the plan is distinguished by a great courtyard in the form of a Greek cross. It may generally be described as a single-corridor plan, with arcaded halls like small court-yards at the intersecting angles, one of which is also the principal staircase, as we shall have to notice presently. The plan is eminently picturesque, if that is a virtue in a large public building: it seems to cover far less ground with buildings than any of the others, so that if all the requirements have been provided, as we are assured they are, then it is a marvel of compact and skilful planning. The outlines (in plan) of the great court-yard are if anything too much broken up; but this very fault gives rise to many charming "bits" of design and great play of light and shade. The Whitehall front is recessed in the centre with advanced wings at each end. The principal entrance is in the centre of this front and opens into one of the internal halls above mentioned; another entrance, from the Spring Gardens side, opens into the grand staircase hall, one of the great features of the design. The whole arrangement is remarkably simple, and symmetrical to a degree hardly to be expected in such picturesque grouping. The corridors are fairly well lighted; though not so good in this respect as the first prize design, still great skill is shown throughout the whole work, and it strikes one as being the most economical of the lot.

As might be expected from the previous works of its authors, the elevations have more of the so-called "Queen Anne" character than any other design in the competition. The promise of picturesqueness in the plan is fully borne out in the elevations, in the Park front especially so, though even in this design, as in almost all the others, it is difficult to say that the exterior expresses in any marked manner the arrangements of the interior. For instance, the internal halls are lost sight of altogether; no feature marks their presence, and looking at the exterior, for aught we can tell, they might as well not be there at all. We think this is to be regretted, as they are large enough in themselves to become marked features in the design externally. There are the usual towers rising from nothing in particular, one at the internal angle at the junction of the parallel front

[1] Continued from page 128, No. 455.

and the return to the Horse Guards, and the other at the northeast corner of the Spring Gardens front; but the towers in themselves are rather commonplace productions. The fronts generally have what may be called pavilions at the angles and in the centres, with high, pitched roofs, tall chimney-shafts, and dormer windows. Between these pavilions the frontage line is slightly recessed and arcaded on the ground and first floors. These arcades are charmingly detailed and form interesting features in the composition, assisting in the play of light and shade, and generally adding greatly to the richness of the design. They are useful, also, for over the first floor a mezzanine floor is cleverly introduced in some parts, so that the building is practically five floors high against the four of some other designs, and the first-floor rooms themselves have their heights in proportion to their size and importance, some under the mezzanine, while others, such as those for the Secretary of State for War, the First Lord of the Admiralty, with their ante-rooms, the Commander-in-Chief, etc., are the full height of both floors. This is quite as it should be, and perhaps also accounts for the comparatively moderate space occupied by the buildings on plan. A very able drawing of the interior of the grand staircase hall shows how cleverly this mezzanine floor has been taken advantage of internally. It is one of the best bits of design in the whole competition, and shows great artistic power and feeling for the style employed, albeit the upper stories are somewhat thin and weak.

The whole of the drawings of this set are very well rendered. The perspective of the staircase hall, just referred to, by Mr. Webb, and the view of the Park front by Mr. Bell, are most effectively drawn. There is also a charming little sketch by Mr. Bell, of the proposed new buildings with their surroundings, as seen from St. James Park, in which the group is very cleverly contrasted with the new Foreign Office, and the towers of Westminster Abbey, and the Victoria Tower of the Houses of Parliament, the whole making an exceedingly effective architectural composition. But after all is said and done, picturesque though the design is, it does not rise to the dignity of a great public work. The type of Classic is too free, too "Queen Anne" we may say, for want of a better word, as there can be no doubt that something much more monumental is needed to fulfil the conditions of the problem. The style was almost required to harmonize more or less with the Classic of the Horse Guards, and where it did differ it should have inclined rather to the monumental than the picturesque in such a large building. The authors proposed to use the old Admiralty screen (now fronting Whitehall) and rebuild it northwards and in a line with their park front, but it can hardly be said to be in harmony with either the spirit or the letter of their design, and would probably have been abandoned.

The fourth design we find in our notes, that by Messrs. Hall and Powell, returns to the more official character of Classic, and is in some respects a very striking composition. In plan it is wonderfully like the selected design, having the double-corridor arrangement, with a large quadrangle entered centrally from Whitehall, and two other smaller courts towards the Horse Guards and Spring Gardens sides respectively. The main difference, however, is that, whereas the principal entrances to the two great departments are under the archway from Whitehall in the selected design, they are in the centre of the quadrangle in Messrs. Hall and Powell's plan. The quadrangle is also of better proportion in itself than Messrs. Leeming's; otherwise there is a good deal of sameness about the general arrangement. The centre of the Whitehall front is also somewhat recessed, which is another advantage, to our thinking.

Externally the orders, where used, are confined in height to a single story, a distinctly different treatment from those we have already noticed. There is a considerable knowledge of detail and effective grouping, the character of the work being much better Classic than in the selected design. The internal arrangements, too, are better expressed in the elevations than in most others, for instance, the two low towers covered with domes, which are leading features in the exterior views, rise over the grand entrance-halls of the two great departments, marking each in the most effective manner, though the towers themselves, as such, never rise very much above the commonplace in the matter of design. The south wing is also graduated down towards the low buildings of the Horse Guards in a manner less detrimental to the latter than can be said for either of the designs placed before this one by the judges. And this is not by any means an unimportant point, as we shall probably find when the selected design is built, by the building being lowered considerably on that side, and the lofty campanile most likely cut out altogether or moved to some more suitable portion of the design, there being no reason, as in Messrs. Hall and Powell's case, why it should not rise from any other corner of the structure.

In the design under consideration, the main entrance from Whitehall to the great quadrangle is poor and unimportant in the extreme, a great contrast in this respect to Messrs. Leeming's, where, by carrying the central arch up into the first floor, adorning it with sculpture and enriching the side archways with columns and pediments, an attempt has at all events been made to invest it with a dignity worthy of its importance; whether they have altogether succeeded or not is quite another question, but here, in Hall and Powell's, were it not for the whole centre being recessed, the entrance would be in danger of being lost sight of entirely. For the rest, the Classic is of the ordinary type, suggesting a large block of offices, or of houses in flats, which might be in the West End or in the City, and which one would drive past like any other ordinarily respectable-looking building, without the least idea that there was anything particular to suggest the two great departments of the Navy and the Army of a great Empire.

Of the other designs, after the four we have noticed, the most striking, perhaps, is that by Messrs. Stark and Lindsay. It differs from the rest in plan by having the major-axis of its quadrangle north and south, instead of east and west, with a loop towards Whitehall making it a kind of T-shape on plan. The main entrance is into this loop from Whitehall, but there is also another similar entrance at the north end of the quadrangle from Spring Gardens, while the entrances to the admiralty and the war offices are on the west side of the great courtyard. The double-corridor arrangement is mainly followed in the disposition of the apartments, but without the internal halls which distinguish the plans already noticed. Each department has a grand staircase, however, though scarcely on the magnificent scale of Messrs. Webb and Bell's. The elevations are somewhat of the Louvre type, with high ornamental, too ornamental, roofs. The Park front has a rather picturesque and vigorous-looking tower at either end, between which the sky-line is broken by the high pitched roofs and tall chimney-shafts of a couple of pavilions. And this arrangement is repeated on the return flank towards the parade, the design falling off in richness as it approaches the old building of the Horse Guards. The pavilions have also highly ornamental dormers, which are repeated still more elaborately in the towers; the upper stories of the latter are open, enriched with columns, and covered with domical roofs, forming, as it were, low campaniles. The whole design is treated with considerable richness throughout, with much florid detail and ill-studied ornament. The basement and ground floors are rusticated; the first and second floors have coupled columns between each pair of windows, the order being the height of one floor only in each case. The view of the building towards the Park and the Parade is perhaps the most striking, the small scale of the orders and the detail generally giving it an appearance of great size. The drawing is rather unequal throughout.

Messrs. Maxwell and Tuke send a pretentious but weak Classic design, full of towers, and domes, and what not, two of them being planted close up to the Horse Guards, so as to dwarf the old building completely. The elevations are drawn in a slipshod style, and this also applies to the perspectives.

The designs by Messrs. Spalding and Auld and Mr. Thomas Porter are also Classic of the poorest description, and the less said about them the better: in the words of the old rhyme: —

> "It isn't that the things ain't rich and rare;
> One wonders how the Devil they got there!"

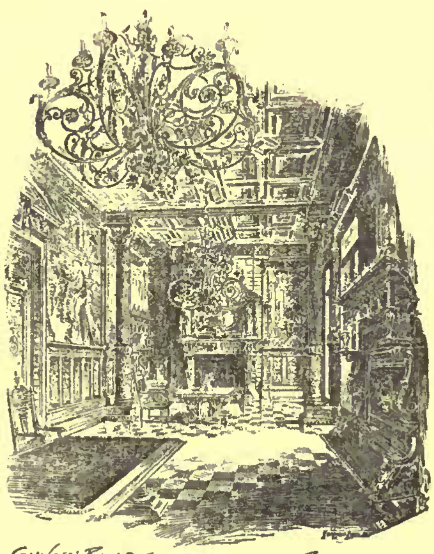
And the same might be said of that Gothic wonder by Messrs. Glover and Salter, which in style is a kind of cross between poor Burges's design for the New Law Courts and Messrs. Mappin and Webb's warehouse, at the corner of Queen Victoria Street, in the City. We think it was almost a cruelty to have asked these gentlemen to send in the large-scale drawings of the second competition, when it must have been perfectly well known from their sketch designs there was no earthly chance of their being accepted. Shades of Scott and Street and Burges, what a falling-off is here! It has often been asserted of late that the New Law Courts is the last great building of the Gothic revival: there will now be no mistake about it, if this is what the style has come down to. What a melancholy waste of time the whole thing is! Let us forget it all as quickly as possible.

Thus the latest great competition is finished. We understand the Government have confirmed the award of the judges, and that Messrs. Leeming and Leeming have been formally appointed architects for the new buildings. As we have said, nothing can be more satisfactory than the business-like manner in which the competition has been carried through. Whether it would not have been wiser and better, in the interests of art, to have had a selected competition of the best and most experienced men in the profession is altogether another question. The powers that be evidently thought otherwise, and Mr. Shaw-Lefevre has been as good as his word. We are left with the result of months of study and work, to make the best of it as far as this is now possible. The outlook is not very cheering, to be sure, but there is nothing for it but to put the best face on it we can, and hope the future will bring us something better and nobler than we are promised in the present.

As a display of architectural design, considered from a fine-art point of view only, the competition has been more or less a failure. We are told the successful men were fifth in the Glasgow Town-Hall competition; be this as it may, that is about the relative position the whole lot bear to what was done at Glasgow. Not one of the designs comes within even a measurable distance of the selected design at Glasgow, not to speak of several others which ran it very close for first place. Neither in the grasp of the subject as a great national building, as an architectural composition of the highest class, nor in the display of knowledge of Classic work as such, do any of the designs approach the best work shown in the two competitions we originally mentioned, viz., the Oratory Church at Brompton, and the Town-Hall at Glasgow, and, considering the proposed new buildings are supposed to be a work of far greater importance than either of those, and that the competition came after them in point of time, the result, artistically considered, can only be looked upon as a retrogression, where we had every right to expect and almost to require, a decided advance. What are great national monuments for but to display the highest and noblest art we are capable of as a nation? From what are we to be judged hereafter, as artists, but these very monuments? More than this, a national work of this kind is more or less a school for the time being, and it is essential for our best interests as artists that nothing but what is highest and noblest, or at all events the highest and noblest that the best amongst us can give, should be taught in such an enduring object-lesson. And still further, English Classic has noble examples to emulate, and noble traditions to hand on unsullied to those who may come after us. It is therefore of the first importance that our record should be pure. Viewed in the light of all this, we are compelled to acknowledge the results before us as in the highest degree disappointing, and we venture to think the national interests would have been far wiser and better served had the judges frankly confessed that none of the designs reached that high standard of artistic merit that would justify their acceptance for execution, but that rather they should have paid the nine competitors their hardly-earned premiums, and begun *de novo* with a selection of half-a-dozen of the most accomplished men in the profession. Judged by results, the open competition in this case has been a mistake; it has not given us the best we can get, though that best is to be had for the seeking. With all respect for the honorable intentions of our honorable First Commissioner of Works, there is a higher standpoint still, a determination to secure only the best for the nation, and having manifestly failed to obtain it in one way, to set about more diligently to find it in another.

We have purposely avoided the question of the relative merits of an open or close competition as an initial proceeding, considering the matter closed by the adoption of the former, and that we were bound to await the issue; but now that the result is as unsatisfactory as it well could be, we cannot see where the injustice of resorting to the latter could now arise; we hold it the wiser course to frankly acknowledge our failure, rather than to perpetuate what we know to be a blunder. Probably we may be told it is all a matter of taste. Some may consider the selected design a work of very high art. The only answer we can now give is that it is not a matter of taste at all, or of what this one or that one may think; it is a question of absolute knowledge, as demonstrable as any other fact, but that to pursue the subject farther at present would lead us too far out of the region of criticism.

MOSCOW'S NEW CATHEDRAL.



COUNCIL ROOM, BANK PARISIENNE PARIS.

THE new Cathedral at Moscow, writes a correspondent of the *Times*, is one of the most remarkable churches in Europe. Not many cathedrals can boast of having been built in one lifetime, but there are Russians still living who saw the French army depart from Moscow, to commemorate which event the Church of St. Saviour has been erected. In less than three months after the retreat of the foe, a decree went forth from Alexander I, that a memorial temple should be built, and five years later, the foundations were laid; but not on the present site. The Emperor accepted plans, which had they been carried out, would have given to Russia the highest building in the world, namely, 770 feet, the site being on the Sparrow Hill, between the routes of the entrance and departure of Napoleon, but the undertaking for a while collapsed, and the architect and building-committee, after expending or misappropriating in ten years upwards of four millions of roubles, were banished, and their estates confiscated. The Emperor Nicholas adopted new plans, and chose the present site, which has cost with embankment, terrace, etc., upwards of £180,000, and whence, at the onset, a nunnery had to be removed, and 70.000 cubic feet of earth to be displaced, before, on the 27th July, 1838, the laying of the foundations was commenced. The building continued slowly to rise for twenty years, and in 1858 the scaffolding was removed, this latter item alone having cost 277,000 roubles, or upwards of £40,000 (reckoning the rouble, that is, at 3*s*., as throughout this letter). A quarter of a century more has been expended on fittings and decoration. The style is ancient Russian, or rather Græco-Byzantine, the most striking feature of which, to a Western eye, on the exterior is the five copper cupolas, for the gilding of which were required 900 lbs. of gold, their total cost being upwards of £170,000. The domes are surmounted by crosses, the central one nearly 30 feet high, standing 340 feet from the ground. The building covers an area of 73,000 square feet. The bells, as usual in Russia, are of ponderous weight. The largest, or "holy-day" bell, weighs twenty-six tons, or half as much again as "Great Paul." Even the second, or "Sunday" bell is within a ton's weight of our bantling; while the smallest of the "every-day" bells descends to about 30 lbs. The cost of the peal was upwards of £13,000.

The foundations of the church are of Finnish granite, and the whole edifice is faced with marble, the doors being of bronze, ornamented with Biblical subjects, and lined with oak. The principal entrance measures 30 feet high by 18 feet broad, and the two doors weigh thirteen tons, the total cost of all the doors being £62,000. Thus, it will be allowed that many of the features of St. Saviour's are produced on a magnificent scale, though one familiar with the spire of St. Stephen's, Vienna, or that of Salisbury, the west front of York Minster, or that of Amiens, might hesitate to pronounce the effect of the exterior of St. Saviour's beautiful. As to the interior, there can be, I think, little difference of opinion. I have seen most of the celebrated cathedrals in Europe (with the exception of those of Spain), but in its way I know of nothing so exquisite as the interior of St. Saviour's at Moscow. The building is erected in the form of a Greek cross, three of the broad ends of which form corridors, lower and upper, surrounding three sides of, and open to, the central square or temple proper, while the fourth end is occupied by the altar and its appurtenances. The upper corridor reminded me of the galleries in Santa Sophia at Constantinople. The walls are adorned with frescos illustrating principal events in the history of the Russian Church. The walls of the lower corridor or "procession gallery" are adorned with paintings commemorative of the battles of 1812.

But it is when one stands in the temple proper, and looks above and around that the gorgeousness of the building is so striking. The floor of this part is 220 feet square, the length of the cross either way 270 feet, and the height from the ground to the cupola measures 230 feet. The floor is of marble, and the walls are lined with exquisite varieties of the same material. It was intended at first to use only Russian marble, but some amount of Italian was subsequently found to be indispensable. The total cost of all the marble in the building exceeded £300,000. Lifting one's eyes, the galleries are seen to contain thirty-six windows, and the cupola sixteen, all of which are double, with frames of bronze. Round the cupola is one row of 640 candelabra, placed there at a cost of £27,000, with a second row of 600, costing an additional £12,000. There are four lustres weighing four tons each, and the total number of candles to be lighted throughout the building is upwards of 3,000. At the top of the cupola is a painting by Professor Markoff that will freely shock the principles of Westerns, who object to the use of pictures in worship. It represents in colossal proportions the first person of the Blessed Trinity as an old man with the infant Jesus. The height of the figure is 49 feet, the length of the face 7 feet, and the height of the infant 21 feet. Also, below the cupola are a number of figures of Apostles and Fathers, each 21 feet high. Great expense has of course been lavished on the eastern end of the church. The cost of materials and workmanship for the altar-space, apart from the *icons* or sacred pictures, amounted to £36,000. In this part of the church are some of its most remarkable paintings, most, if not all, by Russian artists. They are too numerous to particularize. I remarked, however, a striking picture of Sergius blessing Demetrius of the Don. I see from my notes that "The Last Supper," by Semigratzky, and eleven pictures by Verestchagin attracted my attention. The structure of the altar-screen is a departure from the traditional Russian type, for instead of a tall, ugly, blank partition, half or two-thirds of the height of the church, hiding the eastern end, the screen of St. Saviour's is low and elegant, and throws open, except for a few feet above the floor, the whole of the sanctuary. But a more marked, and, as some would think, unorthodox departure from the customs of the Russian Church is the construction of the altars. I am under the impression, gathered, I think, from the work of the learned Dr. Neale on the Eastern Church, that the "holy table" in the Russian Church should be always of wood, whereas in St. Saviour's I saw two at least constructed of blocks of polished marble, the semblance of a table being given to each by a moveable inch board of cypress wood laid on the top. Much of the ornamentation of the sanctuary and its furniture was exceedingly beautiful, notably some enamelled candelabra by Klebnikoff. But perhaps I have sufficiently described this princely cathedral, erected at a cost of two and a quarter millions of pounds sterling, said to be capable of accommodating 10,000 worshippers, and which from its first conception has been built, as I have said, in a single lifetime.

THE ILLUSTRATIONS.

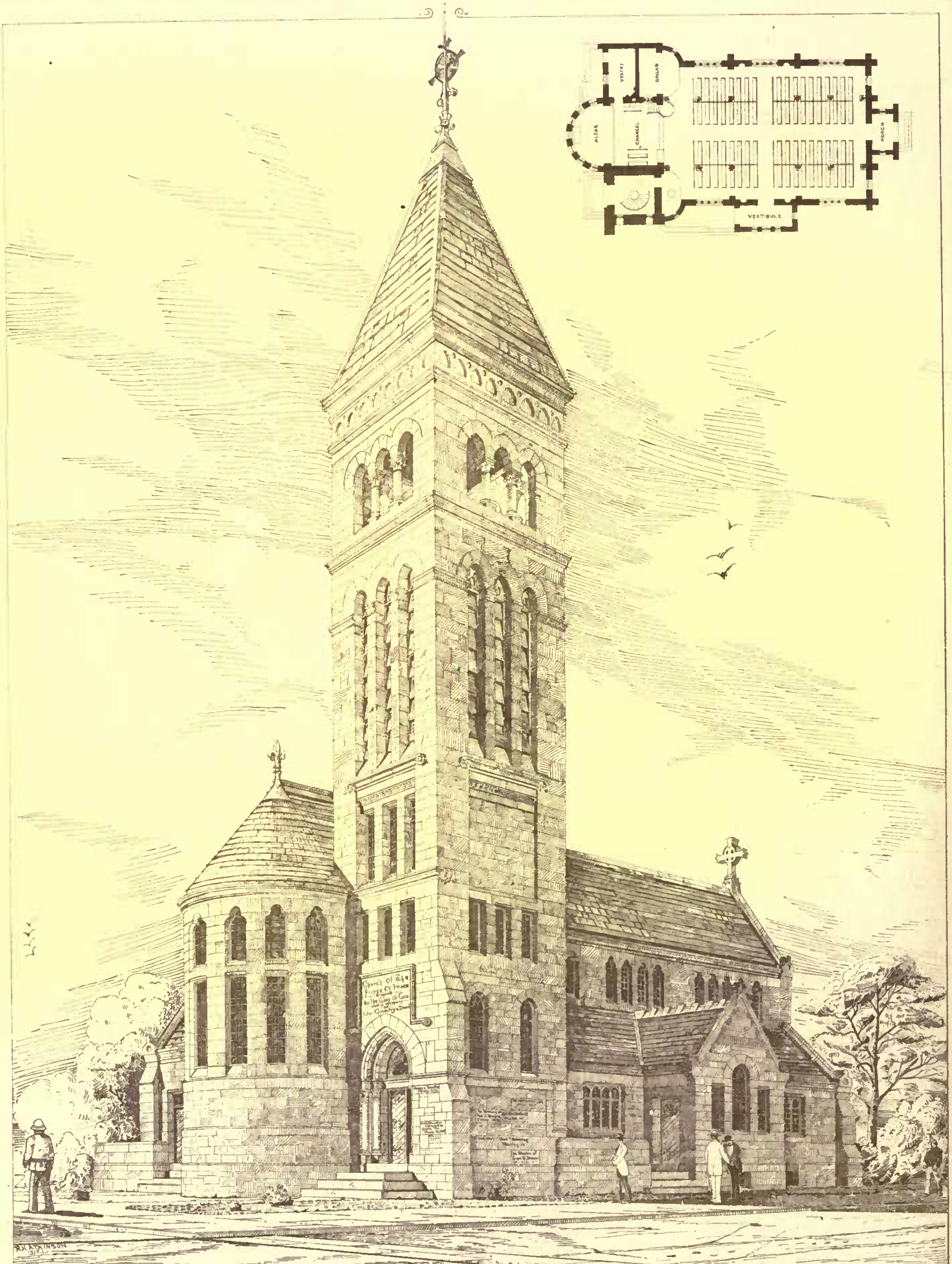
CHURCH OF ST. JAQUES AT DIEPPE.[1]

THE church of St. Jaques is the largest and considerably the most interesting of the two parochial churches of the place. It had the singular good fortune of escaping, together with the castle, nearly uninjured from the bombardment, during the reign of our third William, which laid the town in ashes. It was begun about the year 1260, but was little advanced at the commencement of the following century; nor were its western chapels, the works of the piety of individuals, completed before 1350. The roof of the choir remained imperfect till nearly ninety years afterwards, while that of the transept is as recent as 1628. Thus it is a valuable specimen of the ecclesiastical architecture of successive ages. In the lines of the transepts are traces of the early pointed style, apparently coeval with the church at Eu; the friezes are ornamented with small pierced

[1] From Cotman's "*Antiquities of Normandy.*"

TOLEDO.—567.—Claustro de San Juan de los Reyes, visto desde el fondo.

PHOTO CAUSTIC. HELIOTYPE PRINTING CO. BOSTON.



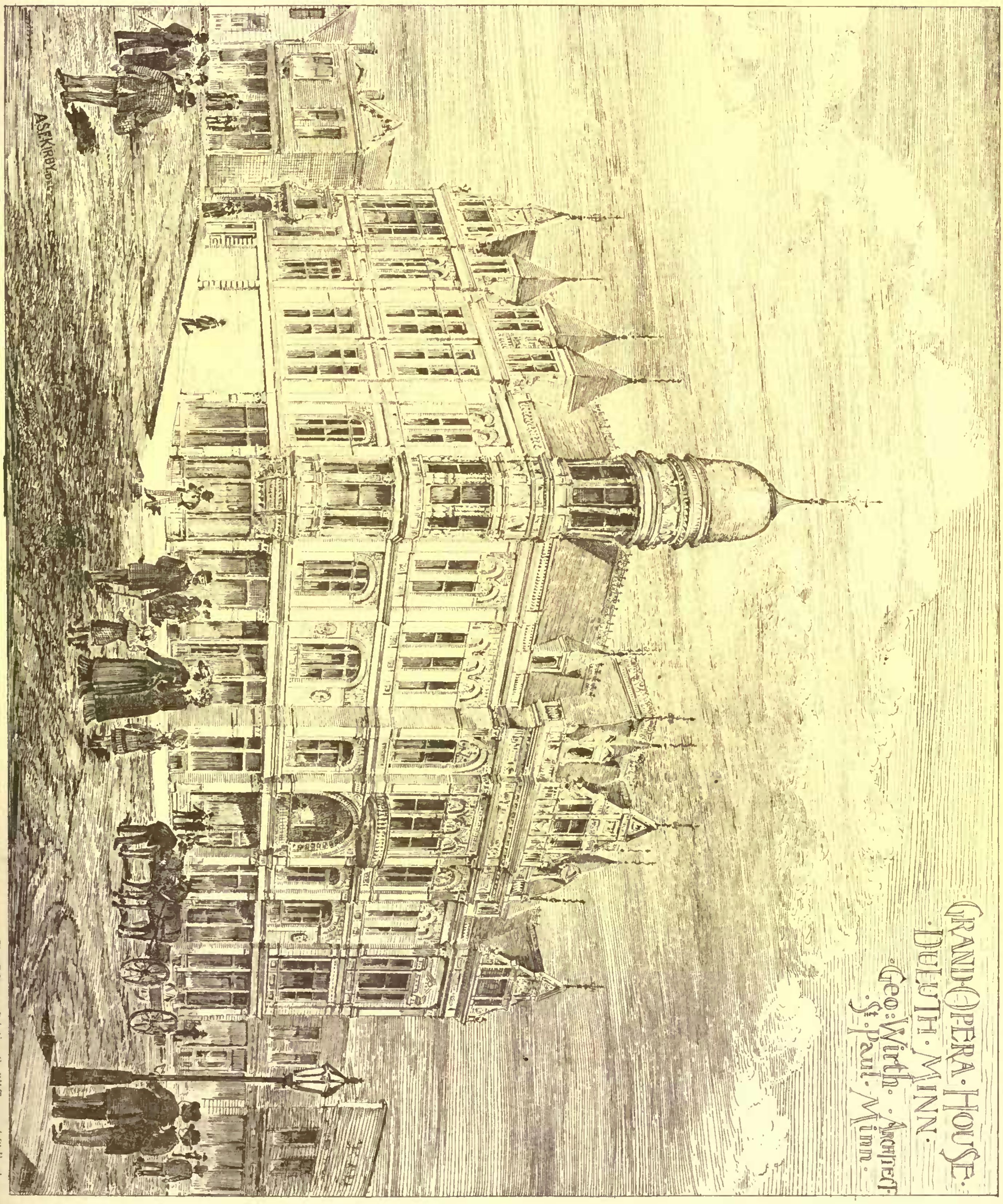
Revd. A. E. Tortat, Rector.

Memorial Church ✠ Gettysburg Penna.

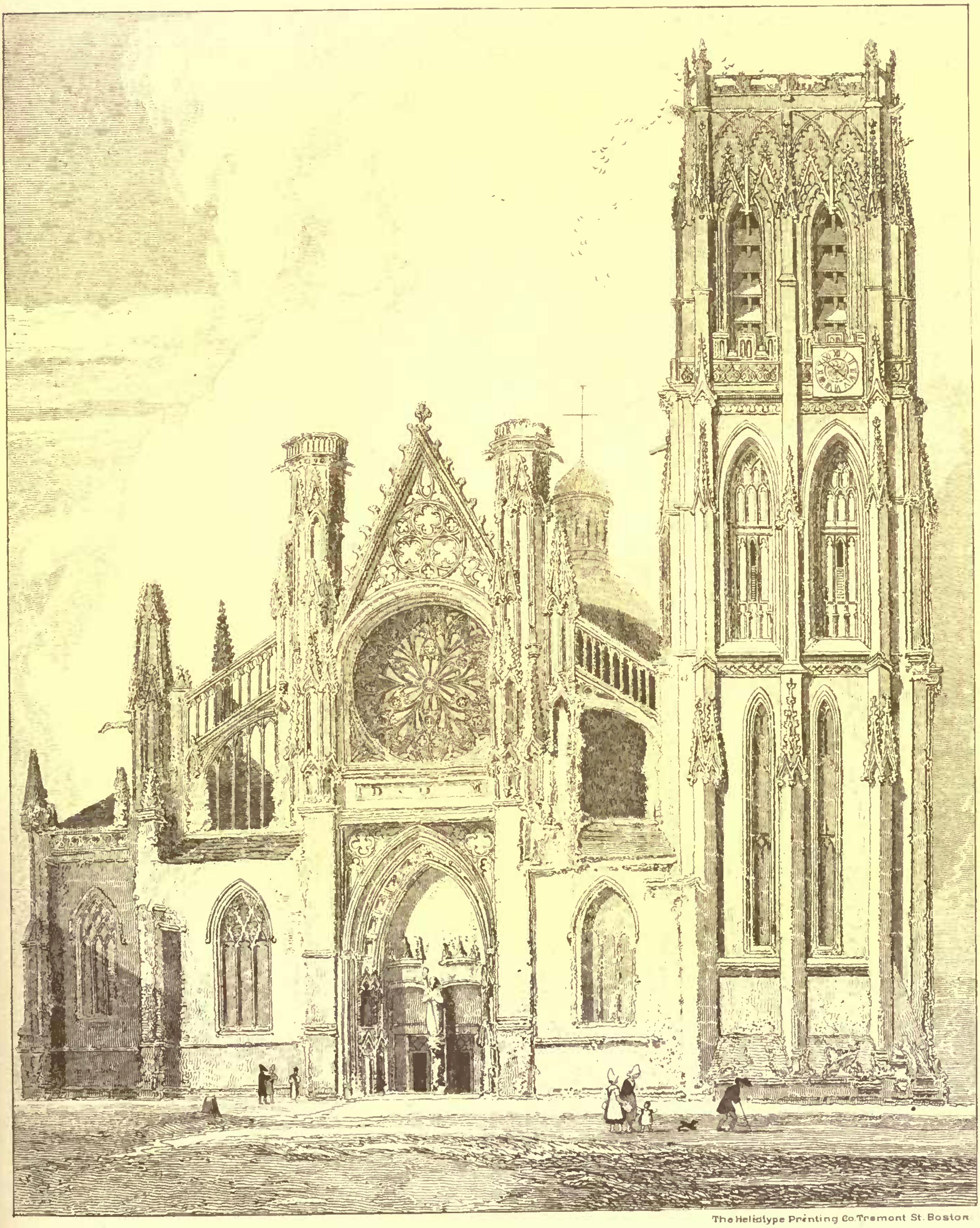
to be erected in memory of the Country's Dead

J. A. Dempwolf, Architect, York, Pa.

The Heliotype Printing Co. Tremont St. Boston.



The Heliotype Printing Co. 211 Tremont St. Boston.



The Heliotype Printing Co. Tremont St. Boston

CHURCH OF ST. JACQUES, AT DIEPPE.

quarterfoils, as in that building, and the portals now mutilated are in the same style. The nave is of much later date, and the vaulting, though Gothic, is intermixed with Grecian members and scrolls. The triforium in the choir is filled with elegant Perpendicular tracery. The Lady Chapel is perhaps one of the last specimens of Gothic art, but still very pure, except in some of the smaller members, such as the niches in the tabernacles, which end in scollop-shells, instead of terminating with a groined canopy. The bosses of the groined roof are of the most delicate filigree work, and the vaulting is also ornamented with knots pendant from the ribs. The panel-work round the chapel takes circular terminations in each panel, but filled within with an elegant tracery terminating with the acanthus. The windows of the chapel are acutely pointed; the horizontal mullions (an unusual feature in French architecture) are ornamented on the outside of the ovals. The nave is supported by flying-buttresses, each filled with tracery of eight mullions. The tower at the south angle of the west front is lofty and in the Perpendicular style. In the north aisle of the choir is an elegant screen, which probably incloses a chantry-chapel, and, like the Lady-Chapel, exhibits a singular mixture of pointed forms, interspersed with Roman members; parts of it resemble the tomb of Bishop Fox, at Winchester.

MEMORIAL CHURCH, GETTYSBURG, PA. MR. J. A. DEMPWOLF, ARCHITECT, YORK, PA.

THIS church, dedicated to the Prince of Peace, is intended to be erected as a special memorial of those gallant defenders of their country, who fell in the famous battle. The material it is proposed to employ is a rich gray granite, extensive beds of which exist on the battle-fields. The interior face of the tower (which contains a spiral iron staircase), will be lined with the same granite polished, and on the stones of the outer faces of walls, as well as the polished interior of tower will be inscribed the names of those whose friends may wish to honor them in this manner. The interior walls of the church, will be lined with English tiles interspersed with memorial tablets. The wood finish of the interior will be oak, including an open-timber roof of the same material. All the windows will be memorials in stained-glass. The twelve columns will be of polished granite, and commemorative of the twelve great battles of the war.

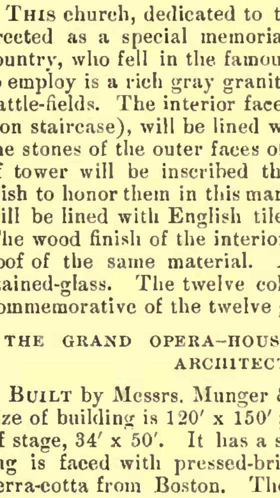
"THE GRAND OPERA-HOUSE, DULUTH." MR. GEORGE WIRTH, ARCHITECT, ST. PAUL, MINN.

BUILT by Messrs. Munger & Markell, at a cost of $100,000. The size of building is 120′ x 150′; size of audience-room, 54′ x 80′; size of stage, 34′ x 50′. It has a seating capacity for 1,200. The building is faced with pressed-brick, moulded-brick from Chicago, and terra-cotta from Boston. The acoustics and ventilation are excellent. A number of stores and offices occupy part of the building.

CLOISTER OF SAN JUAN DE LOS REYES, TOLEDO, SPAIN.

FOR a description, see the *American Architect* for January 26, 1884, page 40.

VENTILATION IN CONNECTION WITH WARMTH AND LIGHTING.[1]



IN this lecture I propose to endeavor to explain what are the principles which should guide us in warming our houses, and then to endeavor to show how those principles can be usefully employed in practice. We must all agree that our present arrangements are inconvenient in certain respects, so far as our towns are concerned. When we bring a large number of houses together, as we do in our great cities, the methods which we adopt for warming our houses conduce to the production of a very large amount of smoke and pollution of the atmosphere. The amount of coal which we burn is out of all proportion to the heat which we produce. Therefore, in our towns, the methods to which we resort for warming our rooms load with impurities the air which we have to breathe. Those who have been born and have lived in the heart of London do not know what the feeling is of breathing fresh invigorating country air. The question is: how can we alter this? The first step towards alteration is to know what conditions we want to obtain. We will consider, in the first place, what advantages our present methods of warming secure for us; and next, how we can secure these in ways less hurtful to our atmosphere.

The open fire is the most favorite method of warming. So far as the production of heat is concerned, it is also the most wasteful. One pound of coal is more than sufficient, if all the heat of combustion is utilized, to raise the temperature of a room twenty feet square and twelve feet high, to ten degrees above the temperature of the outer air. If the room were not ventilated at all, and the walls were composed of non-conducting materials, the consumption of fuel to maintain this temperature would be very small; but we must change the air of the room if we are to live in it, or else the act of breathing would render the air so impure that we should die. The air which passes out of the room to make way for fresh air is warm, and carries some heat with it; the fresh air which comes in, if cold, absorbs heat, which brings up its temperature to that of the room. All this entails a development of additional heat. For instance, if the volume of air contained in the room above mentioned were changed every hour, one pound of coal additional would be required per hour to heat the inflowing air, so that to maintain the temperature at ten degrees above that of the outer air during twelve hours would require twelve pounds of coal. Besides this, there is a continual escape of heat going on through the walls, windows, ceiling, etc., and thus the mere circumstances of occupation of a room entail a greater consumption of fuel than the mere one pound of coal in order to maintain the temperature. But the open fire consumes much more than would be necessary to keep up the heat. The principle of the ordinary open fireplace is that the coal shall be placed in a grate, to which air is admitted from the bottom and sides to aid in the combustion of the coal, and an ordinary fireplace, for a room of twenty feet square and twelve feet high, will contain from about fifteen pounds to twenty pounds at a time, and if the fire be kept up for twelve hours, probably the consumption will be about one hundred pounds, or the consumption may be assumed at about eight pounds of coal an hour. But the consumption of fuel enables the open fire to perform other functions besides those of warming. It is a great engine of ventilation. One pound of coal may be assumed to require, for its perfect combustion, 160 cubic feet of atmospheric air; eight pounds would require 1,280 cubic feet; but at a very low computation of the velocity of the gases in an ordinary chimney-flue the air would pass up the chimney at a rate of from four feet to six feet per second, or from 14,000 to 20,000 cubic feet per hour; with the chimneys in ordinary use, a velocity of from ten feet to fifteen feet per second often prevails, giving an outflow of air of from 35,000 to 40,000 cubic feet per hour.

We have therefore to consider the open fire in two aspects: 1, as a method of warming; 2, as an engine of ventilation. In its aspect of warming, the radiant heat from the fire does not warm the air of the room; the rays from the fire warm the sides and back and parts adjacent to the grate; they warm the walls, floor, ceiling, and the furniture of the room, and these impart heat to the air. The form and material of the fireplace can thus assist materially the warming of the air. The rays should impinge more freely on the walls and floor than on the ceiling. A projecting chimney-piece, with a surface favorable to the absorption and emission of heat would be more favorable to the warming and circulation of the air than one which would allow the rays to pass to the ceiling. In an ordinary fireplace the sides should be splayed, as in the Rumford form of grate; the sides and back should be of non-conducting material, with a surface favorable to the rapid absorption and emission of heat. Thus brick or tiles are better than iron for this purpose. Similarly, the degree to which the materials of the walls or floor of the room are unfavorable to conduction, but favorable to the absorption and emission of heat, will have a bearing on the capacity of the room for warmth. The open fire, moreover, has this advantage: that a person can obtain just as much or as little heat as he desires by placing himself in front of the fire or at the side. There is, however, this inconvenience about the open fire: the large volume of air drawn out of a room by the chimney must be supplied from somewhere, and consequently the very means adopted to heat the room tends to produce draughts, because the stronger the direct radiation, or rather the brighter the flame, in open fireplaces, the stronger must be the draught of the fire and the abstraction of heat.

Let us next consider what are the conditions which we require for comfort. The normal temperature of the human body is 98° Fahrenheit. If it rises much above or falls much below that, death will ensue. But the human body is a furnace in which the process of combustion is continually going on; therefore, in order to preserve the normal temperature, the body must continually give off a certain amount of heat. By the laws of radiation, a heated body parts with its heat more or less rapidly in proportion to the low or high temperature of bodies near it. Thus, if a hot body be placed near a cold body, the hot body will radiate heat rapidly; if the hot body be near a body less hot than itself, but still hot, it will part with its temperature slowly. Let us apply this to a room. If you are sitting in a room near a cold brick wall, you feel what you think is a draught. It is not necessarily a draught at all; but the side of your warm body turned next the wall parts with its heat rapidly, and you experience a local chill. If you hang a piece of carpet against the wall, the draught is no longer felt, because the carpet checks the rapidity of the radiation. Now, the chief source of heat in the open fire is its radiant heat, and as it warms the walls of the room and the furniture, it takes off any sensation of chill from the walls, etc., although the air may be comparatively cool. You must next bear in mind that the proportion of radiant heat to the total heat given out by a heated body depends on the temperature of the body. Thus, with a red-hot piece of iron, or a flame, the great part of the heat given out is radiant heat; whereas, with a body heated from 150° to 200°, like a hot-water pipe, a comparatively small proportion is radiant heat. Therefore, when you heat a room by means of hot-water pipes, or by means of warmed air, the walls do not get warmed in the same proportion, and although the air may feel warm, the walls may remain

[1] A paper by Capt. Douglas Galton, C. B., LL. D., F. R. S., read at a Conference at the International Health Exhibition, and published in the *Architect*.

cold, so that the heat of the body may be radiated to the walls and give the sensation of chill.

I confess that personally I think there is nothing to be compared with what my friend, Sir F. Bramwell, calls the pleasant, pokeable fire; but I do feel most strongly that, however much private feelings may incline us all to use the open fire, it is our duty, now that our towns are becoming so vast, to adopt some method of heating which will produce less smoke. It is not as if there were any probable and early limit to the size of London or of other large towns. They grow continuously, and London has progressed at the same steady rate since the beginning of this century. In 1851 it contained a little over two million inhabitants, and was looked upon as vast and abnormal; it now contains four million, and is steadily increasing. The smoke destroys our light, it injures our air, it ruins our furniture, our pictures, our decorations, and with the increase of London this must go on in an accelerating ratio. But it requires education in the people to get rid of it. The Smoke Abatement Society, under the chairmanship of Mr. Ernest Hart, sounded the first note against this gigantic evil. In response to the demand then made, many new forms of fireplace were proposed; but the practical conclusion to be derived from that exhibition was that so long as we burn our fuel in the raw state in our rooms and in our kitchens, we cannot get rid of smoke. The main object of the present exhibition is to educate the people in the science of health. The public has long felt the want of pure water, and has obtained a supply of comparatively pure water in the metropolis. The public has not yet become fully alive to the necessity of pure air. It is our business at this exhibition to endeavor to awaken the public mind to this want. So far as purity of air depends on removal of refuse from our midst, there is hope that in that respect this object may be attained, although no doubt even this simple question is much neglected. Dust is generally removed in open baskets and emptied into open carts, in a manner which seems to have been designed for the purpose of scattering it as much as possible into the surrounding atmosphere. But the purity of air which depends upon the absence of smoke is another matter, and I fear that it will be many years before the selfishness of the community will give way on this point.

The first point to consider is, if we dispense with the use of the open fire, how can we obtain that comfort which the open fireplace gives. The comfort of the open fire is due to the warmth it imparts to the floor, the walls, and the furniture. The air of the room is warmed, not by the rays from the fire, but by the warmth imparted by those rays to those various objects. Therefore the air of the room is somewhat cooler than the walls. Now there is undoubtedly greater exhilaration produced by breathing cool air than by breathing warm air. This is readily accounted for. One cubic foot of cold air at 32° Fahrenheit contains more oxygen than one cubic foot of expanded warmer air at 32° Fahrenheit does. It is thus desirable that air admitted to a room should not exceed from 55° to 60° temperature, for comfort in breathing. This will at once explain to you why the employment of warmed air alone to warm your houses does not give comfort. If the warmed air is admitted at a comfortable temperature for breathing, viz., about 55°, the walls, which derive their heat from the air, will be somewhat below that temperature. The discomfort is caused by the warm body radiating its heat too rapidly to the colder walls. Therefore, if you are to abandon the open fire, but retain its comfort, you must warm the walls and floors, etc., of your rooms. If you can maintain your walls, floors and ceilings at a temperature of from 55° to 65°, combined with an adequate change of air, you will not experience much inconvenience from the loss of the open fire, however much you may regret its companionship and its pokeableness.

There are four ways in which we may effect this. In three of these ways one fire in each house in a central position would be used. In the fourth the heat would be applied in the room itself by means of gas. It is probable, however, that a combined arrangement would be desirable. In all the cases where the heat is furnished from one fire, this fire would be in a close furnace for warming each house or self-contained block of buildings, and thus the fire could be so arranged by means of self-feeding apparatus as to be practically smokeless. The heat from the fire would be conveyed to the various parts of the building by hot air, hot water, or steam. Where warmed air is used it would be necessary to adapt the house in its original construction to the purpose, because the air would have to flow up, through spaces in the walls, from the basement. Moreover, it would not be economical to bring up the air in the outside walls, because then nearly half the heat would pass direct to the outer air. The warmed air passing up the central walls of the house would part with some of its heat to the walls, and would thus enter the room at a lower temperature than that of the walls. In order to draw up the warm air into the rooms, it would be necessary to have some means of extracting the air from the room, so as to draw in the warmed air. It would not always flow in of itself in this country. Thus you see that the warming by means of fresh air involves ventilation, and moreover requires, if it is to be thoroughly efficient, that your architect should have thought out the whole problem when he first plans the house, and before you build it; otherwise you are met with difficulties at every turn. In the method of heating by hot air alone you have this further consideration: the air in the heating-chamber is necessarily at a given temperature, and your house is thus heated uniformly; but it may happen, in this climate especially, that you may want one room to be warm, whilst another is cool. It is generally on this account that other methods of heating have been preferred. It is to these methods of heating that I would now direct your attention. These methods are hot-water pipes, or steam-pipes, led from the fire, which is placed in some central position, and arranged to accumulate the heat in those rooms or other places which it is desired to heat.

I will at once say that the arrangements hitherto made of warming by either hot-water pipes or steam-pipes have not fulfilled the conditions I have mentioned as being necessary to supply the comfort of the open fire. The method adopted is to accumulate a certain amount of heating surface in a coil or nest of pipes, or in what is termed a "radiator" in the United States; but the plan of distributing the heat by means of a large flat surface placed close to the wall has been generally adopted. I do not wish to imply that it has not been thought of, because some few years ago, in an exhibition of sanitary appliances held at the Society of Arts, Mr. Pritchett, of Bishop's Stortford, suggested something of the sort. The apparatus consists of a series of receptacles or cases for water. The cases themselves were formed of ordinary plates of corrugated metal, strongly put together, but having a small interval between them so as to unroll the water, as it were, into a film, and form a succession of reservoirs of water, about thirty inches in height, more or less, as is required, but only from one-third inch to one inch in thickness, enabling them, therefore, to be placed continuously as a dado, or as a series of panels, round any room or building intended to be warmed, and occupying scarcely any appreciable portion of the space of the room or building. The corrugated form given to these reservoirs not only increases the area of the external surfaces, back and front, and imparts strength to the vessels, but secures a certain amount of friction in the action of the warmed water within the vessels, which predisposes it to part with its heat during its circulation. I have never seen this applied in practice on a large scale. These panels might conveniently form the dado of a room, and, if of six feet high, would insure the comfort of the occupants of the room, as they would effectually prevent persons in the room from radiating the heat from their persons to the surrounding walls. Such panels all round the room would especially lend themselves to warming fresh air to be admitted into the room. Mr. Pritchett proposed that these should be warmed by the circulation of hot water; but it is certain that it would be more advantageous to employ steam to heat them if they were established on a large scale. In England steam is not much employed for heating. We are prejudiced against it; we fear accidents. It is, however, a method of conveying heat which is eminently suited to use on a large scale, and if we are to hope to abolish our smoke nuisance, it is by methods of heating on a large scale only that we may succeed. Steam heating is extremely simple in its application. Steam is easily led to great distances. Steam-heated pipes are hotter than hot-water pipes, therefore their effect in warming the air in contact with them is also greater; and therefore, when heating is required on a large scale, it will be found that it is more economical to use steam-pipes than hot-water pipes; besides which the pipes may be smaller, and thus in both ways expense is saved. Highly heated steam-pipes, moreover, radiate a large portion of their heat to the walls and furniture of a room.

Heating by steam is universal in the United States, and the usual system may be described as follows: The steam is conveyed from the basement, along pipes, to the room or passage where it is wanted to be used, and there it is passed into a cluster or coil of pipes called a radiator, which gives an enlarged heating-surface. The cause producing the circulation throughout the pipes of the warming apparatus is solely the difference of pressure which results from the more or less rapid condensation of the steam in contact with the radiating surfaces; a partial vacuum of greater or less amount is thereby formed within the radiating portions of the apparatus, and the column of steam or of water equivalent to this diminution of pressure constitutes the effective head producing the flow of steam from the boiler; while the return current of condensed water is determined by the downward inclination of the pipes for the return course. Therefore, the flow-pipe should be carried in as direct a line as possible from the boiler to the highest point; all the coils for heating should be placed on the return pipe, which should be laid in a uniformly descending line back to the boiler, so arranged as to prevent the lodgement of any condensed water on its way there; because if condensed water lodges in the pipes, most unpleasant and startling noises result. It is a source of economy in steam heating that the condensed water should flow back to the boiler. This is what is called close circulation, with separate supply and return mains, both of which extend to the farthest distance to which the heat has to be distributed. It is, however, possible to carry the steam and bring back the condensed water by means of a single main, which answers at once for both the supply and the return, either with or without a longitudinal partition inside it for separating the outward current of steam supply from the return current of condensed water. If more convenient, the return of the condensed water to the boilers may be dispensed with, and the steam may be applied in what is called the system of open circulation, where a supply-main conveys the steam to the radiating surfaces, whence a return main conducts the condensed water either into an open tank for feeding the boiler, or into a drain to run to waste, or for use as hot water, the boiler being then fed from some other source; in either case suitable traps have to be provided on the return main, for preserving the steam pressure within the supply main and radiators.

The difficulty of steam heating lies in regulating the temperature of the pipes. With hot water you can have your pipes heated to anything you like, from 50° to 180°; but with steam-pipes it is different. The heat is got up very rapidly when the steam is turned on, and goes off very rapidly when turned off. There are various arrangements for regulating steam heating when applied to warm inflowing air. In the New York Hospital the incoming air is warmed by coils of steam-pipes, and generally to a considerable temperature; but in order to prevent the warmed air entering the wards at too high a temperature, this hot air is passed into a mixing-chamber, to which cold air can be admitted at will, so that the hot air can be mixed with cold air to the extent necessary to moderate its temperature before it is allowed to flow into the wards. There is, however, one great advantage possessed by coils of steam-heated pipes: they give out a larger proportion of radiant heat to the walls than is given by hot-water pipes. You can easily understand how much simpler it would be to warm Mr. Pritchett's dados and wall-panelling by steam-pipes carried through them instead of by hot water.

The next way in which heat can be applied is by means of gas. A gas-jet warms any surface in contact with it. If, therefore, you enclose a gas-jet in a metal case, and if you bring air to feed the gas-burner from the outer air, and carry away the products of combustion also to the outer air, you can use the heat of the metal case to warm the surrounding air in the room, whilst the fumes of combustion from the gas will be taken outside and do no harm to the air of the room. Gas-jets might thus be applied with the greatest ease to warm Mr. Pritchett's dados and wall-panels, the gas-jets being placed inside the dado, and the products of combustion carried to the outer air. Mr. Boyle has invented a very efficient method of applying gas to warm inflowing air at an ordinary ventilator; it is in use at the Guildhall. The fresh-air inlet has placed in it a pipe which is coiled round. A gas-burner is placed at the bottom of the pipe, separate from the air of the room; the products of combustion pass up the coiled pipe and then down and out to the open air, the pipe being warmed by the heat they give out in their passage, and the fresh inflowing air being warmed by the pipe. Of course, in all these arrangements air must be extracted by flues or fans or some other method, so as to insure a due circulation of air. But however advantageous gas may be in the methods of its application to warming, and I do not hesitate to say that it can be easily applied so as to be hygienically perfect in that respect, you can, moreover, apply your heat at the exact point at which you want it. You can so arrange it as to give out a low degree of heat for warming fresh inflowing air, or to give out heat to warm your dados and prevent your own body losing its natural heat too rapidly by radiation; or you can use it to give out a high degree of heat, and thus to furnish radiant heat to warm you by direct radiation. It has only to be carefully adjusted to produce all these advantages, yet there is this enormous drawback to its use: at the price of 3*s.* 6*d.* a thousand cubic feet, it would cost to effect these things about four times the price of coal. I believe that if it could be supplied so as not to exceed double the price of coal, it might be economical to use it, because you can use it when and where you desire it. You can turn it off when you leave your room, and turn it on again when you return, and in this climate, where our changes of temperature in winter are so rapid, a uniform heat applied everywhere often becomes oppressive.

Let us consider for a few minutes what is the meaning of revolutionizing the methods of warming our houses in the way I now propose. We should not load our atmosphere with soot. Each of the fires in a house requires its separate chimney, and as if the householder were determined to do all in his power to make the atmosphere impure, smoke which is arrested in the chimney-flue in the form of soot is periodically pushed up out at the top of the chimney into the air, not only to the detriment of the occupier of the house, but to that of the neighbors — an arrangement which may be witnessed any morning in houses where chimneys are being swept. These inconveniences result from having separate fires in every house, and for each separate object. Let us consider for a moment the amount of labor and expense entailed by the mere supply of fuel upon this separate system. Take, as an example, one house of moderate size. The consumption of coal at a low calculation will be twenty-four tons a year, which would require twelve carts to convey it to the houses; or a street such as Eaton Place would require twelve thousand carts to supply it with coal. These carts entail the presence of between two thousand and three thousand horses, and each horse causes, by the manure it deposits in the street, an additional pollution of our atmosphere. When the coal is placed in the house, these twenty-four tons require to be carried up in coal-scuttles, each holding probably a quarter of a hundredweight. That is to say, that there would be to be carried from the cellar to various parts of the house nearly two thousand coal-scuttles full of coal. The residue would have to be carried down again in the shape of ashes, probably to the extent of four hundred coal-scuttles, independently of the proportion of ashes which get scattered from the fireplace about the room, and have to be cleaned up by the housemaid. In addition to this, the dirt engendered by the smoke and soot sent up into the atmosphere renders much additional cleaning necessary, and entails on the inhabitants of London a vast expenditure on soap, and on repainting and redecorating our rooms. Indeed, the late Miss Garrett, who was celebrated for her skill and taste as a decorator of houses, told me she had no sympathy with the movement for the abatement of smoke, because she looked upon smoke and fog as specially sent by Providence for the benefit of decorators. The labor thus entailed is wasted force. It entails vast unnecessary labor and waste of fuel. Probably, if the price of coal had remained high, as in 1875–6, we should ere now have begun to warm our houses in a more rational way. But it is not on the ground of economy that I advocate a change; it is on the ground of purity of air. So long as we pollute the air with soot, not only is the outside air impure, but the air is so loaded with dirt that the careful householder excludes it from his rooms where possible. You would all be ashamed to supply your guests at a party with bad water; if you were equally ashamed, which you ought to be, to supply them with bad air, we should soon take measures to build our houses so as to keep up a continual flow of fresh air throughout our rooms. And then we should be rapidly compelled to take measures also for warming our houses in a way which would not pollute our atmosphere.

THE CINCINNATI COURT-HOUSE COLUMNS.

To the Editors of the American Architect: —

Gentlemen, — Your editorial in reference to the proposed erection in Eden Park, on the Museum grounds, of the six Corinthian columns with their pedestals and entablature, taken from the ruins of the court-house, does some injustice to the movement set on foot for their preservation, and, in view of all the facts, a true statement of the case is perhaps warranted.

The idea is *not* to erect a ruin, nor so much to preserve a memento and reminder of our late unpleasantness, as it is to preserve these columns as fine examples of Corinthian columns,— capital, base, entablature. They are the only examples of the kind in the city, except at the old Post-Office, which is to be torn down inside of three years, thus leaving us poverty-stricken for this kind of architectural material and example. It is stated that there is not even a first-class plaster cast of such a column. Now it is proposed to take these fellows and put them up in the open air, where they can stand out in bold relief against the sky, and be stared at and sketched and measured by all future (and present, for that matter) students of architecture. And where's the harm? Nobody need believe that they are a ruin, if they don't want to. You don't have to believe even that they are ever-mindful monuments of the late riot, telling of the inability of the officers of the law to take care of its property and of executing the law. No; they are to be put upon the ground (they don't go into the building, because they are too big) simply and purely as examples and models of Corinthian columns, and must be respected accordingly. Moreover, they are to be put up without expense to the County, Art Museum, or any other public fund, but the cost is to be borne by private subscription.

Now don't you think it would be better to thus preserve them than to consign them to the scrap-heap of some unappreciative stone-yard, where, after the dust of ages has buried them from the sight of men, they might possibly be resurrected, and perhaps cause future nations to expend large sums of money in digging for the ruins of a temple that they are led to suppose existed on the site, because of these bothersome columns? No; let us get rid of them by putting them up in the open air, where they speak out for what they are. Y.

ARCHITECTURAL COMPETITIONS.

Chicago, September 10, 1884.

To the Editors of the American Architect: —

Dear Sirs, — In reading the communications of the Architectural Association of Des Moines, Iowa, in several recent issues of the *American Architect*, one is led to ask: Have we an architectural "Salvation Army" here in the West? What, precisely, they are driving at I am at a loss to make out from the sophomoric effusions above alluded to; but I presume they hope to reform the present system of competition in the West. Vain hope! The rush and striving for commissions on the one hand, and the desire to get something for nothing on the other, will be found in practice to override all considerations of professional honor ("do unto others as you would have others do unto you"), and end in the utter ignoring by the public of the position and rights of the architectural profession. This apathy or want of appreciation on the part of the public is probably due somewhat to the "methods" pursued by the architects themselves to get business. (I am speaking of the West.) No sooner is it announced that an important structure is about to be erected, than plans innumerable are thrust, unsolicited, under the noses of the proprietor or the committee, until at last, bored almost to death, the proprietor or the committee exclaims, "a plague o' both our houses!"

A few months since, a curiosity in the shape of an advertisement appeared in a Chicago daily, headed, in large letters, "Free Architecting; for particulars, address ——, Des Moines, Iowa." Wishing to know how money could be made by "free architecting," I wrote to the advertiser for "particulars," and received by return mail his explanation and his business card. He was one of a numerous fraternity here in the West, an "architect and builder," and "whenever he could get a job of building by doing so, he put in the *architecting* free!" I forwarded the correspondence to the Architectural Association of Des Moines, and hope they have manfully wrestled with the subject.

In refreshing contrast to all the above, I am happy to report the recent action of the Union League Club of Chicago, who are about to erect a new club-house. A building-committee, consisting, I believe, of three members, was appointed by the club to "employ an architect and build a club-house." The committee looked over the list of members and found the names of nine architects thereon! Was ever club so blessed with architectural talent? But no! *embarras de richesse!* What to do with it all? was the question. Should a competition be called confined to these nine architectural members of the club — waste four weeks in preparation of plans, and six weeks in a club wrangle over them, only to have, perhaps, the worst of the lot adopted, because its author was a "good fellow," an adept at electioneering, and polled the largest number of votes? And could they ignore the extra (?) claim of one architectural brother who thought he was going to the root of the matter by subscribing to the stock of the club?

And now comes the refreshing part of the whole business. Requiring the services of only one architect to build the building, the committee have appointed, *without competition*, Mr. W. L. B. Jenney, an architect of fine taste and much experience, and the writer congratulates them on the appointment, and believes they will have no reason to regret it. Your obedient servant. X.

GLAZING SASH-DOORS.

Elmira, N. Y.

To the Editors of the American Architect: —

Dear Sirs, — Please decide in next issue which is the proper way to hang a *sash-door* or *door with glass*, putty inside or outside.

Yours, etc., Fred Fuller.

[The putty should be outside. If the reverse should be tried, water would find its way between the glass and the horizontal muntins, would then in cold weather freeze and throw off the putty. Besides, the ordinary way of glazing windows and doors secures the best effect for the interior. — Eds. American Architect.]

PAYING FOR UNUSED DRAWINGS.

Cleveland, O., September 4, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Will you please answer, through the columns of your valuable paper, the following questions: —

Where an architect prepares drawings and specifications for a building under the direction of his client, the drawings are submitted to contractors for estimates, and bids for the work received; then the client changes his mind respecting the work, orders the drawings laid aside, and orders the architect to make another set of drawings and specifications, which are submitted to contractors, bids received, and the building erected. Now, is the architect entitled to receive pay for the first set of drawings and the expense of receiving bids, etc.? And if so, what per cent on the lowest bid received would he be entitled to? Please answer and oblige

Yours truly, A. D.

[The customary charge in such cases is two and one-half per cent on the estimated cost. If the detail drawings have been prepared, the charge is three and one-half per cent. This is for buildings costing more than ten thousand dollars; for those of less cost the percentage would be higher, but in the same proportion to the charge for full service. — Eds. American Architect.]

NOTES AND CLIPPINGS.

St. Michael's, Coventry. — For the proposed restoration of St. Michael's Church at Coventry — the second largest parish church in England — the sum of $175,000 is required, and the sum of $130,000 has already been raised. The subscribers include Jews, Roman Catholics, Churchmen, Dissenters and Agnostics.—*Exchange.*

New Method of Tree Felling. — The London *Lumber Trade Journal* states that a new method of tree-felling by dynamite has been successfully introduced. A cartridge of the explosive substance is placed in a channel bored directly under the tree to be operated upon, and when exploded the tree is simply forced up bodily and falls intact on its side. If this system works as well as it is represented to do, and the tree is not fractured by the force of the explosion, a large proportion of valuable wood at the base of the trunk can be utilized which is now lost. For clearing forest properties to convert into arable land, this method appears admirably adapted, as it brings up the roots of the tree at the one operation, and dispenses with the tedious and costly process of grubbing the roots of the felled timber.

Discoveries at Zapatera, Yucatan.— Mr. H. Meyer, the archæologist, writes to the *New York Evening Post* from Nicaragua: "I have in my archæological excavations on the Island of Zapatera, made a rather interesting discovery. About 42 feet under the surface of an ancient cemetery (4 feet vegetable soil, 15 feet volcanic ashes, 7 feet vegetable soil, 16 feet volcanic ashes) I discovered a rock which, judging from the figures it contains, has served in remote times for astronomical observations. On this rock I have found two stone tablets, one of which contains a representation of the world; part of Africa and Asia united, Europe and this continent; a large continent is situated in the Atlantic Ocean, which I consider to be the mythical lost Atlantis, mentioned in some of the ancient authors. The other tablet contains inscriptions, of which part is undoubtedly Phœnician. Owing to the rainy season I have for the present suspended work on Zapatera, and am engaged on the Island of Ometepe, where it is possible to excavate on account of the soil. . . . The volcano of Ometepe, which opened last year, is continually working; its thunder and roaring is sometimes frightful; yet part of the people who last year left the island, have returned to their homes."

Bruges and Antwerp. — I suppose that there is hardly another town in Belgium that is to-day as poor as this once thriving Town of Bruges; one-third of her population, of less than 50,000 souls, are paupers; her waterways are stagnant, choked with weeds, and unvexed with the keels of commerce; there is no sound of heavily-laden drays in her streets, and the old buildings which stand knee-deep in her canals are overgrown with moss, and slowly decaying, without hearing the sound of hammer and saw in structures that should replace them. The oldest parts of the town seem to have changed very little, or not at all, since the Counts of Flanders, whose effigies adorn the walls of the Hôtel de Ville, held sway under the careful watch of the people, and you do not feel that you have taken any step at all into the past in going from the streets into the Hospital of St. John, where the beautiful works of Memling are preserved. It does not affect you at all to know that he painted these pictures for this very building before the fifteenth century had reached its end, and you would not be surprised if the attendant who exhibits his works should offer to take you to the painter's studio and show him engaged in his labor. I do not know that I can give any one who reads these lines a hint of the peculiar, antique charm of Bruges; I feel it very keenly, even in my rememberance of the place, but understand that it is as difficult to describe as the smell of a flower, or the taste of a fruit would be; so I can only say that if the reader does not comprehend from what I have written what it is that makes Bruges such a delightful old place to visit, he must go to the town and feel for himself what I am sure all must feel who have made trial of it. No American can come to Bruges and see its belfry, which is surely the most imposing tower in Belgium, without thinking of Longfellow's beautiful lines upon it, although he will search vainly now for the little inn at which the poet stayed at the time of his visit. The chimes are beautiful, and one listens with pleasure to the sound of their ringing by day and night, but they are not to be mentioned in the same hour with those in the cathedral at Antwerp, which I am sure make the finest bell music that can be heard in all the world. There are ninety-nine bells in the gracefully-soaring tower, which ring with every quarter hour, and at the hour itself fling five minutes of exquisite melody over the listening waters of the Scheldt. Compared with them the chimes of Bruges are harsh and noisy, for they seem to have mellowed and hushed themselves with time, until now they have acquired an indescribable beauty and solemnity of sound. You hear them best at night, when the noise of the town is hushed and the people are asleep, and I used often to go out in the darkness from my hotel near by and stand near the tower and listen to their weird and fascinating music, which seemed to come from the sky. If you will but think of all other music as material, you will understand me when I say that these bells seem to utter the spirit of sweet sound.—*Correspondence Boston Advertiser.*

A Long Pneumatic Tube.— The New York *Graphic* gives the following details concerning the proposed pneumatic tube for carrying letters and small packages from Chicago to New York. The idea at first seems impracticable, but on examination it turns out to be feasible. Two tubes are to be made of brass, which will run side by side, although it is said, one tube will be tried at first. A powerful engine with an exhaust-wheel is to be stationed at one end. It is said that if the tube is properly made and planted no air will escape. The right of way, it is believed, can be secured for nothing, or at a nominal expense, and the main cost will be the tube and the engines and stations. A letter, a sample of grain, or package of any kind which is to be sent, is inclosed in a leather ball. A ball presents the least friction as a rolling object, and the leather is to be stiff and heavy. A continuous current of air is passing through the tube constantly. With one pipe the plan is to reverse the engine every hour — the first hour forcing air into it at the Chicago end, and sending packages to New York, the next hour exhausting the air at Chicago and drawing the packages as quickly back. The men who have it in charge do not say how long it will take to send a package this way, but claim to send it in less than a minute. Stations will be established at the important cities on the route. It is expected to pay a large profit, and to do the business of the telegraph companies, express companies and the mail. They say the scheme of sending crude petroleum by a pipe for long distances, as is now done, was laughed at at first, and that this one is more practicable, if possible, and not nearly so costly, as the pipes are to be small, and can go around curves and over hill as well as on a level.

Painting Tin Roofs. — Tin on a house-top should be well painted once in four years. For roofs, light, cool colors are preferable, because they reflect the warm rays of light, and thereby lessen the expansion and contraction of the metal and the shrinking of the boards underneath, and so lessen the liability of the tin to crack in the seams. The temperature of attic rooms in summer will be materially lower if the roof be painted with a light rather than with a dark color. The writer has learned from long experience that the finest French ochre is the most economical pigment that can be used for that purpose. If, as is sometimes the case in country houses, where the roof is a conspicuous object in the architecture of the building, a dark color be indispensable, the use of pure Venetian red darkened with lamp-black, is recommended as the most durable and economical. If, by some process the oil used in roof-painting could be prevented from becoming hard and brittle, it would be a great gain. The poorest oil-paint, however, is better than neglect; and the best economy consists in keeping tin entirely and thoroughly protected from the corroding influence of dampness. Old paint, which has become "fatty" from exposure to the atmosphere, is better than new for roof painting. Not a drop of turpentine should be used for such work.—*The Metal Worker.*

Yellow Poplar. — A correspondent writing to the *Northwestern Lumberman* from Clinton, Tenn., says: "While the white-pine manufacturers do not know what to do with all their lumber, we yellow-poplar manufacturers do not know how to manage to supply the steadily increasing demand. Two years ago we could hardly get $16 for Nos. 1 and 2 here, on cars, for the Boston and New York markets, but to-day, with not ten car-loads of good poplar lumber in four mill-yards, we are readily getting $22.50."

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

304,715. SAW. — James E. Emerson, Beaver Falls, Pa.

304,730. FIRE-ESCAPE.—William F. High, Reading, Pa.

304,732. CIRCUIT-CLOSER FOR BURGLAR-ALARMS. — Albert Iske, Lancaster, Pa.

304,736. ANTI-SIPHONING TRAP.—Francis William Kelly, Minneapolis, Minn.

304,744. ROOFING MATERIAL. — Henry M. Miner, Philadelphia, Pa.

304,763. KEY-FASTENER. — Edward K. Summerwell, Covington, Ky.

304,778. DOOR AND GATE SPRING. — John Broughton, Brooklyn, N. Y.

304,780. FIRE-PROOF BUILDING.—Edward M. Butz, Allegheny, Pa.

304,781-784. STRUCTURAL SHAPE FOR BEAMS, GIRDERS, ETC. — Edward M. Butz, Allegheny, Pa.

304,785-792. — METAL COLUMN, GIRDER, OR PILASTER. — Edward M. Butz, Allegheny, Pa.

304,793. CONSTRUCTION OF METAL BUILDINGS. — Edward M. Butz, Allegheny, Pa.

304,794-795. — METAL BEAM OR GIRDER. — Edward M. Butz, Allegheny, Pa.

304,796. FIRE-PROOF BUILDING.—Edward M. Butz, Allegheny, Pa.

304,797-798. METAL BEAM OR GIRDER. — Edward M. Butz, Allegheny, Pa.

304,803. DOOR-SIGNAL. — Alonzo L. Dorn, Chicago, Ill.

304,807. WRENCH. — Benton Elmore, Etna, Cal.

304,814. LOCK-HINGE. — Daniel H. Fitzgerald, Reading, Pa.

304,820. FIRE-ESCAPE. — Joseph Merlin Hodson, Amherstburg, Ontario, Can.

304,821. FOLDING FIRE-ESCAPE LADDER. — Ferdinand W. Hofele, New York, N. Y.

304,823. ELEVATOR. — Merrill N. Hutchinson, New York, N. Y.

304,832. PNEUMATIC DISPATCH AND SIGNALLING APPARATUS.— Edwin S. Leaycraft, Jersey City, N. J.

304,833. SWITCH FOR PNEUMATIC TUBES. — Edwin S. Leaycraft, Jersey City, N. J.

304,834. PNEUMATIC APPARATUS FOR TRANSMITTING PARCELS.—Edwin S. Leaycraft, Jersey City, N.J.

304,841. SEWER-TRAP. — Frederick Meyer, New York, N. Y.

304,850. FIRE-ESCAPE. — Edward Painter, Easthampton, Mass.

304,865. METALLIC LATHING. — Benjamin Scarles, Clinton, Mass.

304,888. VENTILATING APPARATUS. — Henry N. Wickersham, Wilmington, Del.

304,894. FIRE-ALARM.—B. Jay Antrim, Philadelphia, Pa.

304,898. FIRE-ESCAPE. — Gottlieb F. Bauer and Dolph Williams, Springfield, O.

304,902. PROCESS OF MANUFACTURING PAINTS. — Revere M. Breinig, Brooklyn, N. Y.

304,906. FURNACE-GRATE. — Richard S. T. Cissel, Elizabeth, N. J.

304,908. ELECTRIC INDICATING DEVICE FOR ELEVATORS.—Charles L. Clarke, New York, N. Y.

304,909. REVERSIBLE SCRAPER FOR SCRAPING AWAY OLD PAPER, CALCIMINE, ETC., FROM WALLS. —John E. W. Coleman, San Francisco, Cal.

304,911. FIRE AND WATER PROOF PAINT. — Chas. W. Colony, Sandy Creek, N. Y.

304,930. WATER AND WASTE-PIPE. — John J. Herbert, Holyoke, Mass.

304,961. MACHINE FOR TRIMMING AND PUNCHING ROOFING-SLATES.—Charles W. Romoser, Marion, O.

304,964. FIRE-ALARM. — Frank Arthur Simonds, Grand Rapids, Mich.

304,984. SASH-HOLDER. — Wilbur Sargent Young, Gillespie, Ill.

305,000. AUTOMATIC ELEVATOR-GUARD. — Franklin P. Hinds, Boston, Mass.

305,020. INSULATOR FOR LIGHTNING-RODS.—John Anthony Ruth, Baltimore, Md.

305,027. WRENCH.—Edmond H. St. John, Toledo, O.

305,033. STORM AND SCREEN DOOR. — Henry G. Wolfram, Sharon, Wis.

SUMMARY OF THE WEEK.

Baltimore.

STORE AND OFFICE-BUILDING. — Plans are being prepared by Louis J. Ginter, architect, for S. S. Clayton, Esq., for a four-st'y store and office-building, to be erected on West Fayette St., between St. Paul and Calvert Sts., to cost about $5,000.

COTTAGE. —Mrs. Kimberly is having built in the suburbs, on Cold Spring Lane, a two-st'y and attic frame cottage, 33′ 6″ x 35′ 6″, to cost about $3,000, from designs by Louis J. Ginter, architect; Thos. L. Jones, builder.

BUILDING PERMITS. — Since our last report thirteen permits have been granted, the more important of which are the following: —

C. D. Huncke, three-st'y brick building, e s Hanover St., between Conway and Camden Sts.

Henry Winkler, three-st'y brick building, n s Hudson St., w of Curley St.

G. G. Pedrick, three-st'y brick building, e s Norris Alley, s of Lafayette Ave.

S. G. Ridgaway, four-st'y brick warehouse, rear s s Pratt St., w of Fremont St.

W. I. Phillips, 5 three-st y brick buildings, s s Mulberry St., w of Fulton Ave., and 4 three-st'y brick buildings, w s Fulton Ave., n of Lanvale St.

Boston.

BUILDING PERMITS. — *Dartmouth St., No.* 139, Ward 11, for C. G. & R. T. Paine, brick dwell. and store, 43′ x 94′, flat; G. W. Pope, builder.

West Third St., No. 535, Ward 14, for Jno. J. Dorgan, brick stable, 14′ x 14′, flat; Wm. T. Eaton, builder.

Dudley St., No. 302, Ward 20, for Francis Knight, brick apartment-house, 40′ x 54′, flat; A. Ripley, builder.

Trumbull St., No. 19, Ward 17, for Frank Fox, brick stable, 25′ x 40′, flat; I. Bean, builder.

Shawmut Ave., Nos. 356-360, Ward 17, for J. F. Johnson, brick apartment-house, 54′ x 61′, flat; Jas. Smith, builder.

Bradford St., No. 50, Ward 17, for J. F. Johnson, brick apartment-house, 54′ x 61′, flat; J. Smith, builder.

Newbury St., near Exeter St., Ward 11, for W. S. Rand, 2 brick dwells., 22′ x 52′, mansard; W. S. Rand, builder.

Avon Pl., Nos. 29 *and* 31, Ward 22, for S. V. White, 2 brick dwells., 26′ x 36′, flat; S. V. White, builder.

Blue Hill Ave., Ward 21, for A. F. Brown, family-hotel, 70′ x 76′, flat; S. V. White, builder.

Kneeland St., Nos. 147-153, Ward 12, for B. S. Evans, brick workshop, 15′ x 47′, flat; Patrick & Malley, builders.

Warren St., No. 324, Ward 24, for Wm. Donaldson, dwell., 12′ x 36′, flat; Wm. Donaldson, builder.

Everett St., Nos. 60, 62 *and* 64, Ward 2, for Geo. W. Hargrave, 3 dwells., 19′ 8″ x 31′, flat; G. W. Hargrave, builder.

Medford St., No. 82, Ward 3, for Mrs. Henry Moore, dwell., 13′ 4″ x 55′ 1″, flat; Jno. McCusker, builder.

Woodville Sq., No. 19, Ward 20, for C. E. Wiggin, Jr., dwell., 16′ x 16′ and 26′ x 29′, pitch; J. McCusker, builder.

Mayfair St., No. 17, Ward 21, for Alden Frink, dwell., 24′ x 40′, pitch; C. H. Blodgett, builder.

Jarvis Pl., off George St., Ward 20, F. J. Pootunato, mechanical, 20′ x 26′ flat; F. J. Pootunato, builder.

Laurial Ave., n Bernard St., Ward 24, 2 dwells., 14′ x 19′ and 22′ x 31′, pitch.

George St., Nos. 108 *and* 110, Ward 20, 2 dwells. for F. J. Pootunato, 20′ x 40′, flat; F. J. Pootunato, builder.

West Broadway, No. 92, Ward 13, for T. Corcin, frame storage, 14′ x 26′, flat; Jas. Edwards, builder.

Saratoga St., Nos. 817, 820-822, Ward 2, for Thos. Pounder, 3 dwell., 20′ x 26′ (817) and 20′ x 30′, pitch; Thos. Pounder, builder.

Brooklyn.

BUILDING PERMITS. — *Clymer St.*, n s, 100′ e Kent Ave., five-st'y stone factory, tin roof; cost, $25,000; owner, F. Cowperthwait; architect, W. H. Gaylor; builder, Thomas Gibbons.

Manhattan Ave., w s, 325′ s Meserole Ave., 2 four-st'y brick stores and tenements, tin roofs; cost, for both, $14,450; owner, Mary Marrett, 112 Java St.; architect, Fr. Weber; builders, James Rooney and Thomas Keppie.

Meserole St., s s, 200′ e Bushwick Ave., one-and-two-st'y brick stable, tin roof; cost, $4,000; owner, Otto Huber, Meserole St.; architect, Charles Stoll.

South Fifth St., s e cor. Ninth St., one-and-two-st'y church and Sunday-school rooms, slate and tin roof; cost, $65,000; owner, St. Paul's E. L. Church, South Fifth and Ninth Sts.; architects, J. C. Cady & Co.; builders, W. & T. Lamb, Jr., and Bernard Gallagher.

Ninth St., e s, 62′ s South Fifth St., three-st'y brick parsonage, slate and tin roof; cost, $7,500; owner, St. Paul's E. L. Church; architects, J. C. Cady & Co.; builders, W. & T. Lamb, Jr., and Bernard Gallagher.

Myrtle St., 175′ w Evergreen Ave., extending to Myrtle Ave., two-and-three-st'y frame stable and dwell., tin roof; cost, $6,000; owner, A. Lee, 152 South Second St.; architect, E. F. Gaylor.

River front, 196′ s Joralemon St., six-st'y brick warehouse, gravel roof; cost, $45,500; owner, F. Woodruff, 92 Remsen St.; architect and builder, T. Stone.

Powers St., s w cor. Leonard St., four-st'y frame store and tenement, tin roof; cost, $7,000; owner, M. Reynolds, cor. Lorimer and Richardson Sts.; architect, A. Herbert; builders, J. Lehigh and J. Wilson.

Monroe St., n s, 400′ w Ralph Ave., 4 two-st'y and basement brick dwells., tin roofs; cost, each, $4,-700; owner, A. Peck, 755 Monroe St.; architect and carpenter, F. Marryott; mason, T. Miller.

Herkimer St., n s, 150′ w Hopkinson Ave., two-st'y frame dwell., tin roof; cost, $3,000; owner, D. Poumerenk, 2134 Atlantic Ave.; builder, W. Vitz.

Humboldt St., n w cor. Seigel St., four-st y brick factory, tin roof; cost, $15,000; owner, Martin Worn, on premises; architect, J. Platte; builder, J. Auer.

Franklin Ave., e s, 75′ s Gates Ave., 2 three-st'y dwells., gravel roofs, wooden cornices; cost, each, $7,500; owner and builder, J. B. Alexander; architect, A. Hill.

Bedford Ave., w s, 40′ n Butler St., three-st'y and basement tenement, tin roof; owner, Mrs. S. Berri, 448 West Twentieth St., New York; architects, J. B. McElfatrick Sons & De Baud; builder, A. C. Squires.

Clifton Pl., n s, 25′ w Nostrand Ave., three-st'y brick tenement, tin roof; cost, $7,000; owner and architect, Henry Van Staden, Clifton Pl., n w cor. Nostrand Ave.; mason, not selected; carpenters, Williams & Bros.

Maujer St., Nos. 189 *and* 191, three-st'y brick school, tin roof; cost, $8,500; owner, German Evangelical Lutheran St. John Church, Grahsm Ave., cor. Ten Eyck St.; architect, Th. Engelhardt; builders, J. D. Anderson and J. G. Hoepfer.

Union Ave., e s, 100′ n Frost St.; two-st'y frame tenement, tin roof; cost, $3,500; owner, P. J. Campbell, Union Ave., near Frost St.; architect, E. F. Gaylor; builder, not selected.

Fourth Ave., w s, 50′ s Seventeenth St., 2 three-st'y brick stores and tenements, tin roofs; wooden cornices; cost, each, $10,000; owner, Thomas Pitbladdo, 213 Seventeenth St; architect, J. B. Pitbladdo; builders, W. & T. Corrigan.

Monroe St., n s, 225′ w Broadway, 6 two-st'y frame dwells., gravel roofs; cost, each, $3,000; owner, Jas. H. Hart, No. 1 Fort Greene Pl.; architect, C. F. Eisenach; builder, J. Bauer.

ALTERATIONS. — *Court St., No.* 233, new brick front and add one-st'y; also four-st'y brick extension; cost, $6,850; owner, A. Lutiger, on premises; architects and builders, M. Freeman's Sons.

North Second St., No. 380, add two stories and alter to store and tenement, front wall rebuilt; cost, $4,-900; owner, John A. Albohn, 378 North Second St.; architect, L. F. Graether; builder, J. Schook.

Chicago.

BUILDING PERMITS. — J. Casey, three-st'y store and flats, 107 East Huron St.; cost, $6,000; architect, J. Otter; builder, E. Lindstrom.

J. Schramm, three-st'y store and dwell., 559 Twenty-seventh St.; cost, $8,000.

A. Weaver, 3 two-st'y dwells., 109 and 111 Seeley Ave.; cost, $6,000; builder, S. Webb.

Karl Kristan, three-st'y store and dwell., 735 Milwaukee Ave.; cost, $10,000; architect, H. F. Kley.

J. Rowe & R. Prosser, 2 two-st'y dwells., 3450 and 3452 Dearborn Ave.; cost, $8,000.

J. Busby, 4 two-st'y dwells., 3422-3428 Dearborn St.; cost, $12,000.

W. Collins, two-st'y dwell., 226 Laflin St.; cost, $3,000.

J. Gubbins, two-st'y dwell., 19 Winthrop Pl.; cost, $3,000.

B. Steinbrecker, two-st'y store and dwell., 786 Eighteenth St.; cost, $4,500.

J. W. Crandal, two-st'y dwell., 3721 Lake Ave.; cost, $5,000; architect, L. B. Dixon; builders, Barney & Rodatz.

W. H. Burnett, 2 two-st'y dwells., 2340 Indiana Ave.; cost, $8,000; architect, S. S. Beman.

S. L. & J. B. Wood, 2 two-st'y dwells. 804 and 806 West Monroe St.; cost, $11,000; architect, P. W. Ruehl; builder, J. Pratt.

Mitchell, two-st'y dwell., 635 West Adams St.; cost, $7,000; architect, Halberg.

G. W. Hoffman, 7 three-st'y stores and dwells., 3622 to 3632 Cottage Grove Ave.; cost, $35,000; architects, Thomas & Rogers; builder, J. Kraloce.

H. H. Beers, two-st'y dwell., 1225 West Jackson St.; cost, $3,000.

J. Walsh, two-st'y store and dwell., 37 Parnell Ave.; cost, $3,000.

D. A. Titcomb, two-st'y store and dwell., 124 North West Ave.; cost, $4,000.

St. Stanislaus School, basement, 55 Bradley St.; cost, $3,000.

Wm. Mahoney, three-st'y store and dwell., 147 West Jackson St.; cost, $6,000.

A. C. Gebhardt, five-st'y warehouse, 253 and 255 Kinzie St.; cost, $18,000; architect, Wm. Strippelman; builder, Geo. Eberlein.

C. Heinze, two-st'y dwell., 28 Evergreen Ave.; cost, $7,000; architects, Schaub & Berlin; builder, Chas. Krueger.

H. Kerr, 2 two-st'y dwells., 1120 and 1122 Jackson St.; cost, $7,000; architect and builder, P. R. James.

A. H. Nelson, two-st'y dwell., 185 West Division St.; cost, $2,800.

W. M. Crilly, two-st'y livery stable, 200 and 202 Thirtieth St.; cost, $12,000; architect, F. B. Townsend; builder, W. M. Crilly.

F. F. Axtell, two-st'y dwell., 512 West Monroe St.; cost, $10,000; architect, J. H. Moore; builder, J. Hebard.

J. C. Jaeger, two-st'y dwell., 438 Garfield Ave.; cost, $3,000.

A. Wigglesworth, two-st'y dwell., 58 Oak St.; cost, $3,000; architect, A. McIntosh.

H. H. Brinton, 3 two-st'y dwells., 1183 to 1187 Van Buren St.; cost, $6,000.

R. Meadowcraft, three-st'y flats, 278-280 East Erie St.; cost, $18,000; architect, J. S. Woollacott; builders, J. Woollacott & Son.

B. Case, two-st'y store and flats, 976 West Lake St.; cost, $3,800.

E. Lehman, 4 four-st'y stores and flats, 558-564 West Harrison St.; cost, $30,000; architect, S. B. Shipman; builders, Geo. Lehman & Co.

M. Watson, three-st'y store and flats, 280 East Division St.; cost, $7,000.

D. M. Snow, four-st'y store and flats, 3403-3405 State St.; cost, $10,000; architects, Thomas & Rodger; builder, B. Robinson.

G. Reshopt, two-st'y store and dwell., 363 North Ashland Ave.; cost, $2,500.

J. D. Becket, 9 three-st'y stores and flats, 262-276 Ogden Ave.; cost, $40,000; architect, C. L. Stiles; builder, L. Daegling.

J. Alexia, two-st'y dwell., 697 West Eighteenth St.; cost, $3,500.

J. Dolsen, three-st'y store and dwell., 703 Throop St.; cost, $7,000; architect, J. Ruehl; builder, M. Holtz.

J. M. Cully, two-st'y dwell., 905 West Monroe St.; cost, $7,500; architects, Burnham & Root; builder, H. Hibbard.

Chicago Theological Seminary, three-st'y factory, 507-513 West Kinzie St.; cost, $12,000; architect, F. Naesches; builder, C. G. Mulles.

S. Brintnell, two-st'y dwell., 3438 Wabash Ave.; cost, $8,000.

T. Nickerson, 2 two-st'y dwells., 3440-3412 Wabash Ave.; cost, $16,000; architects, Burling & Whitehouse; builders, Burney & Rodatz.

M. F. Crowe, three-st'y store and dwell., 192-194 West Indiana St.; cost, $8,000.

J. Krabenstein, addition, 739 Wells St.; cost, $2,-900.

Keo & Chaplin, three-st'y flats and barn, 67 Hills St.; cost, $9,000; architects, Harold & Hanson.

Bethany Congregational Society, two-st'y church, cor. Superior and Lincoln Sts.; cost, $1,000; architect, J. C. Moore; builders, Barker & Son.

H. C. Anderson, two-st'y dwell., 539 South Leavitt St.; cost, $2,500; architect, L. B. Halberg.
J. Busch, addition, 554 Sedgwick St.; cost, $2,500.
A. Silha, 2 three-st'y stores and flats, 518-550 Blue Island Ave.; cost, $15,000; architect, P. W. Ruehl; builders, Bemis & Sayers.
W. H. Thomas, 3 cottages, 881-895-897 Elk Grove Ave.; cost, $3,000.
Dr. J. Ullrich, two-st'y dwell., 202 Centre Ave.; cost, $8,500; architects, Cudel & Blumenthal; builders, Mueller & Scheel.
J. M. Dowling, 4 three-st'y dwells., 129-135 Pearson St.; cost, $30,000; architect, A. Smith; builder, J. M. Dunphy.
P. & W. Brosman, 2 three-st'y stores and flats, 862-861 Milwaukee Ave.; cost, $20,000; architect, J. J. Egan; builder, M. J. Benson.
W. Howe, two-st'y dwell., 362 Fourteenth St.; cost, $2,700.
F. Schulz, two-st'y dwell., 964 Eighteenth St.; cost, $2,700.
Ashbury Church, church, 3120 Fifth Ave.; cost, $5,000; architect, C. M. Palmer.
F. Krey, three-st'y store and dwell., 168 East North Ave,; cost, $6,000; architect, Rehwaldt.
L. A. Bailey, two-st'y dwell., 780 Hubbard St.; cost $2,500.
Heissler & Jung, four-st'y bakery, cor. State and Twenty-fourth Sts.; cost, $60,000; architects, Furst & Rudolph; builder, H. Appel.
A. Churchill, three-st'y livery stable and dwell., 184 and 186 Green St.; cost, $12,000; architect, C. C. Miller; builders, O'Neil Bros.
Thos. Pursell, four-st'y store and dwell., 149 West Twelfth St.; cost, $10,000; architect, W. Ruehl; builders, Kelly & Cooney.
M. O'Connell, 2 two-st'y dwells., 3631 and 3633 Vernon Ave.; cost, $8,500; architect, J. J. Egan; builder, J. Conley.
W. J. Watson, two-st'y dwell., 2610 Prairie Ave.; cost, $30,000; architects, Treat & Foltz; builder, A. Bienolt.
M. F. Irwin, three st'y store and flats, 1186 West Van Buren St.; cost, $9,000; architects, J. Van Osdel & Co.; builders, Clark Bros.
C. Kleihn, two-st'y flats, 233 West Huron St.; cost, $3,800.
LeGrand Skating-Rink Co., skating-rink, 412 to 430 North Clark St.: cost, $7,000.
G. Edwards, three-st'y flats, 402 Maxwell St.; cost, $12,000; architect, F. Keltanick.
O. C. Johnson, three-st'y flats, 82 West Huron St.; cost, $4,000.
W. H. Thomas, two-st'y dwell., 1417 West Jackson St.; cost, $2,500.
E. J. Roda, 4 one-st'y cottages, Twenty-fourth Place; cost, $4,000.
F. Haeckendehl, two-st'y flats, Laurell St.; cost, $3,300.
F. Pegel, two-st'y flats, 593 West Fourteenth St.; cost, $4,100.
Mrs. B. Bloom, 8 two-st'y stores and flats, 213 to 257 Thirty-first St.; cost, $25,000; architects, Treat & Foltz; builder, W. Illett.
E. Einter, two-st'y dwell., 323 Twenty-second St.; cost, $4,300.
M. Krauser, store, 985 Milwaukee Ave.; cost, $4,000.
Conrad Seipp, 3 two-st'y dwells., 2960 to 2964 Groveland Park Ave.; cost, $21,000; architects, Bauer & Hill; builder, C. Thiele.
J. Walker, 2 one-st'y cottages, Hanover St., cor. Twenty-eighth St.; cost, $2,700.
F. H. Eiler, two-st'y dwell., 803 Clybourn Ave.; cost, $3,000.
J. A. Lamb, two-st'y dwell., 1254 West Monroe St.; cost, $2,800.
Chas. Shober, three-st'y dwell., 514 Wells St.; cost, $10,000.

Cincinnati.

BUILDING PERMITS. — Mrs. Kiefer, three-st'y brick building, n s of Elm St., between Liberty and Green Sts.; cost, $4,000.
Wm. Fogarty, two-st'y brick building, w s of Gilbert Ave.; cost, $2,000.
Sam. Doll, two-st'y brick building, 515 Walnut St.; cost, $2,060.
H. J. Winton, two-st'y frame building, s s of Eastern Ave., between Reed and Broad Sts.; cost, $2,000.
J. S. Dempsey, two-and-one-half-st'y frame building, w s of Eastern Ave.; cost, $2,500.
Six permits for repairs, costing $3,000.
Total cost to date, $2,479,255.
Total permits to date, 635.

New York.

ARMORIES. — The Sinking Fund Commissioners have authorized an expenditure of $2,000,000 for new armories. A competition for plans has been decided on.

BREWERY. — Conrad Stein's brewery, on Fifty-sixth and Fifty-seventh Sts., between Tenth and Eleventh Aves., is to have additions and alterations made, at an expense of about $50,000, from plans of Mr. Julius Kastner.

INANIMATION is the order of the day. The stonemason's strike seems to be the last straw to break the camel's back, and outside of the most ordinary work of "up-town speculative builders," we find no work not previously noted to report.

BUILDING PERMITS. — *Thirteenth Ave.*, s e cor. Fourteenth St., 2 six-st'y brick storage warehouses, gravel roofs; cost, each, $42,000; owners, H. K. Thurber & Son, 146 West Twelfth St.; architect and builder, J. G. McMurray.
One Hundred and Twenty-fifth St., n s, 225′ e Seventh Ave., three-st'y brick stable, tin roof; cost, $30,000; owner, William E. Dean, 235 East One Hundred and Twenty-fourth St.; architects, Cleverdon & Putzel.
Eighth Ave., e s, 100′ 10″ n One Hundred and Twenty-second St., 3 four-st'y brick tenements, tin roofs; cost, each, $11,000; owner, Lorenz Weiher, New Rochelle; architect, J. F. Burrows.
One Hundred and Forty-ninth St., n s, 100′ w Third Ave., three-st'y frame tenement, tin roof; cost, $3,000; owner, Fritz A. Seijo, Third Ave., cor. One Hundred and Forty-ninth St.; architect, A. Pfeiffer.
One Hundred and Fifty-first St., n s, 275′ e Courtlandt Ave., three-st'y frame tenement, tin roof cost, $5,500; owner, Geo. Stolz, 642 North Third Ave.; architect, same as last.
Fourth Ave., s e cor. One Hundred and Thirteenth St., five-st'y brick store and apartment-house, tin roof; cost, $24,000; owner, Wm. Henderson, 512 East Eighty-second St.; architect, J. C. Burne; builder, not selected.
One Hundred and Thirteenth St., s s, 26′ e Fourth Ave., five-st'y brick store and apartment-house, tin roof; cost, $21,000; owner, etc., same as last.
One Hundred and Thirteenth St., s s, 52′ e Fourth Ave., 5 five-st'y brick apartment-houses, tin roofs. cost, $20,000; owner, architect and builder, same as last.
Norfolk St., n w cor. Hester St., five-st'y brick tenement, tin roof; cost, $15,000; owner, Jacob Gottlieb, 33 Hester St.; architect, Chas. Rentz.
Sixty-ninth St., s s, 100′ w Ninth Ave., 5 four-st'y brown-stone front dwells., tin roofs; total cost, $90,000; owner, Chas. L. Guilleaume, 56 East Seventy-sixth St.
One Hundred and Tenth St., s s, 170′ w Third Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $16,000; owner, Timothy Daly, Jr., 323 East Eighty-sixth St.; architect, Elbert D. Howes; builder, Hugh Meehan.
One Hundred and Thirtieth St., n s, 75′ w Boulevard, two-st'y brick building, tin roof; cost, $28,000. owner, Chas. Franke, 135 West One Hundred and Thirtieth St.; architect, Wm. Graul.

ALTERATIONS. — *Rutherford Pl.*, No. 3, four-st'y brick extension, tin roof, interior alterations; cost, $6,000; owner, A. H. Flanders; architect, H. Kreitler.
West One Hundred and Twenty-fifth St., No. 40, one-st'y and basement brick extension, tin roof, also store-front in first story; cost, $3,000; owner, Bernard McGurk, 341 East One Hundred and Twenty-fourth St.; architect, Chas. Rentz.
One Hundred and Thirty-fourth St., s s, 150′ e Lincoln Ave., raise one st'y; cost, $5,000; owner, The New York Wood-Turning Co., on premises; architect and builder, Wm. J. Merritt.
Ninety-eighth St., s s, 110′ e Third Ave., to finish four uncompleted buildings; cost, $7,000; owner, Richard Claffy, 903 Bushwick Ave., Brooklyn; architect, E. D. Howes.

Philadelphia.

CHURCH. — *Tacony St.*, cor. of Keystone and Unrich St., the St. Leo's R. C. Church is being erected from plans by Frank Watson, architect; 68′ x 140′; cost about $60,000.

BUILDING PERMITS. — *Garrett St.*, e of Twenty-first St., 14 two-st'y dwells., two, 16′ x 35′, twelve, 14′ x 36′; Jno. White, owner.
Broad St., cor. Cumberland St., three-st'y store and dwell., 20′ x 66′; J. N. Pattison, contractor.
Fifth St., cor. Columbia Ave., four-st'y factory and boiler-house, 63′ x 100′; Geo. Krissler, contractor.
Howard St., n of Somerset St., 2 two-st'y dwells., 18′ x 42′; W. A. N. Fuller, owner.
Ridge Ave., n of Sedgeley St., 3 three-st'y dwells., 16′ x 54′; Z. Stout, owner.
James Ave., e of Ridge Ave., two-st'y dwell., 16′ x 46′; Chas. Bartle, contractor.
Twenty-second St., s of Allegheny Ave., 3 two-st'y dwell., 17′ x 45′; J. E. Throp, contractor.
Howard St., n of Cambria St., two-st'y dwell., 17′ x 40′; J. Firth, contractor.
Caroline St., n of Susquehanna Ave., 7 two-st'y dwells., six, 14′ x 40′; one, 15′ x 40′; Jas. B. Carey, contractor.
Sixty-third-and-a-half St., s of Hamilton St., two-st'y dwell., 16′ x 40′; B. T. Kelly, owner.
Dauphin St., w of Fifteenth St., 2 two-st'y dwells., 16′ x 50′; Jas. Shoemaker, owner.
Penn St., n of Allen St., three-st'y dwell., 20′ x 58′; Wilson Milnor, contractor.
Twenty-fifth St., bet. Sharswood and Stewart Sts., 6 three-st'y dwells., and 2 stores, 16′ x 49′; J. G. Ruff, contractor.
Sharswood St., bet. Twenty-fifth and Twenty-sixth Sts., 11 two-st'y dwells., 11′ x 34′; J. G. Ruff, contractor.
Stewart St., bet. Twenty-fifth and Twenty-sixth Sts., 11 two-st'y dwells., 14′ x 34′; J. G. Ruff, contractor.
North Eleventh St., No. 2242, two-st'y dwell., 16′ x 48′; Jos. Lutz, contractor.
Dorrance St., No. 1322, two-st'y dwell., 16′ x 26′; C. J. Newman, contractor.
Greenway Ave., w of Seventy-fourth St., 2 two-st'y dwells., 30′ x 32′; G. T. Patchel, contractor.
Cresheim Creek, near new railroad bridge, two-st'y factory building, 30′ x 50′; D. Hey, owner.
South St., Nos. 1508 and 1510, 2 two-st'y stores, 18′ x 40′; Geo. W. Leech, owner.
Eighth St., n of Cumberland St., 7 two-st'y dwells., 15′ x 47′; A. D. Kennedy, owner.
James Ave., e of Ridge Ave., two-st'y dwell., 17′ x 43′; D. Nunnville, owner.
Franklin St., cor. Foulkrod St., 2 two-st'y dwells., 16′ x 48′ and 20′ x 57′; A. Linn, contractor.
Twenty-eighth St., e of Oxford St., 2 two-st'y dwells., 14′ x 40′; Henry Rankin, owner.
Oxford St., e of Twenty-eighth St., 2 two-st'y dwells., 14′ x 40′; Henry Rankin, owner.
Frankford Road, n of Clearfield St., two-st'y store and dwell., 18′ x 50′; Henry G. Schultz, contractor.
Thirty-second St., cor. Hartwell Ave., three-st'y dwell., 88′ x 112′; Wm. C. Mackie, contractor.
Sixth St., s of Cumberland St., three-st'y dwell., 17′ x 54′; W. H. Lower, contractor.
Vine St., w of Fifty-sixth St., two-st'y dwell., 16′ x 44′; Geo. Willetts, owner.
Lyceum Ave., No. 460, three-st'y dwell., 18′ x 50′; E. C. Parker, owner.
Ash St., n w of Richmond St., three-st'y store and dwell., 16′ 8″ x 46′; A. R. De Crosta, contractor.
Ash St., n w of Richmond St., three-st'y dwell., 16′ x 40′; A. R. De Crosta, contractor.
Croskey St., s of Montgomery Ave, 6 three-st'y dwells., 15′ x 47′; Jno. S. Serrill, owner.
Twenty-third St., cor. Morris St., two-st'y dwell., 17′ x 51′; Haibach & Auchter, contractors.
Fisher St., No. 1313, two-st'y dwell., 16′ x 32′; Bridget Blake, owner.
Frankford Road, No. 3136, three-st'y dwell., 28′ x 48′; Thos. J. Goldsmith.
Marion Ave., w of Forty-fifth St., 7 two-st'y dwells., 15′ x 37′; Jno. Bateson, Jr., owner.
South St., No. 507, three-st'y store and dwell., 15′ x 54′; Dahl & Kidel, contractors.
Ashmead St., e of Main St., 2 two-st'y dwells., 16′ x 36′; G. W. Kaupp, owner.
Fiftieth St., cor. Aspen St., 4 two-st'y dwells., 13′ x 42′; Daniel Flaeger, owner.

ALTERATIONS and improvements are being made to the St. Peter's R. C. Church, Fifth St., cor. Gerard Ave., and to St. Philip's R. C. Church, Second St., cor. Queen St.; from plans by Deery & Keerl, architects and civil engineers.

St. Louis.

BUILDING PERMITS. — Fifty permits have been issued since our last report, nineteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —
Mr. Johansen, 2 adjacent two-st'y dwells.; cost, $7,000; A. Whri, contractor.
Joseph Gallagher, two-st'y brick building; cost, $5,000; Jos. Gallagher, contractor.
G. Waugh, 2 adjacent two-st'y tenements; cost, $3,000; G. Waugh, contractor.
Mrs. Curtis, two-st'y brick dwell.; cost, $5,000; B. J. Goesse, architect; Goesse & Remmers, contractor.
Morris Maloney, 2 adjacent two-st'y tenements; cost, $4,000; T. Murphy, contractor.
Herman Stamm, 2 adjacent two-st'y tenements; cost, $7,600; Geo. Roeder, contractor.
D. Malone, two-st'y brick dwell.; cost, $3,000; T. Murphy, contractor.
D. Malone, two-st'y brick dwell.; cost, $3,000; T. Murphy, contractor.
St. Vincent Parish, two-st'y brick school-house; cost, $11,000; J. S. Frye, contractor.
T. Manning, 3 adjacent two-st'y tenements; cost, $6,000; T. Manning, contractor.
R. C. Miller, two-st'y brick dwell.; cost, $2,965; E. C. Johnsen, architect; Helm Bros., contractors.
James Burke, 2 adjacent two-st'y dwells.; cost, $3,500.
Thomas Kinneary, two-st'y brick tenement-house; cost, $3,000; M. Saine, contractor.
Rock Spring Distilling Co., one and two st'y distillery; cost, $10,000; Jno. Bambrick, contractor.
Wm. Behrens, two-st'y brick tenement; cost, $3,000; Schildermann & Gross, contractors.

General Notes.

BURLINGTON, VT. — C. Macomber, wood dwell.; cost, $6,000; D. S. Hopkins, Grand Rapids, Mich., architect.

BUSTLETON, PA. — The M. E. Church will be remodelled, and new spire added; from plans by Hazlehurst & Huckel, architects, Philadelphia, Pa.

CASOPOLIS, MICH. — C. S. Kingsbury, wood dwell.; cost, $6,000; D. S. Hopkins, Grand Rapids, Mich., architect.

CONSHOHOCKEN, PA. — Public school-house, of pressed brick and Trenton brown-stone, 32′ x 100′; probable cost, $18,000; plans by Hazlehurst & Huckel, architects, Philadelphia, Pa.

FARMINGDALE, ILL. — Two-st'y frame dwell., cost, $3,000; W. Ludlam, owner; George H. Helmle, architect.

FARMINGTON, CONN. — The women who have been members of Miss Porter's school have raised $5,000 and will build a memorial hall to be used in connection with the school, for music-rooms and a studio. The hall will be 30′ x 46′, and two stories high.

GLEN COVE, N. Y. — The plans for the new Episcopal church in this village have been completed by H. M. Congdon, of New York. The cost will not exceed $12,000. The work will be vigorously prosecuted, with a view to completion by Christmas.

GRAND RAPIDS, MICH. — The building interest is rather quiet architecturally, in this section at present; at the same time there are a great many cheap, small dwells. being built in the suburbs, and mechanics seem to be quite busy.
The fall work seems to be of the latter class mostly.
W. A. Bencke, wood dwell.; cost, $2,500; D. S. Hopkins, Grand Rapids, Mich., architect.
J. B. Evans, wood dwell.; cost, $2,500; D. S. Hopkins, Grand Rapids, Mich., architect.
Miss McDowell, wood dwell.; cost, $2,000; D. S. Hopkins, Grand Rapids, Mich., architect.

IMLAY CITY, MICH. — E. E. Palmer, wood dwell.; cost, $3,000; D. S. Hopkins, Grand Rapids, Mich., architect.

JANESVILLE, WIS. — Albert Kavilsge, wood dwell.; cost, $3,000; D. S. Hopkins, Grand Rapids, Mich., architect.

KALAMAZOO, MICH. — G. E. Stockbridge, wood dwell. and stable; cost, $8,000; D. S. Hopkins, Grand Rapids, Mich., architect.

KANSAS CITY, MO. — D. B. McMechan, brick residence at 1303 Penn St.; cost, $5,000.
Dr. W. H. Kimberlin, double brick residence on McGee St., near Independence Ave., four-st'y, and 38′ x 40′ cost, $8,000.
James Park, brick house, at s w cor. Eighteenth St. and Broadway; cost, $3,000.

MINNEAPOLIS, MINN. — R. E. Lidgerwood, three-st'y brick store and 4 flats, Washington Ave., bet. Thirteenth and Fourteenth Aves. s; cost, $6,000.
Pilgrim Congregational Church Society, wooden church, s w cor. Lyndale and Fourteenth Ave. n; cost, $11,000.
F. L. Hutchins, two-st'y wood dwell., w s Fifteenth Ave., s, near Eighteenth St.; cost, $4,000.
George H. Holt & Sons, two-and-one-half-st'y dwell., cor. of Park and Sixteenth Aves., s; cost, $7,000.
John Hidlund, double store, two-st'y, cor. of Twelfth St. and Twentieth Ave., s; cost, $4,000.
Andrew Charles, double wooden tenement, cor. Seventeenth Ave. s, and Twenty-fifth St.; cost, $3,000.

NEWARK, N. J. — The corner-stone of a new pastoral residence for the Rev. Father Gottfried Prieth, pastor of St. Peter's Roman Catholic (German) Church, on Belmont Ave., was laid September 14.

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CONTENTS.

We have received a letter, marked "not for publication," from one of the largest manufacturers of plumbing goods in New York, informing us that we know very little of the way in which such goods are sold, contradicting our statement that architects are not generally furnished with discount sheets by dealers, and complaining that our comments upon the dispute between the plumbers and the dealers in New York are "hardly fair to men who, it may be with considerable loss to themselves, stand up for what is just and right." In regard to the assertion made in the letter, that our information on the subject is very limited indeed, that the rule of our correspondents' house "has always been to furnish architects with trade discounts," and that the same thing "is done by all manufacturers of any standing" within his knowledge, we can only say, after such experience as can be gained from directing the execution of perhaps a hundred and fifty thousand dollars' worth of plumbing contracts, that we have never received but one discount sheet from the particular firm which objects to our conduct, and, if we recollect rightly, only one from any other manufacturer or dealer. Furthermore, on making personal request from our critics for a discount sheet to put with a new price-list that they had sent us, we failed to obtain it, and were obliged to seek the aid of a friendly plumber to secure a document which is unfortunately indispensable in examining plumbing accounts. If, by some strange oversight, our names alone have of late years been omitted from the mailing lists for discount slips of all the manufacturers and dealers in plumbing goods, we should be glad to know it, and to have them reinstated without delay, and if there are any other architects who do not receive discount sheets regularly, we shall be happy to have them join us in the application.

In regard to the other question, whether the dealers are, in their struggle with the plumbers, standing up for what is just and right, against trade-unionism or communism, we confess to a certain doubt. Hitherto the matter of plumbers' trade discounts has presented itself to us only as a system under which, for some incomprehensible reason, architects were compelled, in examining plumbers' bills, to get out two or three printed price-lists, and find the value there set down as corresponding with each item in the account; then, with the help of such discount sheets as they could procure, to calculate the sum which must be subtracted from this price to find the net cost, and finally to add to the net cost a reasonable allowance for profit, say twenty-five per cent, and compare the result with the figures in the bill. As the discounts now vary from nothing to sixty per cent, according to the character of the goods, and have been seventy per cent or more for certain kinds, the conscientious performance of this duty involves an expenditure of time and labor on the part of the architect entirely out of proportion to that required for checking bills for other building materials. If, as we are told, the convenience of the dealers in plumbing goods is, in some mysterious way, promoted by requiring all this work of architects, we presume that those of the latter who are regularly furnished with discount sheets will submit quietly for the present, but the whole profession will welcome the day when wholesale prices of iron pipe and brass faucets are quoted like those of brick and wood, and can be as easily checked, with the usual profit added, on plumbers' bills. As we understand it, the plumbers themselves have something the same idea. Although we have been told the contrary in some of the dealers' letters, we do not find that the plumbers wish to conceal the trade prices of the goods they buy from those who wish to know them. Their principal claim is, not that the dealers should keep the trade prices secret, but that they should not sell at these prices to persons out of the trade, and, as we have said before, we see no reason why this favor should not be accorded to them, just as it is by wholesale dealers in other sorts of goods to their principal customers. If there are any reasons why the trade in plumbing goods should be made an exception to the rule, they can best be argued by the parties concerned, without reference to the architects, who would rejoice sincerely to see a definite retail price-list established for such goods, at a reasonable advance on the net cost, and all plumbers secured in the enjoyment of the profit to be derived from selling in accordance with it.

We have a very pleasant letter from Cincinnati, setting us right with regard to the story about the "ruins" at the Art Museum, which we borrowed, with some suspicion, from the New York *Times*. The facts of the case are, in respect to the first structure spoken of, that six Corinthian columns, designed by the present architect of the Museum building, were saved almost uninjured from the fire which destroyed the County Court House last year. Although executed more than thirty years ago, the columns were designed with scrupulous fidelity to the best examples of the order, and as they would otherwise have been broken up to build cellar walls of, the suggestion was made that they should be preserved as models for the School of Design. Their value for this purpose is increased by the fact that there is only one other building in Cincinnati with Corinthian columns, and this is soon to be removed, and private individuals having offered to defray the cost of removing and setting up the columns, the Trustees of the Museum set apart a place for them, near the Museum, but necessarily outside, since the columns are forty feet high. We are very glad to make this correction, which shows the foundation of the *Times'* foolish story to have been a movement which does great credit to the thoughtfulness of those who suggested it. The other story, about the "Castle of Elsinore," appears to have had even less ground. It seems that a stone building was recently erected, but not near the Art Museum, by the City Water Works Board, to cover the valves in some large main pipes, and the superintendent of the works, or some other individual, thought fit to call the structure "Elsinore," and from this meagre material the *Times* reporter manufactured his romance about the Trustees of the Art Museum and their "model castle." We can only say that we are sorry to have been deceived by it, and shall wait, on the next occasion, for more evidence before we allow our faith in the good taste of those who direct the affairs of art in Cincinnati to be shaken.

A SERIOUS accident took place not long ago at Detroit, where the trusses of a new skating-rink fell in, carrying with it eight men who were at work on the roof. Fortunately, none of the men were fatally injured, although most of them received sprains or bruises. The building was constructed with walls of boards on light studding, carrying trusses one hundred feet in span. The description given in the Detroit papers is not very clear, but the trusses seem to have been of arched form, rising about twelve feet in the middle, with horizontal tie-beams. These tie-beams were made of three planks, bolted together, but carelessly constructed, one of them, as it lay on the ground after the accident, showing two heading joints between the planks at the same point, throwing the whole tension upon the third plank. The accident seems to have brought a great deal of unfavorable criticism upon the architect, who very injudiciously tried to excuse himself by saying that there was hardly an architect in the city who considered himself competent to design a truss roof of the character of the one which fell. This excited the indignation of his professional brethren, and they made haste to hold him up to still further scorn, which, whether deserved or not, will, we hope, teach him the lesson that detraction from the merit of others is a poor way to gain credit for one's self. The real responsibility of the architect for the accident seems to have been quite remote. Knowing his own inability to design such a roof correctly, he was prudent enough to employ a civil engineer to do it for him, including in the commission the planning of the supports. This is exactly what he ought to have done, and what every architect should do in cases where he has reason to distrust his own imperfect or half-forgotten science, and upon the actual designer of the structure should rest the blame of its failure.

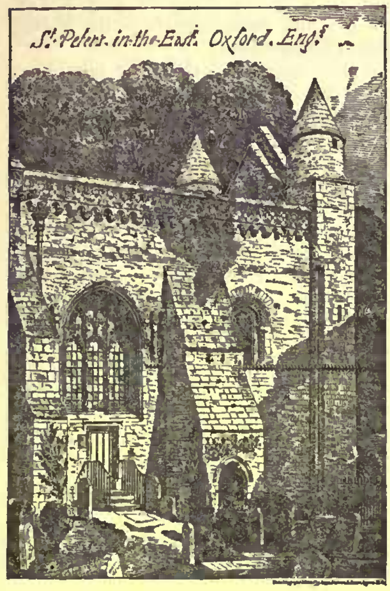
THE *Scientific American* makes a suggestion as to the cause of the frequent burning of barns which deserves the attention of architects. As an illustration of its theory it relates a story of a workman who, while helping to get in some hay which had been gathered in cocks and protected with caps the night before, remarked that the hay was warm. Another man suggested that it might be hot enough to light a match, and the first, to satisfy himself, dropped an unlighted match into a rick near by. In five minutes the rick was in a blaze. If hay stacked in an open meadow will set fire to a match, the *Scientific American* thinks that when packed in masses in a close loft it may heat so much as to kindle the more combustible particles, and burn itself, with the building containing it. Any one can satisfy himself of the effect of fermentation in raising the temperature of leaves or other vegetable substances by looking at a thermometer plunged in a fresh hot-bed, or by thrusting his hand into a heap of moist leaves, or fresh-cut grass, or even tan bark. In the former case he will often see the mercury far above one hundred degrees Fahrenheit, while the hand will sometimes detect a heat in the interior of the mass which it cannot bear without some discomfort. The larger the mass, and the more closely it is packed, the higher will be the heat, and where the air is prevented from circulating, the constant addition of heat may bring it to the point of charring the woody particles. Once at this stage, the sudden admission of air would probably set the charred material into a blaze. The best way of avoiding this danger is to provide thorough ventilation for hay-lofts. With free access of air, not only is the fermentation of the imperfectly cured hay checked, and a part of it thus saved from spoiling, but the heat is carried away before it becomes intense enough to do harm.

LE GENIE CIVIL gives some curious particulars in regard to epidemic cholera, which, if not very pleasant to read, may be useful to remember. According to Dr. Hector George, the author of the article, the second and final stage of the disease is characterized by a change in the condition of the blood, which becomes thick, "like gooseberry jelly," and gradually ceases to circulate through the veins and arteries. During this stage, which sometimes continues for a day or two before death takes place, the patient has the appearance of a corpse. The skin is cold and blue, from the darkening of the unoxygenated blood in the small veins and arteries, the pulse ceases, partially or entirely, and the lungs act so feebly that there is often difficulty in ascertaining whether vitality has wholly departed or not. In two instances, during the epidemic of 1848–49, cholera patients who had been pronounced dead were brought back to life; in one case by prolonged immersion in a warm bath, and in the other by injecting water into the veins; and it is singular that not only does the body usually remain without signs of decomposition for a long time, often five or six days after the action of the heart has stopped, but it is common, in the autopsy of victims of cholera, to observe movements of the limbs of the corpse. One surgeon mentions that in post-mortem examinations of cholera patients he had been obliged to fasten them to the operating-table, to prevent them from falling from it; and another speaks of a case where, having moved aside the hands, which interfered with his work, the corpse immediately replaced them in their former position. In the same case, the first touch of the scalpel, after the hands had been again removed and secured where they would be out of the way, caused a general muscular contraction; but, as the surgeon says, being accustomed to the movements of dead cholera patients, he went on and finished the operation which he intended. In view of these facts, it seems well to consider that in the terror of an epidemic, interments of those supposed to be dead are very likely to be hastily made, and if there is any reason to doubt the complete extinction of life, it is not only safe, but prudent, to delay final disposition of the corpse until all efforts at resuscitation have failed. Among the means for combating the deadly stagnation of the "collapse," Dr. George mentions particularly the use of water. Rubbing with hot, dry towels, blisters and massage have all been tried for restoring warmth and circulation, with more or less success, but together with these it seems necessary to restore fluidity to the blood, either by injecting water directly into the circulation, or by pouring liquids into the stomach through a tube. By the injection into the veins of a weak solution of salt in immense quantities, ten quarts or more in twelve hours, several patients have been saved; and twenty quarts or more of very weak broth in twenty-four hours have been absorbed through the stomach into the circulation, with the same effect.

THE same excellent journal reproduces a lecture delivered in August last by M. Chamberland, the director of the laboratory of M. Pasteur, upon the contagions in the air and in water, which, as giving the results of the most recent and scientific investigations of the subject is of great interest. According to M. Chamberland, the living organisms with which the carbuncle of sheep, the cholera of fowls, and the pulmonary consumption, measles, and gangrene of man are known to be connected may be divided into two classes, both of which live and increase in the blood, causing dangerous fermentations and decompositions, although they differ in form, as well as in certain important details of their life-history. One of these classes include the bacilli, all of which have the form of short hairs or rods, while the other comprehend the micrococci, or small, globular or oval bodies, often joined together, in different species, by twos or threes, or in greater number. When fully grown, both species have a soft, jelly-like appearance, and generally a uniform color, and may be observed to increase by budding or division, in one case a branch growing from the original body, which afterwards separates and becomes an independent organism, and in the other case the original creature dividing into short pieces, each of which takes up a separate existence. Besides this mode of increase, however, certain varieties of ferments have another, which consists, so far as can be observed, in the resolution of each individual into a considerable number of tiny eggs or spores. How these spores or germs reproduce the original organism is not shown, but it is remarkable that, just as the seeds of plants are far more enduring than the plants from which they are derived, and which they reproduce, so the germs of microbes resist adverse influences which immediately destroy the bodies from which they spring. Thus, while all bacteria are destroyed by a temperature one hundred and forty-eight degrees Fahrenheit, the spores of certain species bear without injury a temperature of one hundred and ninety-four degrees. Alcohol, carbonic acid, compressed oxygen, a long-continued vacuum, and most other antiseptic agents, which are fatal to fully-grown infusoria, have no injurious effect upon their germs, and the latter may be dried, and float indefinitely in the air, or may be buried for years in the ground, without losing their vitality, while the former would immediately perish under such conditions. It is perhaps fortunate that most of the micrococci, and many of the bacteria, produce, so far as is known, no spores, and among those which perpetuate themselves in that way the formation of spores takes place only under certain conditions. For example, in the blood of dead animals, which is no longer aerated by the action of the heart and lungs, bacteria live, but never produce germs, while the same effect follows if disinfectants are added to the liquid in which they exist, or if the temperature of the air in which an infected animal lives is kept below fifty-four degrees Fahrenheit, or above one hundred and eight degrees. Under circumstances unfavorable to the development of germs, the bacteria, with the offspring which they produce by division, live only for a limited time, and if no new infection takes place during that time, the ferment dies out, and with it the disease which it produces. As an illustration of this it has been shown that if a flock of sheep is attacked with carbuncle in winter, and is kept free from additional infection for thirty or forty days in a temperature below fifty-four degrees, the disease disappears, and does not return except as a consequence of fresh contagion from outside.

THOUGH crushed under "the thousand and one bricks on top of him" the "Rip Van Winkle" of the *American Architect* still has life enough left to affirm his belief that the quondam subscriber, who years ago complained because the journal contained no "funny column," will find in "Circular No. 5," of the Des Moines Architectural Association's Series (published on another page) quite as much that is humorous, if not witty, as can be well crowded into the same space. Being, however, thus annihilated, he feels a relief that he will no longer have to find printer and circulation for the dissemination of words and phrases the real meaning of which he shamefacedly confesses he has never been able to decipher.

THE FOUNDATIONS OF THE NEW CAPITOL AT ALBANY.[1]



THE author has not met with sufficient information to establish a rule for determining the load which may be safely imposed by a structure upon earth of a specific character and condition. The degrees of consistency and compactness in different kinds of earth and their mixtures, and, above all, the extent of moisture therein, so affect the supporting power as to discourage any attempt at a formula for practical use. The nearly universal rule seems to be, to depend upon the previous experience of the locality, or upon observations of structures supported on similar earths in like conditions; in fact, to guess at, what the author believes may, in most cases, be determined with considerable precision, and so avoid on the one hand the unnecessarily costly foundations which are so frequently observed, and, on the other hand, those inappropriate and insufficient foundations which cause the destruction of the superstructure.

He was requested ten years ago, to devise plans for the foundations of a large and costly State building, which had to rest upon soil apparently equable and stable; but which proved on careful examination, to lack these qualities to a remarkable extent. It was also found that the earth, to a great depth under many portions of the foundations, received and parted with a considerable amount of moisture with the changing seasons. The circumstances of the case did not allow the use of piles or inverted arches; it was, therefore, necessary to spread the base of the walls over such an area as would afford the requisite sustaining power, and also to protect the clay and sand from any excess or deprivation of its natural degree of moisture, so as at all times to derive from it the same degree of support. The importance of the work warranted the expense of experiments to determine the questions above referred to. In the absence of any similar or equally extensive experiments, the author is induced to submit the present ones, in the hope that an explanation of the methods adopted, and the results obtained, will prove serviceable.

The structure, though a single building, may be considered as a collection of a dozen large ones, with great differences of elevations, and weights upon the lower walls, and yet so bonded together as to require that the pressure of each of the parts should be the same per square foot on the earth beneath. This object has been fully accomplished; and when the structure is loaded to the maximum extent of 200,000 American tons, the author believes that it will not compress the earth upon which it rest more than three-fourths of an inch, and exactly the same under every part thereof. The building measures 300′ x 400′, on plan, and has three main stories and a basement. The lower walls are 110 feet high, but those of the corner towers, pavilions, and main tower, are of much greater height.

The ground covered by the structure sloped eastward at the rate of 1 in 25. The pit was excavated to a depth of 5 feet below the natural surface at the south-east corner, and 25 feet at the north-west corner. The excavations, together with the borings which were made in the bottom of the pit, fully exhibited the character of the earth. The lower strata (termed in the locality "blue clay," and "Albany clay") are more than 100 feet in thickness, resting upon the Hudson River Argillite (a clay slate), the two forming the banks of the river for thirty miles of its course. The "blue clay" contains from 60 to 90 per cent of alumina, the remainder is fine silicious sand. It also contains many nodules of clay, highly charged with carbonate of lime in the form of rings and discs about an inch in diameter. Overlying the blue clay was a mass of earth from 1 foot to 35 feet deep, composed of the same clay mixed with sand of different degrees of fineness, in proportions varying to such an extent as, when saturated, to render it in some places, a semi-fluid, while in others it was nearly pure sand, and very porous. This material occurred in veins and strata, large and small, above and below the level fixed for the foundation. One of the largest of these veins of viscid earth passed diagonally across the foundation, and at a depth of 6 to 20 feet below the bottom of the pit. It was 200 feet long, and from 5 to 25 feet wide.[2] Other veins and strata of less size were found extending across the bottom, and sometimes terminating in pockets in the blue clay. Borings, from 10 to 30 feet deep, were made in several places below the bottom of the pit, which showed the substratum to be blue clay; and a well which had been sunk close by, to a depth of 100 feet, was entirely in the blue clay.

The earth in its natural condition at midsummer contained from 27 to 43 per cent of moisture. When the samples were thoroughly dried and pulverized, and again fully saturated (without dripping), they absorbed from 39 to 46 per cent of water. The blue clay ordinarily held about 40 per cent, and when dried, again absorbed about 43 per cent. It was, therefore, as a rule, completely saturated in its natural state. It was upon this kind of earth that the subsequent experiments of the supporting power of the clay were made. The pure clay, obtained by separating it from the sand, weighed 116 lbs., and the sand so separated 80 lbs. per cubic foot; but when they were again mixed in different proportions the weight of the mixture was less than the proportionate means between them. Earth taken from the same places as the samples, varied from 81.5 to 101.4 lbs. per cubic foot, depending upon the proportions of the clay and sand; and these weights show, to some extent, the relative supporting power of the earth at the places from which the samples were taken.

It was originally intended to support the structure upon wooden piles, of which a considerable number had been procured, before the author was entrusted with the direction of the work. Many comparatively large buildings in Albany have been supported upon wooden piles driven into the blue clay, or upon thick planks laid under the walls. In a few cases, the wood used for this purpose has been found in tolerable preservation[3] half a century after it had been buried in the blue clay; but, generally, such timber was much decayed at the end of a quarter of a century; and several heavy buildings, after having stood firm for twenty years began to settle, and the walls to crack, in consequence of the decay of the wooden supports, and the unequal settlements therefrom. It appears that when the clay had been kept constantly moist, the wood did not materially decay in half a century; but, wherever the moisture was drawn off, the wood did not last more than twelve years. In this case, even if a wooden foundation could have been arranged so as to be kept constantly wet, it would have ultimately decayed; and its use was, therefore, inadmissible. Cast-iron piles of white iron could be relied upon for a century or more, but would also have eventually decayed.

The use of sand and concrete piles, made by boring or driving holes into the clay, and filling them with these materials was also considered. For reasons which will subsequently appear, inverted arches could only be used under a part of the structure,[4] and it was deemed advisable to have but one system of support. The author, therefore, finally determined upon the plan which has been executed.

In most buildings, except where spires or towers are introduced, the weight is nearly equably imposed upon the several foundation walls; but in the Capitol, the main and pavilion towers are much higher and heavier than the adjacent walls. The extremely heavy fire-proof floors, loaded as they will be frequently with dense crowds of people, books, etc., must necessarily carry their load to two only of the four surrounding walls, and, with some of the roofs acting in the same manner, will produce very unequal pressures upon the foundations.

The weight of the whole building and its contents when in use will be 200,000 American tons. The area of the base of the exterior and court walls, and the rear walls opposite, is about 24,000 square feet, and sustains an average of 6½ tons per square foot on the basement walls. The main tower, which weighs 30,000 tons, has an area of 2,508 square feet, equal to 12 tons per square foot upon its foundation walls. The weight on the foundation under the exterior walls of the corner towers is 47 tons per lineal foot; on the interior walls of the same towers, it is only 39 tons; and on the adjacent division walls, 23½ tons. Still greater differences in the weight on adjacent walls occur in other parts of the building, especially at the main tower, where the weight is 134 tons per lineal foot, and on the adjacent walls but 47 tons and 39 tons. Passing around the exterior walls of one-quarter of the structure (the remainder being a repetition of the same sized walls), the weights to be supported per lineal foot are successively as follows: commencing at the main tower, 134 tons (which may possibly be increased); the adjacent walls are 47 tons per lineal foot for 60 feet; next, 44½ tons for 60 feet; next, 47 tons for 120 feet (turning the corner tower); next, 44½ tons for 60 feet; next, 67 tons for 18 feet; and next, 50 tons for 52 feet to the centre of the south or north front. On the rear of each of these walls, the interior wall is loaded with 39 tons, and the division walls with 8½ to 23½ tons per lineal foot.

The exterior walls of cut granite facing, backed with rubble and brick, average 150 lbs. per cubic foot. The floors, including the iron box girders, cross beams, brick arches and covering, average 24 lbs. per square foot. The possible weight of crowds of people upon the floors is taken at 100 lbs. per square foot; the snow upon the roofs, at 2 feet depth, is 12½ lbs.; and the effect of the strongest winds, which may at times be deflected perpendicularly against some of the roofs, is taken at 15 lbs. per square foot. The calculated weight

[1] A paper by William Jarvis McAlpine, M. Inst. C. E., from *Selected Papers* of the Institution of Civil Engineers.

[2] This vein was dug out, and replaced with clay and sand artificially mixed, moistened, and slightly rammed in layers, so as to render it as similar to the adjacent natural material as possible.

[3] In digging the trenches for the street pipes of the new waterworks at Albany the author had occasion to remove many of the old pine water-pipe logs, of which only the sap wood was decayed. They had been buried in the blue clay more than half a century.

[4] It was necessary to arrange to carry two-thirds of the weight upon the exterior, rear, and court walls, which are separated 120 feet on two of the fronts, and only 90 feet on the other two. Inverted arches spanning three very unequal spaces would have imposed unequal loads upon the clay beneath, and their use would have defeated the design of distributing exactly the same weight upon every part of the clay beneath the structure.

which may come upon each of the walls is as follows: on the corner towers and front foundation walls, 47 tons per lineal foot; on the main east and west front, 50 tons; on the curtains, 44½ tons; on the ventilating tower, 67 tons; on the division walls, extending upwards through four stories, 23½ tons; on the partition walls of two stories, 13½ tons, and of those which extend one story high, 8½ tons, per lineal foot. The main tower is designed to be of stone, except the portion immediately below the dome, which, from being so high from view, was proposed to be made of iron. If it should be of stone to the dome, that change, together with some others, would increase its weight to 36,000 tons, equal to 14.4 tons per square foot at the base. Its footing stones were spread to 110 feet square, and the concrete to 125 feet square, and 5 feet thickness. The weight on the clay, with 30,000 tons, is 1.92 ton per square foot; and with 36,000 tons, it would be 9.3 tons; but it was arranged for an underpinning, if necessary.

THE EXPERIMENTS.

For the purpose of ascertaining the sustaining power of the blue clay in its natural condition, two sets of experiments were made; in the first, by pressure upon a square foot, and in the second, upon a square yard of the surface. The machine used was a mast of timber 12 inches square, held perpendicularly by guys, with a cross frame for the weights. A hole was dug, 3 feet deep, in the bottom of the blue clay foundation, 18 inches square at the top, and 14 inches at the bottom. The foot of the machine was placed in this hole, and weights 2,754 lbs. to 23.784 lbs. were applied. Small stakes were driven into the ground, in radial lines from the centre of the hole, and the tops carefully driven to the same level; and by means of a straight-edge any change in the surface of the ground adjacent to the hole could readily be detected and measured.

Table I shows a continued settlement of the clay under the foot of the machine as the loads were added; but no change in the surface of the adjacent ground was observed until an hour after a weight of 11,844 lbs. had been applied, when an uplift of the surrounding earth was noted, in the form of a ring with an irregular rounded surface, the contents of which, above the previous surface, measured 0.09 cubic foot, which is equivalent to a displacement of 1.09 inch of clay in depth under the foot of the machine, or equal to one-fifth of the whole settlement which had then occurred.

TABLE I.

Observation.	Day.	Hour	Duration.	Weights. Each.	Weights. Total.	Settlement. Each.	Settlement. Total.	
			h'rs.	lbs.	lbs.	in.	in.	
1	Mon.	5 P. M.	—	2,754	2,754	0.288	0.288	The weight of machine.[1]
2	Tues.	9 A. M.	16	—	—	0.612	0.900	
—	"	9 "	—	2,820	5,574	—	—	1st stone added.
3	"	10 "	1	—	—	0.528	1.428	
—	"	10 "	—	6,260	11,834	—	—	2d. and 3d. stones added.
4	"	11¾ "	1¾	—	—	4.752	6.180	Uplift noted.
—	"	11¾ "	—	3,250	15,084	—	—	4th stone added.
5	"	½ P.M.	¾	—	—	3.588	9.768	
6	"	1 "	½	—	—	1.728	11.496	
—	"	1 "	5min.	2,890	17,974	0.060	11.556	5th stone. Immediate settlement.
7	"	1½ "	½	—	—	3.288	14.844	
—	"	1½ "	—	2,980	20,954	—	—	6th stone added.
8	"	2 "	½	—	—	4.128	18.972	Uplift noted.
—	"	2 "	—	2,830	23,784	—	—	7th stone added.
9	"	2½ "	½	—	—	5.184	24.156	
10	"	3 "	½	—	—	2.060	26.216	
11	"	4½ "	1½	—	—	1.300	27.516	
12	"	5 "	⅔	—	—	3.084	30.600	Uplift noted.
13	Wed.	5 A. M.	12	—	—	0.600	31.200	No settlement after 5, A. M.
14	"	8 "	3	—	—	—	31.200	

Observations 12 and 13 are not reliable.

[1] The first settlement, noted in observation 1, was due to the weight of the machine, and was not a compression, but only a leveling of the rough inequalities of the clay. The subsequent observation 2, of 0.612 inch, is the compression due to 2,754 lbs. This settlement occurred before 5, A. M.

When the weight had reached 20,954 lbs., and had rested for half an hour upon the clay, a further protrusion was noted. The form of the ring was the same as before, but with more irregularity of surface. The highest part of the protrusion was from 12 to 15 inches from the edge of the pit, where it averaged 0.3 inch high, and sloped off outwardly to an average of 4 feet from the centre of the hole. This uplifted earth measured 0.606 cubic foot, which is equivalent to a displacement of 7.272 inches. When a weight of 23,784 lbs., had been applied, and had rested three hours on the clay, the ring in the highest part averaged 0.5 inch high, in the same general form and extent as before noted. The amount of earth thus raised, was 1.01 cubic foot, equivalent to a displacement of 12.12 inches under the machine.

Before the lifting of the earth surrounding the machine could have taken place, the materials first displaced from under the machine were doubtless forced among the particles of the earth adjacent to the whole, and compressed that earth to some extent; and this operation was continued until the adjacent earth had become so compacted as to cause the lifts noted in the table. The author is of opinion that the compression of the earth below the bottom of the machine continued without any considerable displacement until after a load of 4,000 lbs., of 5,000 lbs. had been applied, and that then the displaced earth found space in the adjoining earth until the load reached 7,000 or 8,000 lbs., when the uplift became visible at the surface of the ground; but that meanwhile the earth directly under the machine was continually more and more compressed in some proportion to the weight added. The small area pressed upon facilitated the escape of the material into the adjacent earth, which weighed only 300 or 400 lbs. per square foot. If the pit had been deeper, or the piston larger, there would have been less displacement.

The second set of experiments was made with the same machine, to the bottom of which was framed a strong base, 3 feet square. The pit was sunk 2 feet deep into similar earth, and was 38 inches square both at the top and at the bottom. The stones were put on at intervals of an hour. There was no uplifting of the surrounding earth.

Table II shows the remarkable regularity in the settlement as the load was increased, and a constant diminution of the increment as the earth became more compacted. At the 6th observation the weight per square foot corresponded nearly with the 2d in Table I, and the settlement was almost the same. The base was nine times as large, so that the proportion of escapement of the earth from beneath, must at this time have been very small. It is probable, however, that if the weights per square foot had been increased so as to equal those in Table I, a similar uplift would have occurred, though of less extent. The author derived from the Tables the opinion that the extreme supporting power of this earth was less than 6 tons per square foot, and that the load which might be safely imposed upon the clay was two tons per square foot.

TABLE II.

Observation.	Weight. Each.	Weight. Total.	Weight. Per sq. ft.	Settlement. Each.	Settlement. Tot'l.	
	lbs.	lbs.	lbs.	in.	in.	
Machine placed......	3,228	3,228	359	—	—	No settlement that could be measured.
1st stone added.... ..	2,380	6,608	623	0.050	0.050	
2d " "	3,300	8,908	990	0.150	0.200	Estimated.
3d & 4th stones added	6,960	15,868	1,763	0.166	0.366	
5th " "	2,830	18,698	2,078	0.134	0.500	"
6th " "	3,250	21,948	2,439	0.124	0.624	
7th " "	4,420	26,368	2,929	0.096	0.720	"
8th " "	1,190	27,558	3,062	0.080	0.800	
9th " "	2,320	29,878	3,320	0.025	0.825	

The notations of the settlement were generally made about an hour after the weight had been applied.

For the purpose of maintaining the clay beneath the structure in the same condition of moisture, a deep puddle wall was extended entirely around the foundation, not only to exclude an excess of water, which might reach it through the veins and films of sand with considerable hydrostatic head, but also to prevent the egress of the natural moisture through similar veins. Although the puddle wall was carried up to the level of the terrace which surrounds the building, yet water might find its way along the face and down the outside of the walls, or possibly through some accidental break in the concrete floors within and surcharge the clay below. To prevent this, there was spread on the top of the clay, over the whole area enclosed, a depth of 6 inches of coarse screened gravel, the effect of which will be that under the great weight of the building any excess of water in the clay beneath will be forced into this pervious gravel, and flow off through it to the drains which encircle and traverse the foundations. The necessity for these provisions will be apparent when it is considered that many of the veins of sand extend to the surface of grounds of much greater elevation than the foundations, and that they communicate with imperfectly built street sewers and water-pipes, while the same or other porous veins extend beneath the surface to grounds which are much lower. Through these sources the clay under some portions of the structure might be charged with water, while that under an adjacent wall might, at the same time, be drained of much of its natural moisture, and thus entirely destroy the design of a foundation which should everywhere have an equal sustaining power. It is not an absolute settlement which is to be apprehended, but a greater yielding in one place than in another.

A common practice of builders who have occasion to erect high and comparatively heavy towers and spires, is to groove the lower part into the adjacent walls, so as to allow the heavier ones to slide in these grooves, without breaking the bonding stones. In the present case the demands of the architect forbade the use of grooving, and hence the necessity for the above provisions.

The main walls of the building are from 5 feet to 7 feet thick, where they rest upon the foundation walls, and bring upon them pressures of from 6 to 9 tons per square foot, which had to be reduced to 2 tons per square foot on the clay. This was accomplished by projecting each of the footing courses beyond those immediately above them. The rule was to commence with a load of two tons per square foot upon the clay, 3 tons upon the top of the concrete, and generally 4, 5, 6, or 7 tons upon each succeeding course of stone. The weight on each lineal foot of the top of the foundation walls, divided by the above pressures, gives the exact width of each course of the footing stones, as shown in Table III.

The large quantity of stone required in a short time—50,000 tons in four months—compelled a resort to a great many quarries, which furnished stones of different thicknesses, and made it necessary to modify the above exact arrangement; but the principle of the distribution of the load, according to the vertical strength of the stone used was maintained throughout the foundations.

It was necessary to consider how far these projections could be made without danger of breakage of the projecting part of the stone. The pressure in this case tending to break the stone is that due to the weight on the wall above it, divided by the width of the wall, and multiplied by the area of the projection, and to treat that result as a load distributed on a beam supported at one end.

To distribute the weight upon the footing stone courses with certainty, the beds of the limestone and granite were dressed to close parallel joints, so that the weight of each of the upper courses should be carried out to the extremity of the next course below. The vertical joints were only required to be quarry joints, not exceeding one inch wide. For certainty and convenience of laying the masonry, the foundation stones were all required to be rectangular blocks, of from 18 to 24 inches in thickness, the breadth to be at least one-and-a-half time the thickness, and the length two-and-a-half times the thickness. The average size of all the stones was 31 cubic feet, equal to 2½ tons, and many of them were from 5 to 8 tons in weight. In the foundations of the main tower the average weight of the granite blocks was 4 tons, and of the projecting blocks 7 tons. The footing courses were spread out equidistant from the lines of the centre of gravity of the imposed weight above. The exterior stones of the three lower footing courses were all headers from 4½ to 7 feet in length. The longitudinal bonding was made by the interior stone and in the upper courses, where the projections were smaller, by alternate headers and stretchers of the front stone, as well as the interior. The result of this bonding will be to distribute the weight, and equalize its pressure upon the clay.

TABLE III.

Parts of Building.	Load per Lineal Foot.	Required width of Courses.						Main Walls.
		Concrete.	Courses of Footings.					
			1st.	2d.	3d.	4th.	5th.	
	tons.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Corner towers, front	47	23 6	15 8	11 9	9 4	7 10	7 4	7 0
" " rear	39	19 6	13 0	9 9	7 10	6 6	5 6	5 0
Curtains, front.....	44½	22 3	14 8	11 1	8 11	7 5	6 5	6 5
Central fronts......	50	25 0	16 8	12 6	10 0	8 4	7 2	6 5
Partitions, 4 stories	23½	11 9	7 10	5 11	4 9	3 11	3 5	3 0
" 2 "	13½	6 9	4 6	3 5	3 0	—	—	3 0
" 1 "	8½	4 3	2 5	2 2	2 0	—	—	2 0

The weight of the main tower was so much greater than that of the other walls, and the earth below it so much inferior, that the foundation was placed 7 feet deeper than elsewhere. With this exception, all the walls were commenced at the same level. The spaces between the main exterior, rear and division walls, and under the arches of the central court, were covered with a layer of concrete, made of screened gravel and hydraulic cement, 1 foot to 2 feet thick.

A CONTEMPORANEOUS ACCOUNT OF ST. SOPHIA.


Capital from Santa Sophia.

DURING some investigations at the Astor Library, I chanced to encounter the following contemporaneous account of St. Sophia. It possesses especial interest from more than one point of view. The work from which it is taken is a French translation, by Cousin, of Procopius's original Greek MS. Procopius, the book tells us, was born at Cæsarea, 495 A. D., and died at Constantinople in the year 565. He was general naval commander, municipal officer, and man of letters, being in turn Lieutenant to Belisarius, Admiral of the Byzantine fleet, Prefect of the city, and author of a history of his own times, of a private history of the reign of Justinian, and of six books of descriptions of public buildings. It is from the last that the passage below is taken. Of all his works, the history of his own times seems to be the best known; it has been translated into all the modern languages, English included. The "*Descriptions of Public Buildings*" have never, so far as I can find out, been honored by an English version. The Congressional Library in Washington possesses a Greek and Latin copy, and the Astor Library a French and Italian rendering. The admirable choice of phrases with which a pendentive dome is described, amply justifies the sentence in Cousin's preface which says of Procopius: "*Il a écrit avec exactitude, avec politesse, et avec élégance.*"

"I have already related with sufficient exactness, in the books of the wars, how there existed at Constantinople a furious sedition, excited by a multitude of persons of low condition, who took 'conquer' for a watchword. They did not revolt less against God than against their prince, for they carried their impiety to such an extreme as to burn the celebrated church which we call the Church of St. Sophia, a term well suited to the Divinity, and which is very proper to explain His nature. God permitted them to commit their sacrilege, in the knowledge that this would afford an opportunity to rebuild the church with more magnificence than ever. Having, then, thus been ruined, it was soon after restored by the emperor, and enriched with such ornaments that if, before its ruin, the design on which it was to be rebuilt had been shown to the Christians, and it had been suggested to them to tear it down in order to rebuild it in this way, they would have consented with joy.

"The emperor applied himself to this work with inconceivable ardor, and imported from all parts the most excellent workmen of his time, regardless of expense. Anthemius of Tralles, who was the most able architect, not only of his own time but of all antiquity, seconded with all his ability the intentions of the emperor, in making the designs and in conducting the work. Isidorus of Miletus, also a celebrated architect, was also employed. In this you see the special favor of God towards Justinian, in that he furnished him with men capable of accomplishing successfully his glorious enterprise. We ought to admire at the same time the sagacity of this prince in choosing men proper for his wishes.

"It is thus that this marvellous church was accomplished and that it became a spectacle which surpasses the understanding of those who see it and the belief of those who hear it spoken of. It towers to a prodigious height commanding the whole city, so much so that it is everywhere the most conspicuous ornament. It rises so high above the other buildings that it seems to look down upon them. There is such a nice proportion between its length and breadth that neither seems extraordinary: neither the one nor the other seems extravagant. It is impossible justly to describe its beauty; it has such majesty and harmony in its parts that it is impossible to remark either an excess or a fault. Although its size surpasses that of all other works, its ornaments are more exquisite than those of many buildings of only moderate dimensions. It shines with such brilliancy and splendor that one would say that, besides being lit up by the rays of the sun, it held some source of light within itself. The front towards the east, where the ineffable mysteries are celebrated, does not rise squarely, but with the form of a half-cylinder. The top is not unlike a quarter-globe; it has above it a work like a half-moon. The art with which this is constructed excites fear, as well as admiration; for, solid as it is, it is suspended in such a way as to seem about to fall, and seems to imperil those who look at it. There are on the pavement within, two ranges of columns arranged in semi-circles, which sustain the base of the half-dome. Opposite the east is a wall in which the doors of the church are situated, and on two sides of which are two ranges of columns similar to those I am about to describe.

"In the centre are four great piers, two towards the south and two towards the north, which correspond to each other and all equally distant. On the two sides between the piers are four columns. These piers are made of large blocks carefully chosen and well polished and joined together; their height is such that one would say they were rocks detached from a mountain. Above, on the four sides, are four arches, each pier sustaining the base of two arches. The crown of each arch rises to an astonishing height. The two arches which are on the east and west are void and open; the other two are filled with a small structure of columns, above which is a round opening, high up through which you can see the light of day. I fear I may not have the capacity to explain myself, yet I hope I may find words to describe what follows in this wonderful work. Between the four arches are four triangles, each of which has an acute angle supported between the bases of the two arches, and raising their other two angles up to the base of the dome. The dome rests on these, a superb feature. Its delicacy compels one to doubt its solidity, and it seems, instead of resting on the work below, to be suspended from heaven by a golden chain. All the parts, joined together with such art, form a marvellous assemblage which one cannot behold without delight and surprise. The eyes cannot long remain in the contemplation of one place without being drawn away by the beauties of some others; the spectators are in a transport and continual agitation, doubting which most to admire. Their minds follow the movements of their eyes, and after being turned from side to side, they remain in a sort of suspense. But enough on this subject.

"Justinian, Anthemius and Isidorus employed divers means to strengthen this edifice. As I do not know all of them, it would be impossible for me to explain them, but I will describe one, which will suffice to enable the reader to judge of the others and understand the solidity of the building. The piers of which I have spoken are constructed differently from the rest of the church; they are square, and built of hard stones polished. The stones on the corners are hewn in the shape of a triangle, and those in the centre in the shape of a square; they are not joined either with lime or bitumen, like the walls of Semiramis, at Babylon, but with melted lead. So much for the piers; let us now look at the rest. The dome is resplendent with gold, and its richness is combined with beauty. The brilliancy of the marble vies with that of this rich metal. There are on each side two galleries, which, far from injuring the design, improve it, making the breadth of the church equal its length, though they are not so high as the rest; they are covered by gilded vaults. One is for the men and the other for the women. They are exactly alike and have no difference between them except in beauty. Who can begin to describe the magnificence of the women's gallery, and the aisles adorned with such rich and precious columns? Who could speak of all the marbles which serve to ornament this marvelous church? It seems as if one were in a meadow agreeably enamelled with all sorts of flowers, and that one saw there green, white, red, purple, and all the other colors which Nature has blended together with more skill than the most learned painter. When you enter there to pray, it seems more like a work of God's wisdom than of man's art; the soul which unites itself to Him in prayer imagines Him present, and His Presence, which has chosen a place so august, seems to honor it by dwelling there. It is not only the first time you enter this church that this thought occurs to the mind; it presents itself each time anew. One is never tired of looking. Every one is overcome by the sight, and when you have come away you never cease to talk of it.

"It would be impossible to describe in detail all the ornaments, all the vases of gold and silver, and all the gems which the emperor has presented. I will leave you to judge of their number and price by a single example, which is that there are forty thousand pounds of silver in the enclosure for the altar. Here only the priests are allowed to enter.

"To finish this account and to conclude in a few words the description of so admirable a work. Justinian employed upon it not only the resources of his treasury, but also the efforts of his genius. While one of the arches of which I have already spoken, that on the east, was still unfinished, the piers on which it was supported began to settle and to threaten ruin. Anthemius and Isidorus, despairing of their skill, went to report this deplorable event to Justinian, who, by an inspiration from God, as I believe, for he had never practised architecture, commanded them to finish the arch, and assured them that when it was completed it would stand of itself with the help of the piers. I should be suspected of flattery if I advanced this anecdote without proof; but as many persons who were present can testify to the truth of what I say, I will continue. The architects followed this order, and when the arch was completed it remained firm, as the emperor had said. The same thing happened to the arches on the north and south sides. When the vaults were closed the whole base of the edifice began to groan, so to speak, under the weight of the burden. The columns which sustained it pushed out all the mortar as if they had been scraped. Reduced to despair, they went to tell the emperor what had happened. But he found the remedy at once; he commanded that the part of the piers immediately above the arch should be taken down, and he had it put back when the moisture was dry. Since then the work has always been perfectly solid and can serve as an illustrious witness of the industry and enterprise of this prince."

GRENVILLE TEMPLE SNELLING.

THE ILLUSTRATIONS.

THE ABBEY CHURCH OF ST. ETIENNE.[1]

THIS abbey, undertaken by the Duke William, is stated by Huet and authors in general to have been completed in 1064, two years prior to the conquest of England. According to Ordericus Vitalis, it was not dedicated till 1077. But upon this latter point authors are not agreed; some say that the dedication took place in 1073, and others in 1081. However this may be, it seems certain that the foundation-charter was granted subsequently to the year 1066; for in it William takes the title of king, and among his many princely donations are enumerated various properties and privileges in different parts of Britain. The monastic buildings appertaining to the abbey were begun in 1074, and completed after a period of twenty-two years. The plan of the buildings was furnished by a lay-brother of the Benedictine order, named William de la Trumblaye, who also erected those of the sister convent of the Trinity at Caen, and those of the abbey of St. Denis. The nave and transepts are the only unchanged remains of the original building; the choir and aisles are of pointed architecture, and are consequently not of the same antiquity. Even the western front partakes, in a measure, of the same mixture. All to the top of the towers is genuine Norman, and of the eleventh century; the spires, with their surmounting turrets, are of a later æra. The choir was enlarged and the apses built in the year 1316 to 1344. The western front of the church exhibits two different characters. Below all is simple almost to meanness; the upper part abounds in ornament, and here the good sense of the architect who added the pinnacles and spires merits commendation in having made them correspond so well in their decorations with the towers.

The plate sufficiently explains all that is to be said of this part of the building, excepting as to the more minute ornaments of the doorways, which deserve to be exhibited in detail. The archivolt is composed of several bands of the simplest moulding, inclosed within three of a different style; the two outermost being formed of the chevron ornament, with its angles unusually acute, the inner of the billet moulding. The capitals of the pillars are studded with small heads, placed under the Ionic volute, exhibiting a mixture of classical and barbarous taste, which is likewise to be found at Cérisy, and upon one of the capitals of the Abbey Church of the Trinity. Along the exterior of the upper part of the nave runs a row of twenty-four semi-circular arches, with imposts and bases, and all uniform, except that eight of them are pierced for windows. This portion of the building is entirely without buttresses; upon the extremity of the north transept are three very shallow buttresses, which rise from the ground to the bottom of the clerestory windows, unbroken by any interruption whatever, but here meet with a string course, beyond which the two outer ones are continued, unchanged in form and appearance, to the summit of the ends of the gable, while the centre one, though it is raised to an equal height, loses more than half its width, and is also much reduced in depth. Over this latter buttress is a window, and between the buttresses are six others, arranged in a double row; each pair differs in size from the rest; those nearest the ground are the largest, and those immediately above them the smallest; the lowest pair on each side is inclosed within a spacious arch, which occupies nearly two-thirds of the gable. Eastward of the transepts is a series of blank intersecting arches, remarkable for their mouldings, which consist of a flat, wide and very shallow band; and here the mixture of the pointed with the semi-circular architecture commences. This portion of the building altogether resembles the Cathedral of Coutances in the disposition of its parts.

It would be difficult to describe the interior of the church in clearer or more comprehensive terms than has been done by Mr. Cohen in Mr. Turner's tour, from which account the following extract is therefore extracted: —

"Without doubt, the architect was conversant with Roman buildings, though he has Normanized their features, and adapted the lines of the Basilica to a *barbaric* temple. The Coliseum furnished the elevation of the nave: semi-circular arches, surmounted by another tier of equal span, and springing at nearly an equal height from the basis of the supporting pillars. The architraves connecting the lower rows of pillars are distinctly enounced. The arches which rise from them have plain, bold mouldings. The piers between each arch are of considerable width. In the centre of each pier is a column which ascends, as usual, to the vault. These columns are alternately simple and compound. The latter are square pilasters, each fronted by a cylindrical column, which of course projects further into the nave than the simple columns, and thus the nave is divided into bays. This system is imitated in the Gothic cathedral at Sens. The square pilaster ceases at about four-fifths of its height; then two cylindrical pillars rise from it, so that from that point the column becomes clustered. Angular brackets, sculptured with knots, grotesque heads, and foliage, are affixed to the base of these derivative pillars. A bold, double-billeted moulding is continued below the clerestory, whose windows adapt themselves to the binary arrangement of the bays. A taller arch is flanked by a smaller one, on the right or the left side as its situation requires. These are supported by short, massy pillars; an embattled moulding runs round the windows In the choir the arches become pointed, but with Norman mouldings; the apsis is a reconstruction. In that portion of the choir which seems original, there are pointed windows, formed by the interlacing of circular arches; these light the gallery. The effect produced by the perspective of the interior is lofty and palatial. The ancient masonry of the exterior is worthy of notice. The stones are all small, perhaps not exceeding nine or twelve inches; the joints are about three-quarters of an inch."

To this description it may be well to add the following particulars concerning the dimensions of the church, taken from the exterior: —

	feet.
Length from east to west	371
Height of western towers	145
" " " with their spires	262
Nave on the western front, to the point of the gable	98
Northern transepts	84
Width of northern transepts	42½

DOORWAY OF CHURCH OF SAN PABLO, BARCELONA.

THE churches of Barcelona are of great antiquity, the cathedral, which is still unfinished, dating in part to the earliest Christian times, while the church of St. Michael, now destroyed, is said to have been a temple of Neptune before its re-consecration to the new religion, and preserved until within a few years a curious ancient mosaic. As is natural in a city which, founded by the Cathaginians and throughout the Roman period an important seaport, the buildings, even of mediæval times, show plainly the influenee upon their designers of the classical work which then existed all about them, and even now remains in numerous fragments about the city. In the plate which we give, the classical suggestions can be easily traced in the capitals and mouldings of the archivolt, although the treatment is thoroughly Romanesque, or perhaps we might better say, early Gothic; and a closer inspection will show also the effect of antique examples in the dignity and breadth of modelling of the sculptured figures.

BLOCK OF STORES FOR L. D. MORRIS, ESQ., GRAND RAPIDS, MICH. MR. SIDNEY J. OSGOOD, ARCHITECT, GRAND RAPIDS, MICH.

THE cost of this building, including plumbing and steam-heating, is to be $25,000.

HOUSE AT MANCHESTER-BY-THE-SEA, MASS. MR. W. RALPH EMERSON, ARCHITECT, BOSTON, MASS.

CONCRETE WATER-MAINS. — Concrete water-mains of small diameter have been turned to account in the towns of Coulommiére and Aix-en-Provence. The pipes are made in the trench itself, by stamping in the concrete into sheet-iron moulds about two yards in length. Mortar serves to set the joints. Concrete man-holes are formed at intervals of a hundred yards, to facilitate the cleaning of the pipes. The ingredients of the concrete are three parts slow-setting cement, three parts river sand, and five parts limestone débris. The whole cost of the pipes, which answer the purpose of conduits very well where the pressure is not great, is said to be about ninety-three cents per running yard. — *Exchange.*

[1] From Cotman's "*Antiquities of Normandy.*"

PHOTO-CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

Convent of St. Paul, Barcelona, Spain: Doorway of Cathedral.

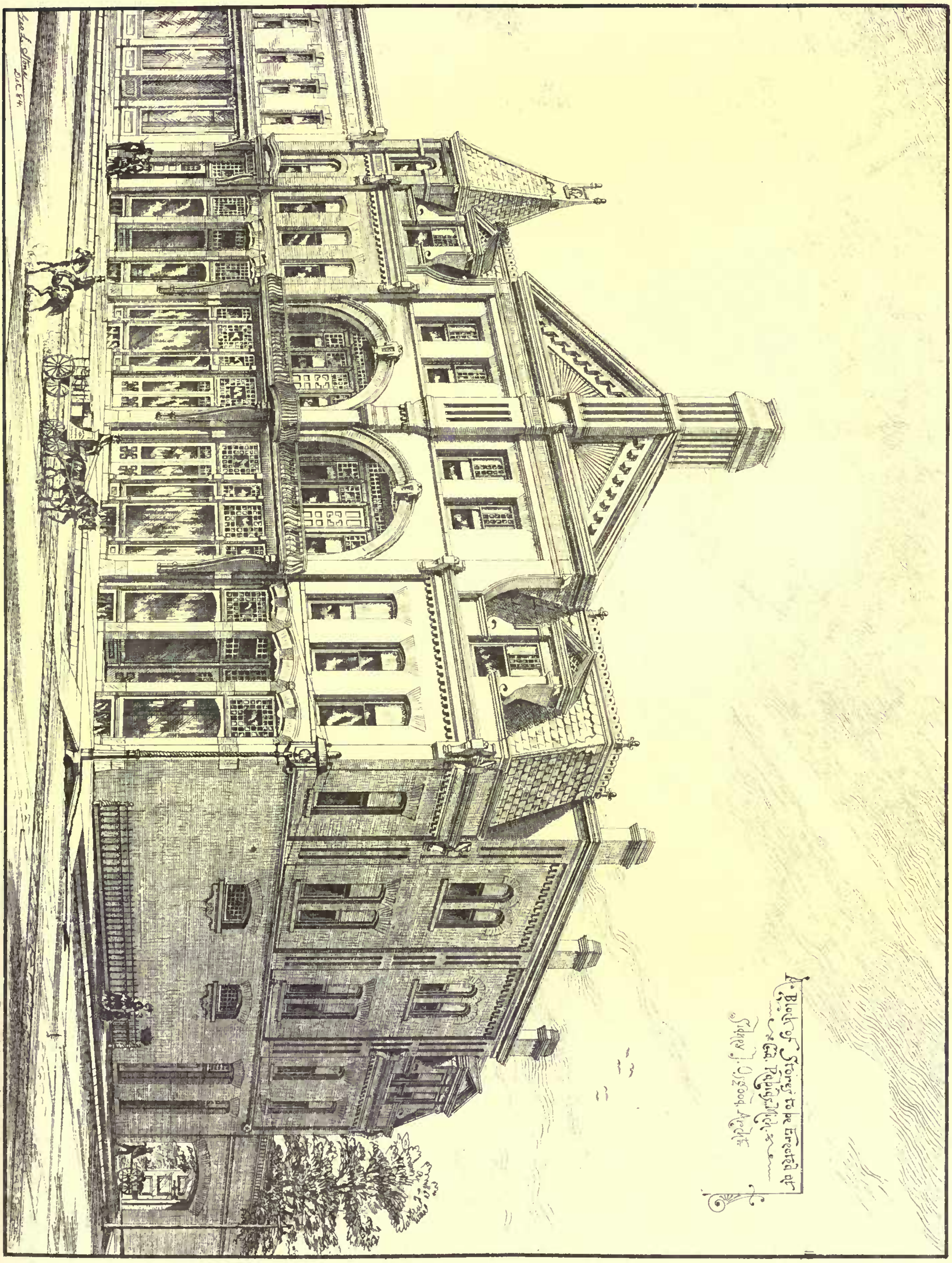
Pencil · Sketches · in & around Manchester · by the Sea · Mass ·

by E · Eldon · Deane.

House at Manchester —
Mr W. R. Emerson Arch't —
ESD.

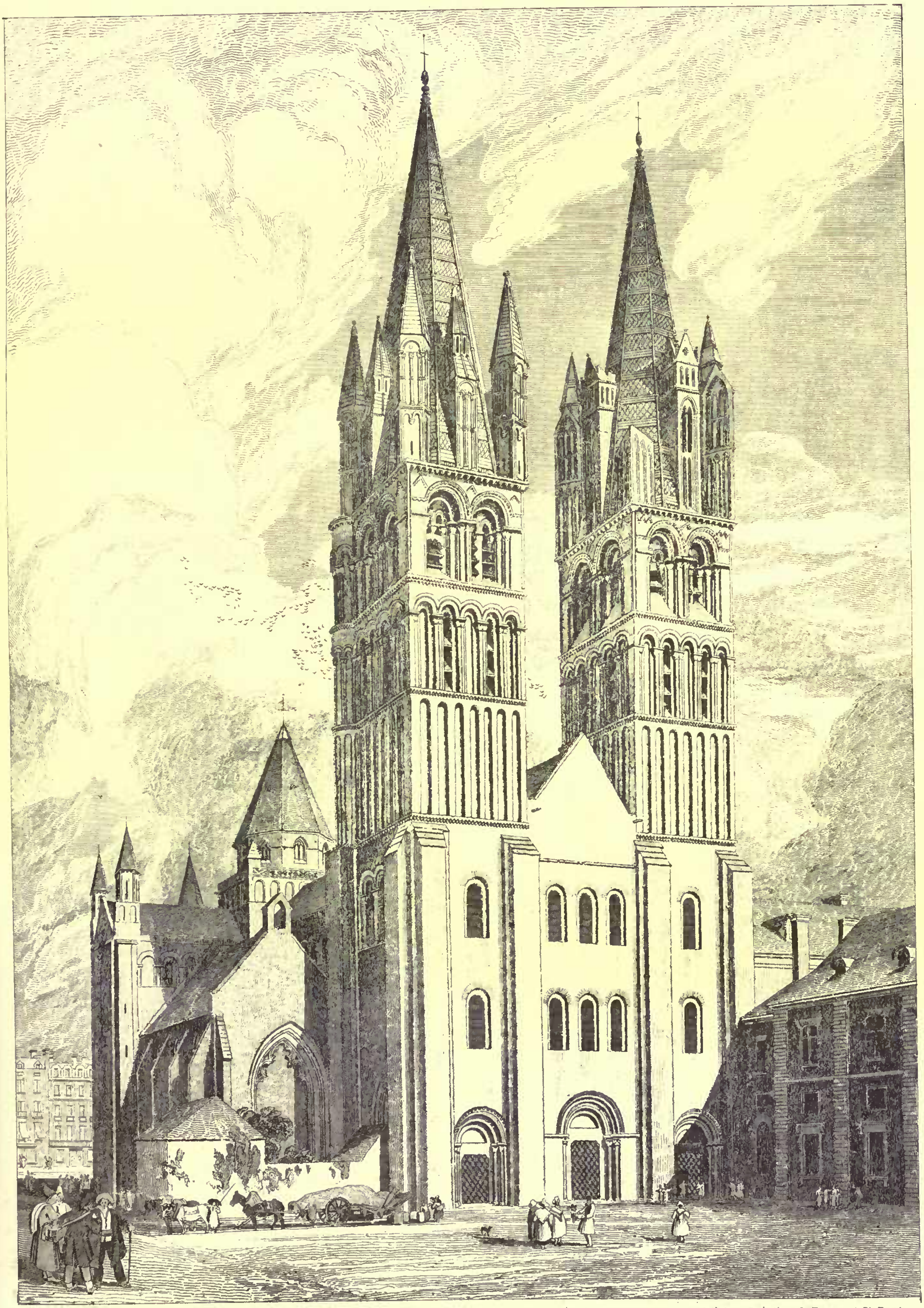
Mr Hemingway's House
Mr. W. R. Emerson Arch't.
ESD.

The Heliotype Printing Co. 211 Tremont St. Boston.



The Heliotype Printing Co. Tremont St. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, SEPT. 27 1884 No. 457



ABBEY CHURCH OF ST ETIENNE, CAEN.

The Heliotype Printing Co. Tremont St. Boston.

THE ROYAL ARMORY OF MADRID.

Heraldic Lion in Panel Mont. S. Michel. France.

A FEW weeks since, says a correspondent of the *Times*, the news arrived of a fire having occurred on the roof of the Royal Museum of Arms and Armor at Madrid; news which startled every historian, archæologist, and lover of the fine arts to whom by hearsay or by sight that invaluable collection was known. Strangely enough, beyond the mere notice of the accident, scarcely any further information has been published in England on the subject, which, as far as the general reading public is concerned, has almost faded out of memory. Not so with those who know the priceless gems of that most rich museum, taking rank as it does with the armories of Vienna, Dresden, Turin and Paris.

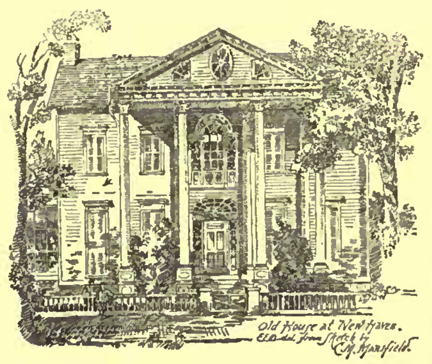
In a long room on the first floor of an isolated portion of the ancient palace, and facing the court-yard of the new, these treasures had been gathered together, and were admirably mounted and arranged under the constant and untiring care of a true art lover, the Conde de Valencia de Don Juan. Here were grouped the numerous and remarkably fine suits of armor for the tournament, for war, or for mere pomp, which actually belonged to, and had been used by the Emperor Charles V, after whose death the other moiety of the Imperial armory passed to the Hapsburgs, and is now preserved at the Vienna Arsenal. Some twenty suits remain at Madrid, among which are some of the finest examples of the Flemish, the Italian, the German, and the Spanish armorer's art, variously enriched by inlay of silver and gold, by graving, and by incomparable *repoussé*. One of the helmets (which has been estimated by good authority as likely to realize at least 75,000 *frs.*, at the Rue Drouot or Christie's) and some shields are quite unrivalled for their admirable design and the perfection of their workmanship. Then in sequence were arranged the splendid suits and weapons which belonged to Philip II, to Don Carlos, to Philip III, and Philip IV, trophies of Lepanto, numberless historic swords, such as that of Francis I, of "el Gran Capitan," Fernando Cortez, Pizarro, etc., many of which are of surprising beauty. For years, after the Spanish fashion, these arms lay here and there neglected in various palaces, etc., exposed to the chances of rust, rough usage, or robbery, until of late, under the intelligent initiative, and at the private expense (some 250,000 *frs.*) of King Alfonso XII, and the painstaking assiduity of a true connoisseur, the collection was barely finished in arrangement when this disastrous fire has thrown all into a second chaos. The effect of that long room, filled with mounted warriors and wearers on foot of these rich suits, was very striking; but that general effect was soon forgotten in the examination of the lovely details of ornamentation which covered the surface of so many of the choicer arms. The "dummy" men and horses on which they were mounted, some portraying the features of those monarchs whose steel shells they bore, were richly caparisoned and decked in costly stuffs of the period of the armor, and copying, as far as could be, the costumes represented in painted portraits of their time; all had been directed by high intelligence. Such was this rich treasure-house when visited a short time since by the writer of this article. By great good fortune the manuscript illustrated catalogue made by order of Charles V existed, and was the foundation for recognition and classification of various important pieces. Contemporary portraits at the Prado and elsewhere also helped in the identification.

On July 10, some short time before midnight, the northern angle of the roof was seen to be on fire. There, in the very centre of the capital, within full view of the Palace Guard (for the building formed one side of the quadrangle), one would have supposed that in a few minutes every sign of fire would have been extinguished, the more so as the building was known to contain so many objects of incomparable value. Yet a precious hour was lost, during which not one bucket of water was thrown, not one fire-engine brought into service. The Spaniards are personally courageous, and those who went to the rescue risked their lives in the endeavor to save the arms. One narrow staircase only existed, and by this and by the windows the arms and armor from the long gallery were hurled pell-mell to the crowd below. But soon the smoke and fire became too strong, and suffocation threatened those engaged in the building; the roof frame was burnt through, and threatened to fall among the workers, and soon what remained of this most noble armory was buried among the burning and smoking fragments of the fallen roof. The loving, careful work of years and priceless treasure was irrevocably lost for want of a few gallons of water and a handy pump. Thanks, however, to those brave men, the more precious objects of the collection have been saved; many much damaged, it is true, but not much hopelessly. Some of the choicest armor and historical suits and swords, the gold Visigothic crowns, some of the banners from Lepanto, and that most precious illustrated manuscript catalogue of Charles V, referred to above, are among the salvage. But the extent of losses cannot yet be known. Nearly all the banners, all the rich and precious ancient stuffs used for clothing the mannequins, all the saddle-cloths, housings, and lambrequins, and the *chaises à porteurs* used by Charles V were burned.

There are some few learned and scientific men at Madrid, and some who love art and antiquity, to whom the rich Gallery of the Prado, the unfortunate Armeria, and other museums of the city are sources of pride and intellectual enjoyment; but, unfortunately such men are lost in the crowd of politicians, for politics in Spain is the mania of the day. Nevertheless, the emotion at the news of the catastrophe was great, and the Minister of the Interior was questioned upon the matter, and upon the existing (or rather non-existing) arrangements for the security of such collections of art and public buildings as the Gallery of the Prado, the Academy of St. Ferdinand, the Archæological Museum, the Royal Library, the Palace, etc., and the inadequacy and bad organization of the fire brigade was referred to. One would have expected that the Deputies and Senators of Spain would have immediately insisted on a proper inquiry being made, with the view of efficiently re-organizing the corps of Pompiers, and perfecting their engines and apparatus. Not so. The Minister of the Interior calmly rises in the Senate on July 11 to declare "that the service for the fire-engines of Madrid, say what they may, was far superior to that of most of the capitals of Europe," upon which the subject drops, and all-absorbing political discussion continues its usual endless course.

Here are some few of the consequences of Spanish negligence. To say nothing of the sale of national works of art and archives by Communes, and from churches, convents, etc., and of grand heirlooms and the like, let us see what has been lost by fire. In 1604, the Palace of the Prado was burnt, and with it some forty *chefs d'œuvres* by Titian, Antonio Moro, Coello, and others; the inventory of these lost historical portraits, etc., still exists. In 1734, the tower of the ancient Alcazar, the Palace of Charles V, and of Philip II, on the site of which now stands the present royal palace. A few years since the Escurial took fire in the roof of the Library, and some hundreds of manuscripts, etc., were destroyed or injured. The Alcazar of Toledo and that of Segovia were burned, and nothing saved. At the Royal Palace, in Madrid, where six hundred magnificent tapestries are stored and other precious objects; at the Picture Gallery of the Prado; at that of St. Ferdinand; at the National Library; at the Archæological Museum, there are neither a station of the fire-brigade, nor water-conduits, nor tanks, nor even buckets. Lightning conductors are rare and ill-constructed, but the cigarette is in every mouth. During winter braziers inadequately warm the rooms, and petroleum lamps are in use, for in many of such buildings the numerous keepers and their families are heedlessly lodged. No telegraphic system is at hand to raise alarm, nor do the keepers make their nightly round.

PRE-HISTORIC ARCHÆOLOGY IN AMERICA.



Old House at New Haven. ... from Sketch by C. H. Mansfield.

AN address was delivered by Dr. E. B. Tylor, as president of the section of Anthropology at the meeting of the British Association in Montreal, in which he referred to the relations between the eastern and western parts of the globe. The following is an extract: —

Of late no great progress has been made toward fixing a scale of calculation of the human period, but the arguments as to time required for alterations in valley-levels, changes of fauna, evolution of races, languages, and culture, seem to converge more conclusively than ever toward a human period, short indeed as a fraction of geological time, but long as compared with historical or chronological time. While, however, it is felt that length of time need not debar the anthropologist from hypotheses of development and migration, there is more caution as to assumptions of millions of years where no arithmetical basis exists, and less tendency to treat everything pre-historic as necessarily of extreme antiquity, such as, for instance, the Swiss lake-dwellings and the Central American temples.

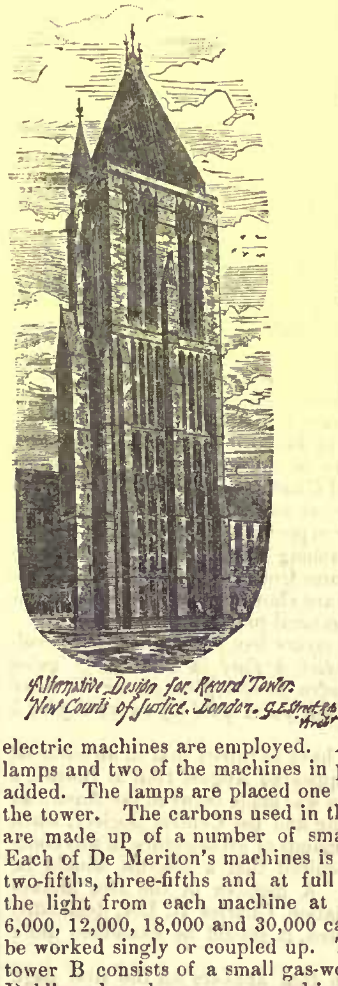
There are certain problems of American anthropology which are not the less interesting for involving no considerations of high antiquity; indeed, they have the advantage of being within the check of history, though not themselves belonging to it. Humboldt's argument as to traces of Asiatic influence in Mexico is one of these. The four ages in the Aztec picture-writings, ending with catastrophes of the four elements, earth, fire, air, water, compared by him with the same scheme among the Banyans of Surat, is a strong piece of evidence, which would become yet stronger if the Hindoo book could be found from which the account is declared to have been taken. Not less cogent is his comparison of the zodiacs or calendar-cycles of Mexico and Central America with those of Eastern Asia, such as that by which the Japanese reckon the sixty-year cycle by combining the elements *seriatim* with the twelve animals, mouse, bull, tiger, hare, etc.; the present year is, I suppose, the second water-ape year, and the time of day is the goat-hour. Humboldt's case may be reinforced by the consideration of the magical employment of these zodiacs in the Old and New World. The description of a Mexican astrologer, sent for to make the arrangements for a marriage by comparing the zodiac animals of the birthdays of bride and bridegroom, might have been written almost exactly of the modern Kalmuks; and in fact it seems connected in origin with similar rules in our own books of astrology. Magic is of great value in thus tracing communication, direct or indirect, between distant nations. The power of lasting and travelling which it possesses may be instanced by the rock-pictures from the sacred Roches Percées of Manitoba, sketched by Dr. Dawson, and published in his father's volume on "*Fossil Man,*" with the proper caution that the pictures, or some of them, may be modern. Besides the rude pictures of deer, and Indians and their huts, one sees with surprise a pentagram more neatly drawn than that defective one which let Mephistopheles pass Faust's threshold, though it kept the demon in when he had got there. Whether the Indians of Manitoba learned the magic figure from the white man, or whether the white man did it himself in jest, it proves a line of intercourse stretching back two thousand five hundred years to the time when it was first drawn as a geometrical diagram of the school of Pythagoras.

To return to Humboldt's argument, if there was communication from Asia to Mexico before the Spanish Conquest, it ought to have brought other things, and no things travel more easily than games. I noticed some years ago that the Aztecs are described by the old Spanish writers as playing a game called patolli, where they moved stones on the squares of a cross-shaped mat, according to the throws of beans marked on one side. The description minutely corresponds with the Hindoo game of pachisi, played in like manner with cowries instead of beans; this game, which is an early variety of back-gammon, is well known in Asia, whence it seems to have found its way into America. From Mexico it passed into Sonora and Zacatecas, much broken down but retaining its name, and it may be traced still further into the game of plumbstones among the Iroquois and other tribes. Now, if the probability be granted that these various American notions come from Asia, their importation would not have to do with any remotely ancient connection between the two continents. The Hindoo element-catastrophes, the East-Asiatic zodiac-calendars, the game of back-gammon, seem none of them extremely old, and it may not be a thousand years since they reached America. These are cases in which we may reasonably suppose communication by seafarers, perhaps even in some of those junks which are brought across so often by the ocean current and wrecked on the Californian coast. In connection with ideas borrowed from Asia there arises the question, How did the Mexicans and Peruvians become possessed of bronze? Seeing how imperfectly it had established itself, not even dispossessing the stone implements, I have long believed it to be an Asiatic importation of no great antiquity, and it is with great satisfaction that I find such an authority on pre-historic archæology as Professor Worsaae comparing the bronze implements in China and Japan with those of Mexico and Peru, and declaring emphatically his opinion that bronze was a modern novelty introduced into America. While these items of Asiatic culture in America are so localized as to agree best with the hypothesis of communication far south across the Pacific, there are others which agree best with the routes far north. A remarkable piece of evidence pointed out by General Pitt-Rivers is the geographical distribution of the Tartar or composite bow, which in construction is unlike the long bow, being made of several pieces spliced together, and which is bent backwards to string it. This distinctly Asiatic form may be followed across the region of Behring's Straits into America, among the Esquimaux and northern Indians, so that it can hardly be doubted that its coming into America was by a northern line of migration. This important movement in culture may have taken place in remotely ancient times. A brief account may now be given of the present state of information as to movements of civilization within the double continent of America. Conspicuous among these is what may be called the northward drift of civilization, which comes well into view in the evidence of botanists as to cultivated plants. Maize, though allied to, and probably genetically connected with, an Old World graminaceous family, is distinctly American, and is believed by De Candolle to have been brought into cultivation in Peru, whence it was carried from tribe to tribe up into the North. To see how closely the two continents are connected in civilization, one need only look at the distribution on both of maize, tobacco and cacao. It is admitted as probable that from the Mexican and Central American region agriculture travelled northward, and became established among the native tribes. This direction may be clearly traced in a sketch of their agriculture, such as is given in Mr. Lucien Carr's paper on the "*Mounds of the Mississippi Valley.*" The same staple cultivation passed on from place to place — maize, haricots, pumpkins for food, and tobacco for luxury. Agriculture among the Indians of the great lakes is plainly seen to have been an imported craft by the way in which it had spread to some tribes but not to others.

The distribution of the potter's art is similarly partial, some tribes making good earthen vessels, while others still boiled meat in its own skin with hot stones; so that it may well be supposed that the arts of growing corn and making the earthen pot to boil the hominy came together from the more civilized nations of the south. With this northward drift of civilization other facts harmonize. The researches of Buschmann, published by the Berlin Academy, show how Aztec words have become embedded in the languages of Sonora, New Mexico, and up the western side of the continent, which could not have spread there without Mexican intercourse extending far north-west. This indeed has left many traces still discernible in the industrial and decorative arts of the Pueblo Indians. Along the courses of this northward drift of culture remain two remarkable series of structures probably connected with it. The Casas Grandes, the fortified communal barracks (if I may so call them) which provided house-room for hundreds of families, excited the astonishment of the early Spanish explorers, but are only beginning to be thoroughly described now that such districts as the Taos Valley have come within reach by the railroads across to the Pacific. The accounts of these village forts and their inhabitants, drawn up by Major J. W. Powell, of the Bureau of Ethnology, and Mr. Putnam, of the Peabody Museum, disclose the old communistic society surviving in modern times, in instructive comment on the philosophers who are seeking to return to it. It would be premature in the present state of information to decide whether Mr. J. L. Morgan, in his work on the "Houses and House Life of the American Aborigenes," has realized the conditions of the problem. It is plausible to suppose, with him, a connection between the communal dwellings of the American Indians, such as the Iroquois long-house with its many family hearths, with the more solid buildings inhabited on a similar social principle by tribes such as the Zuñis of New Mexico. Morgan was so much a man of genius that his speculations, even when at variance with the general view of the facts, are always suggestive. This is the case with his attempt to account for the organization of the Aztec state as a highly-developed Indian tribal community, and even to explain the many-roomed stone palaces, as they are called, of Central America, as being huge communal dwellings like those of the Pueblo Indians.

I will not go further into the subject here, hoping that it may be debated in the section by those far better acquainted with the evidence. I need not, for the same reason, do much more than mention the mound-builders, nor enter largely on the literature which has grown up about them since the publication of the works of Squier and Davis. Now that the idea of their being a separate race of high antiquity has died out, and their earthworks with the implements and ornaments found among them are brought into comparison with those of other tribes of the country, they have settled into representatives of one of the most notable stages of the northward drift of culture among the indigenes of America.

EXPERIMENTS ON LIGHT-HOUSE ILLUMINANTS.



Alternative Design for Record Tower. New Courts of Justice. London. G. E. Street R.A. Archt

THE committee appointed in England to report upon the relative merits of illuminants for light-houses, but which was dissolved, has been reappointed, and has taken the necessary steps toward carrying out an exhaustive series of experiments upon oil, gas and electricity. For this purpose they selected the South Foreland, where there are two light-houses illuminated by electricity, and which have been provided with an abundance of engine power. In connection with the experiments, remarks a foreign exchange, three temporary wooden towers have been constructed in a line landward, and bearing northwest from the permanent high light. These towers are marked A, B and C, and are respectively used for the electric, the gas and the oil light. Tower A is 245 feet from the high light, and tower B 180 feet from A, tower C being the same distance from B. The focal plane of all the towers is 15 feet below that of the electric high light, which is 380 feet above sea level. In the electric arrangements Baron de Meriton's arc lamps and magneto-electric machines are employed. At present there are two of these lamps and two of the machines in place, but another of each is to be added. The lamps are placed one above the other, or superposed, in the tower. The carbons used in them are compound — that is, they are made up of a number of small carbon rods of square section. Each of De Meriton's machines is arranged for working at one-fifth, two-fifths, three-fifths and at full power, the estimated intensity of the light from each machine at those powers being respectively 6,000, 12,000, 18,000 and 30,000 candles. The machines can either be worked singly or coupled up. The arrangements for illuminating tower B consists of a small gas-works erected by J. R. Wigham, of Dublin, whose burners are used in the tower, his system having been adopted for light-houses on the Irish coast. The gas-producing apparatus consists of a small retort-house fitted with two benches of three retorts, the necessary purifiers and a holder capable of containing 4,500 cubic feet of gas. The gas is passed through a meter placed outside the tower to the burners within it, and which are four in number. Each burner is composed of a series of concentric rings of jets, and the light can be started with a minimum power of 28 jets, and increased by gradations of 20 jets up to 108 jets, the full power of each burner, at which it develops 3,000 candle power. There are four of these burners superposed, and they can be used either singly or together, the lights being designated uniform, biform, triform and quadriform, according to the number of burners in use at the same time. The objects of the variations of power in the lights in all cases is to meet the varying requirements of the atmosphere. In tower C oil lights are used, and these are produced by means of burners of the recognized Trinity House pattern. For this purpose nothing further is necessary than a tank outside the tower, containing a store of Scotch paraffine, and the lamps and burners in the tower.

The burners at present in use have six concentric wicks, each developing 720 candle power; but another burner of much higher power, having seven wicks, will shortly be tried. The burners are arranged in three stages, and either a uniform, a biform or a triform light can be exhibited as required. The burners are in duplicate on each stage, and by an ingenious arrangement the first lamp can be shunted out of position if necessary, and the second one lighted and shunted into its place without any appreciable loss of time.

Such are the arrangements for producing the various lights. For testing them, carefully elaborated arrangements have been made. An overland route has been laid down as a line of observation for a distance of two and one-half miles from the towers, and stakes have been driven at every one hundred feet. At half a mile from the towers on this route is hut No. 1, for taking photometric observations, and this is more particularly intended for fog work. At one-and-one-fourth miles is hut No. 2, which is likewise fitted with photometric apparatus. At the limit of the range is the third hut, each hut being conveniently fitted up for the residence of the official in charge. Arrangements have also been made for observations to be taken at the various coast-guards stations within the focal area, at Ramsgate and other contiguous places, and at various points out at sea, including the Gull and Varne light vessels, which are respectively 8 miles northeast and 12 miles southwest distant from South Foreland. The observers are supplied with books for recording their observations in tabular form, which will ultimately be collected and their contents collated for the information of the committee. Ranging over so wide an area, and involving so many investigations, the experiments will necessarily occupy several months, probably five or six. Every illuminant and variety of burner adapted for light-house illumination will be tested under every possible condition pertaining to itself and to the atmosphere. The most important point as regards atmospheric conditions will be fogs, which will have very careful consideration. — *The Iron Age.*

CIRCULARS OF THE DES MOINES ARCHITECTURAL ASSOCIATION.

CIRCULAR NO. 5.

THE undersigned committee in investigating, according to By-Law No. VII on unprofessional conduct, the charge made by the Editors of the *American Architect and Building News* in their issue of September 6th, a charge that would not be worthy of consideration, were it not for the injury it might work in hindering the advance of architecture in this country, have taken the wish of Charles Garnier at the late Paris dinner, as our line of action.

Our report of this dinner states that from among the crowd of good things that came from the lips of Garnier, these words are chosen as most valuable to the architectural profession.

"*Il espère bien que La Société centrale va étudier à fond la question, et qu'on n'entendra bientôt plus parler de récriminations, parce qu'il n'y en aura plus à faire.*"

We have to report that in an editorial that appeared August 16th at Boston, a *parallel* was made between the American Institute and the Central Society, when the demands of architecture in this country required that a *contrast* should be made. A member of the Des Moines Association, Charles H. Lee, demanded by letter, that, if the parallel existed, it should be examined more in detail.

That extremely good illustration that appears on the first page of Frank Leslie's paper, under date of August 30th, seems to suggest the situation, while that "Revel of the pocket" of the D. M. A., was in the condition of the pigeon-houses of the illustration, the *American Architect* seemed about to mount the foundation of the American architectural pyramid "a little too previous," and up a very rickety ladder; C. H. L. claims he "could not resist the temptation to kick it from under them." The committee of the Association would report that the predicament in which it has placed the *American Architect* is to be regretted, but that it was an unavoidable result.

The writer of the unpublished letter states that he did not consider that there were a number on the staff of the *Architect*, instead of one Rip Van Winkle as in the illustration, or he might have had some pity for the under man in the heap, especially, when he now considers the thousand and one bricks on top of them. The committee, however, would report, that the association should not consider as unseemly or as wasted either a smile or a tear, so long as architecture advances.

The committee further reports that the aim of the Association and the welfare of the *American Architect* are identical, and that it should be considered, as heretofore, second on our list of allies.

It is further suggested that a vote of thanks from the D. M. A. be tendered the *American Architect* for fixing the attention of American architects upon this renowned dinner, which, in the words of Garnier, we should investigate "*à fond.*"

Were the *Architect* open to suggestions, the committee would advise the use of a better ladder next time, for which one round at least exists in the new *Art* Scholarship Fund at New York city. See *Art Amateur*, September, 1884.

CHARLES TERRELL, } *Committee.*
W. L. PLACK, }

J. S. BLAKE, *President.* E. H. TAYLOR, *Secretary.*

DES MOINES, IA., September 12, 1884.

CIRCULAR NO. 6.

THE President of the D. M. A., fears that interruptions from Boston may continue. It is even hinted that they will accuse us of court-martialing the wrong man, and not be satisfied till we have court-martialed every one of our number.

Now there is much work to be done before the 12th of November.

We have paid all the respect to Boston she deserves: we have turned out all our corporal's guard for one court-martial, and we cannot afford to keep "the guard" on such duty any longer.

Besides it would not be *wise* to pull all the teeth out of the head of the lion to find the one that causes the most pain. The lion will have to grin and bear it: it will only make him roar the louder, and the architects of America need waking up.

With Jehovah first on our list of allies, Boston ought to be content to be second.

The profession however, cannot risk the possibility of any further hinderance from that quarter. Consider the necessity. We must call in a peacemaker.

Bartholdi there! Put your foot on Boston-town, and keep *ses poules trempés* more quiet, while we build a pyramid in the Mississippi Valley.

Gott mit uns. Don't you know our colors? We are Egyptians.

CHARLES TERRELL,
Late Chairman of the Court-Martial Committee.

Respectfully submitted by the Architectural Association of Des Moines, Ia.

J. S. BLAKE, *President.*
E. H. TAYLOR, *Secretary.*

September 15, 1884.

[WE have no more space for this sort of composition. — EDS. AMERICAN ARCHITECT.]

BASEMENT-FLOORS.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In a certain public building in Washington, there is a basement room enclosed with walls of masonry, and paved with hard brick; on the brick are laid strips, and on these strips a wood floor. The spaces between the strips (and the floor and pavement) are carefully *filled in with dirt.* Is this right? S. F.

[No; the strips and floor, unless of cedar, will rot in a few years. The strips should have been laid on the brickwork, without filling between them, so as to get as much circulation of air as possible all about them, and under the floor boarding. It is not unusual to bore holes all around the edge of a floor laid on sleepers in this way, to promote movement of the air — EDS. AMERICAN ARCHITECT.]

A PLAN WANTED.

MANSFIELD, O., September 16, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Among all your designs, I have never noticed one for an office such as are so often built on the same lot as the residence, by gentlemen, and especially by lawyers, doctors, and persons retired from active business. One having front office-room and rear office or library, designed by a competent architect, should, I think, excite general attention, as this is a line of architecture which is growing in importance. Respectfully, C. B. JAMESON,

[ALTHOUGH it seems to be evident that our correspondent is writing one word for the public and two for himself, we publish his suggestion. It will at any rate serve to discover how many architects are willing to do work for nothing; for if tales be true, he may expect to receive a superabundance of designs from which he can select without cost to himself. — EDS. AMERICAN ARCHITECT.]

BOOK ON INTERIOR DECORATION.

East Boston, Mass.

To the Editors of the American Architect: —

Dear Sirs, — Will you be kind enough to mention the best work on the coloring of rooms? I am building a home, and want instruction as to harmony of color, in painting interiors of house and tinting ceilings, etc. Respectfully yours, C. J. S.

[The best book of the kind that we know of is Dr. Christopher Dresser's "*Principles of Decorative Design,*" which can probably be had of Estes & Lauriat, 301 Washington St., Boston, or of the publishers, Cassell, Petter & Galpin, New York. — Eds. American Architect.]

PILE-CAPPING STONES.

Hartford, Conn., September 22, 1884.

To the Editors of the American Architect: —

Dear Sirs,—Which is the better arrangement of pile footings for a heavy building, small stones, about 2′ 6″ x 2′ 6″, bearing on three piles, or a less number of 3′ 9″ x 5′ 0″ stones bearing on six piles? Q.

[The small stones on three piles will be much the best. It would be next to impossible to set a stone so as to bear equally on six piles.— Eds. American Architect.]

NOTES AND CLIPPINGS.

A Paper Door.—A durable and weighty-looking door is now made of paper. While it costs about the same as wood it is much better, because there is no shrinking, swelling, cracking or warping. It is composed of two thick paper boards, stamped and moulded into panels and glued together with glue and potash, and then rolled through heavy rollers. It is first covered with a water-proof coating, and then with a fire-proof coating, and is painted and varnished, and hung in the ordinary way.— *Exchange.*

An Old Dutch Brick. — In removing some rubbish from the New York City Library recently, the workmen found a curious brick, on which a paper was pasted bearing the following inscription: "This brick was made in Holland, and is one of those given by the city of New York to Thomas Willett, their first mayor, with which to erect his chimney on his plantation in Swansey (now Seekonk), Mass., on his return from New York about the year 1666. The chimney of a house rebuilt on the same site about the year 1771 is mostly composed of the same bricks. A. D. 1841." —*Boston Transcript.*

An Electric Light-House in Brazil. — An electric light-house has recently been erected on the Island of Raza, at the entrance of the Bay of Rio Janeiro. The light-house proper is eighty-five feet high, and is put upon a rock two hundred and thirty feet in height, so that the focus of the light of the apparatus is fixed at an elevation of three hundred and fifteen feet above the sea. The electric current is produced by a continuous-current Gramme machine, working at the rate of seven hundred revolutions, and feeding a light of two thousand candle power. The Gramme machine referred to is worked by a stationary surface-condensing steam-engine, this arrangement being inevitable, owing to the want of fresh water. All the fittings are double, so as to prevent interruptions by unforeseen accidents, and, to make assurance doubly sure, an oil-lamp is always kept in readiness. The light is revolving, having two white discs and one red one, succeeding one another at fifteen minutes' interval, and the light is visible at a distance of about thirty-five statute miles. — *Manufacturers' Gazette.*

Literary Finds. — Chance literature has a strikingly romantic aspect. Many of the greatest discoveries in the era of the revival of learning were characterized by the merest chance. Cicero's important treatise, "*De Republica,*" was discovered concealed beneath some monastic writing. Part of Livy was found between the leaves of a Bible, and a missing page in a battledore. Quintilian was picked out of an old coffer full of rubbish. The one copy of Tacitus which survived the general destruction of Roman libraries was found in a Westphalian monastery. An original Magna Charta, with all its seals and signatures, was found by Cotton, about to be cut up by a tailor into measures. Thurloe's State papers fell out of a ceiling in Lincoln's Inn. Many of Lady Montagu's letters were discovered by Disraeli in the office of an attorney, where they might have remained till this day but for the chance visit of the great bibliophile. And undoubtedly many hundreds of rare books and manuscripts and papers lie hidden away in the presses and cupboards of old manor-houses, whence gradually they may be dragged into the light of day, to be destroyed or to awaken universal interest. No one could have read without emotion how the poor fellows who made up the last struggling remnant of the Greely expedition read with avidity the newspaper wrappings of the lemons they ate. Yet when we recall occasions in our own lives when we have been absolutely dependent upon our own resources for means wherewith to kill time, we can appreciate it. Toward the close of a long voyage, even under modern luxurious conditions, the humblest of chance literature is greedily seized upon; the odd volume of a novel, the mangled remains of a book of poems, a file of very old newspapers — anything, in fact, which is printed — means the disposal of otherwise dreary, monotonous hours. Subjects in which hitherto we have not taken the smallest interest become fascinating; we learn to love a detested author, we skip not a word, and it may be said that many a man has developed a new taste or acquired a new hobby-horse from the perusal of chance literature under such circumstances. Hence we find that sea-skippers are so often well informed on many subjects outside their profession; that lighthouse keepers are sometimes scientific men and linguists; that turnpike keepers are often men of no mean attainments.—*London Globe.*

A Germ Filter for Water. — The tendency of research is to show that the germs believed to cause so many diseases are not found in the air, except under exceptional circumstances, but exist chiefly in water. This is probably due to the fact that rain and filtration eventually bring the products of fermentation and decomposition into the watercourses. Water may, therefore, be considered as one of the principal agents in the propagation of such diseases; and M. Chamberland has recently turned his attention to the production of a microbe filter, which would purify water not only from its mineral but its animal impurities. M. Pasteur has employed a porous vase of baked porcelain to separate microbes from the medium in which they are generated, and this is the basis of M. Chamberland's filter. The latter has observed that water filtered through one of these vases contains neither microbes nor their germs; and the proof of it is that such water can be added in any proportion to susceptible liquids without causing any change in them. The apparatus of M. Chamberland, which was recently brought before the French Academy of Sciences, can be fitted directly to any water-pipe, and acts by the pressure existing in the latter. Under a pressure of of about two atmospheres, which is the pressure in M. Pasteur's laboratory, M. Chamberland obtains with a single porous tube or "filtering candle" (as he calls it) twenty centimetres long and twenty-five millimetres in diameter, some twenty litres (about four gallons) of pure water per day, that is to say, a sufficient quantity for the uses of an ordinary household. By multiplying the number of candles or filter-pipes, so as to form sets or "batteries" of them, a supply of pure water sufficient for a school, hospital, works, or barracks, can be obtained. The filter, therefore, is of a practical kind, and being simple and inexpensive, will supply a much felt want. The filter is cleaned by brushing its external surface, and plunging it into boiling water, or by heating it directly in a fire to destroy the organic matter lodged in it; and properly cleaned the same tube will last indefinitely. While upon this subject we may mention that electricity has been suggested as a means of ridding water of microbes, and a filter which electrifies the water has actually been designed and constructed. — *Engineering.*

A Large Grain-Elevator.—The largest grain-elevator in the world, says the *Nashville American*, is that just constructed at Newport News, under the auspices of the Chesapeake & Ohio Railway Company. It is 90 feet wide, 386 feet long, and about 164 feet high, with engine and boiler rooms 40 x 100 feet, and 40 feet high. In its construction there were used about 3,000 piles, 100,000 feet of white-oak timber, 82,000 cubic feet of stone, 800,000 brick, 6,000,000 feet of pine and spruce lumber, 4,500 kegs of nails, six large boilers, two large engines, 200 tons of machinery, twenty large hopper-scales, and 17,200 feet of rubber belts, in sizes varying from 8 to 48 inches in width, and from 50 to 1,700 feet in length; and, in addition, there were 8,000 elevator-buckets and other material used in building such structures. The storage capacity of the house is 1,600,000 bushels, with a receiving capacity of 30,000, and a shipping capacity of 20,000 bushels per hour.

Contamination of the Washington Water-Supply. — There is quite a local fright at the threatened impurity of the water-supply of this city. The Superintendent of the Canal, who resides in Cumberland, states that the Potomac River, from Harper's Ferry to Seneca, is full of dead hogs, and that there are at least one thousand carcasses in the river and canal at present, and that the farmers in the sections where the hog cholera is raging do not hesitate to throw the carcasses into the river. The Health Officer will take such steps as are possible to prevent the threatened danger to the health of Washington. The aqueduct is to be flushed at once, and appeals are to be made to the Governors of Maryland and Virginia to intercede to prevent this outrage.

Proposed Statue of Louis XIV at Munich. — Great indignation is expressed in Munich over the intention of King Louis II, the music-mad monarch of Bavaria, to erect a colossal equestrian statue of King Louis XIV of France, in one of the squares of the Bavarian capital. The objectors say that the man whom it is proposed to honor was always the arch-enemy of Germany, and that his warfare and aggressions upon the German people were more causeless and wanton than those of any French monarch who preceded or followed him. Threats are openly made that if King Louis persists in his determination to erect the statue, it will be found demolished within a few nights after its inauguration. — *Boston Journal.*

The Last of another of Wren's Churches. — The Church of St. Olave, Old Jewry, one of Wren's London buildings, is doomed. There were two more religious houses dedicated to the Norwegian king, one in Hart Street, where Pepys went to church, and the other in Silver Street, not rebuilt after the great fire. A fourth was on the opposite bank of the Thames. The ruin of St. Antholin, in Watling Street, another church by Wren, is considered by the *Saturday Review* to be the greatest architectural loss that London has suffered since the great fire. "It was one of the most singular and grotesque pieces of vandalism ever perpetrated in a civilized country."

The Greek Church at Sitka. — A Minneapolis artist, who has been "doing" Alaska during the summer, says that all the members of his party, and there were seventy-five of them, agreed that the Greek church at Sitka is the finest church in America. It is built on the plan of a Greek cross, and the interior is a mass of gold and silver, of the magnificence of which a writer says he can give no idea. The walls are hung with pictures of royalty and the priesthood, sent by a Russian princess, who took this temple under her patronage.—*New York Commercial Advertiser.*

A Hint for Tax-Dodgers. — In Mianus, Conn., there is a house built twenty-five years ago by a man named Van Nostrand, who has lived in it all these years without removing the scaffolding that was used in its erection. Only part of the rooms are finished, and it is said that the house was left in that condition to escape the payment of taxes.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since our last report thirty-five permits have been granted, the more important of which are the following:—

J. G. Sauer, three-st'y brick building, n s Lombard St., between Bond and Dallas Sts.

Henry Borgman, 6 two-st'y brick buildings (square), e s Madeira Alley, between Monument and McElderry Sts., and 5 two-st'y brick buildings, w s Patterson Park Ave., between Monument and McElderry Sts.

Irvin W. Carter, 6 two-st'y brick buildings, commencing n w cor. Fulton Ave. and Wilhelm St.

P. Cassidy, three-st'y brick building, n e cor. Chase and Valley Sts.

Broderick Bros., three-st'y brick warehouse and one-st'y brick shop, n s Pratt St., w of Green St.

W. Nissler, three-st'y brick building, n s Chew St., between Bond St. and Broadway.

Jno. Magarity, 4 three-st'y brick buildings, n s Preston St., w of Broadway.

Jas. P. Rock, 3 two-st'y brick buildings, commencing n w cor. Monument St. and Jew Alley.

E. W. Haviland, 4 two-st'y brick buildings, w s Winder St., between Hanover St. and Godman Alley, 4 two-st'y brick buildings, n s McComas St., between Hanover St. and Goodman Alley, and 16 two-st'y brick buildings, w s Goodman Alley, between Winder and McComas Sts.

Wm. Carback, 2 two-st'y brick buildings, w s Chapel St., between Chew and Eager Sts.

Wm. T. Phillips, 6 three-st'y brick buildings, commencing s w cor. Franklin St. and Arlington Ave., and 5 three-st'y brick buildings, w s Arlington Ave., s of above.

Wm. A. Brooks, 7 three-st'y brick buildings, e s Barclay St., n of Townsend St.

Boston.

BUILDING PERMITS.—*Pleasant St.*, n South St., Ward 24, for Wm. Donaldson, brick dwell., 12′ x 36′ and 32′ x 34′, flat; Wm. Donaldson, builder.

Station St., cor. Halleck St., Ward 22, for A. J. Houghton & Co., brick office, 25′ x 40′, hip.

Cumberland St., cor. St. Botolph St., Ward 11, for T. E. Thompson, 2 brick dwells., 30′ x 45, flat; J. E. Potter, builder.

West Camden St., No. 212, Ward 19, for Standard Cordage Co., brick office, 20′ x 20′, pitch; H. Drake, builder.

East Fifth St., Nos. 704-706, for H. B. Stratton, 2 dwells., 22′ x 50′ flat; H. B. Stratton, builder.

Tremont St., No. 1382, Ward 19, for S. Emmes, storage; A. McLean, builder.

Meridian St., cor. Condor St., Ward 1, for R. Gavner, dwell. and store, 24′ x 31′, flat, E. Heustis, builder.

Adams St., n Dix St., Ward 24, for M. A. King, 2 dwells., 12′ x16′ and 21′ x 28′, pitch; Gilbert & White, builders.

New Seaver St., No. 8, Ward 24, for Chas. Jenkins, 2 dwells., 20′ x 29′, pitch; J. Philbrick, builder.

Forest Hill Ave., w s, Ward 24, for D. S. Black, dwell., 20′ x 48′, pitch; A. H. Pierce, builder.

Lyndon St., cor. Syeph Ct., Ward 19, for George Kampe, dwell., 13′ x 28′ and 23′ x 27′, flat; V. Bock, builder.

Cambridge St., n Parker St., Ward 4, for A. Stone, dwell. and store, 25′ x 40′, flat; N. J. McLean, White builder.

Oak St., cor. Farrington Ave., Ward 23, for Chas. F. Koopman, dwell., 10′ x 18′ and 27′ x 30′, pitch; W. S. Mitchell, builder.

Congress St., n A, Ward 13, for N. E. Tel. & Tel. Co., mechanical and storage, 22′ x 200′, pitch; F. A. Bruce, builder.

Brooklyn.

BUILDING PERMITS.—*Middagh St.*, No. 49, four-st'y brick tenement, tin roof; cost, $4,000; owner, Alfred Halden, 155 Bridge St.; builder, W. J. Rogers.

Van Buren St., s s, 100′ e Broadway, 6 two-st'y frame (brick filled) dwells.; cost, each, $3,500; owner and builder, Samuel Post, Broadway, cor. Van Buren St.; architect, H. Vollweiler.

Tompkins Ave., s w cor. Quincy St., 5 three-st'y and four-st'y brown-stone stores and dwells., tin roofs; cost, each, $6,000; owners, Messrs. Stewart & Hubbell, 373 Quincy St.; architect, E. G. Gaylor; builder, J. M. Stewart.

Douglas St., No. 155, being 250′ e Bond St., three-st'y brick tenement, tin roof, wooden cornice; cost, $4,000; owner, architect and builder, J. M. O'Neill, 119 Hoyt St.

Herkimer St., s s, 28′ e Bedford Ave., 2 three-st'y brown-stone dwells., tin roofs; cost, each, $7,000; owner, M. E. Stafford, 48 Herkimer St.; architect, A. Hill; builder, John Stafford.

Madison St., s s, 440′ e Tompkins Ave., 3 two-st'y dwells., tin roofs, wooden cornices; cost, each, $4,-500; owner, architect and builder, Chas. Isbill, 593 Herkimer St.

Stanhope St., s s, 216′ e Evergreen Ave., two-st'y dwell., tin roof; cost, $3,500; owner, F. But, Flushing Ave.; builder, G. C. Brada.

Broadway, w s, 83′ n Willoughby Ave., 3 three-st'y brick stores and dwells., tin roofs; cost, each, $6,-000; owner and builder, Fr. Herr, 778 Broadway; architect, J. Herr.

Stockton St., No. 306, s s, 207′ e Sumner Ave., three-st'y frame (brick filled) tenement, tin roof; cost, $3,-500; owner and builder, George Straub, 11 Lewis Ave.; architect, Th. Engelhardt.

Stockton St., Nos. 308-314, s s, 208′ 6″ e Sumner Ave., 4 three-st'y frame (brick filled) tenements, tin roofs; cost, each, $4,200; owner, builder and architect, same as last.

Henry St., n w cor. Harrison St., 5 four-st'y brown-stone tenements, tin roofs; cost, each, $12,000; owner and builder, Cornelius Donellon, Pacific St., near Henry St.; architect, Geo. P. Chappell.

Oakland St., w s, 50′ s Huron St., three-st'y frame (brick filled) tenement, gravel roof; cost, $4,300; owner, John McHenry, 184 Huron St.; architect, J. Mulhall; builders, Post & Walker.

Leonard St., w s, 150′ n Calyer St., 2 three-st'y frame tenements, gravel roofs; cost, $10,000; owner, Julia Duryea, 118 Oak St.; architect, F. Weber; builders, Post & Walker.

Harrison St., n s, 70′ w Henry St., four-st'y brick tenement, tin roof; cost, $12,000; owner and builder, Cornelius Donellon, Pacific St., near Henry St.; architect, G. P. Chappell.

North Second St., No. 125, n s, 30′ e Third St., four-st'y brick tenement, tin roof; cost, $5,000; owner and builder, Patrick Harden, s e cor. North Second and Third Sts.; architect, A. Herbert.

India St., s s, 100′ e Manhattan Ave., two-st'y brick school, tin roof; cost, abt. $7,000; owner, P. F. O'Hare, Manhattan Ave.; architect, E. P. Mahoney; builders, John Hafford & Son and John Quigley.

Chicago.

HOUSES.—Furst & Rudolph, architects, have completed plans for dwell., to be erected on Ashland Ave. and York St., for L. Russ, Milwaukee pressed-brick, Carbondale stone front, slate roof; cost, $35,000.

Two houses to be built on Ashland Ave., near Van Buren St., for M. Hirsh, were planned by the same architects, Anderson pressed-brick, brown-stone trimmings; cost, $25,000.

STORES AND FLATS.—Architects Furst & Rudolph planned the stores and flats now building for Heissler & Junge, at State and Twenty-fourth Sts., 100′ x 125′, four-st'y, Anderson pressed-brick, stone trimmings and terra-cotta; cost, about $55,000.

CHURCH.—Furst & Rudolph planned the Lutheran Church at Lake View, 50′ x 90′, to be built of pressed-brick.

BUILDING PERMITS.—E. Wilhelm, two-st'y dwell., 27 Hurlbut St.; cost, $3,800; architect, C. Bruntz; builder, M. Zipprich.

F. Gebhardt, two-st'y dwell., 702 West North Ave.; cost, $2,500.

C. A. Blaurock, three-st'y store and flats, 1010 West Harrison St.; cost, $3,500; architect, W. H. Fraser.

J. M. Faalhaber, three-st'y dwell., 526 North Clark St.; cost, $15,000; architect, Otto Matz; builder, G. Soefke.

J. Batterman, three-st'y dwell., Ashland Ave.; cost, $6,500.

M. A. Smith, two-st'y dwell., 345 South Robey St.; cost, $4,000; architect, J. Austin.

L. S. Diller, 5 two-st'y dwells., 88 to 96 North Weston Ave.; cost, $9,000; architect, H. F. Clay.

Women's Hospital and Dormitory, four-st'y hospital, Adams and Paulina Sts.; cost, $40,000.

J. H. Batterman, two-st'y dwell., 457 Dearborn Ave.; cost, $5,000; architect, J. H. Huber; builders, McCarthy & Co.

F. Koephe, two-st'y dwell., 689 North Paulina St.; cost, $3,500.

H. Kunze, two-st'y store and dwell., 70 East North Ave.; cost, $4,500.

H. Rieper, 2 three-st'y dwells., 14 Fowler St.; cost, $4,000.

J. Spry, 2 two-st'y'dwells., 112 and 114 Sangamon St.; cost, $7,000.

P. Becker, 2 two-st'y stores and dwells.; cost, $6,000.

J. Raber, three-st'y store and dwell., State St.; cost, $10,000; architect, J. F. Doerr; builder, M. Schmidt.

Traders' Safe and Trust Company, seven-st'y office-building, 5 to 11 Pacific Ave.; cost, $25,000; architects, Burnham & Root; builder, E. Sturtevant.

W. Rosenstiell, two st'y store and dwell., 311 West Division St.; cost, $2,500.

J. & F. Rutten, two-st'y dwell., 909 Thirty-eighth St.; cost, $2,500.

M. Adams, three-st'y dwell., 7 Lane Pl.; cost, $8,000; architect, G. Spohr; builder, D. Wilkie.

W. Wuestenfeld, two-st'y store and dwell., 146 Webster Ave.; cost, $8,000; architect, Stanger.

Armour, Dole & Co., corn-crib, Morgan St.; cost, $80,000; architects, Baumann & Lotz.

L. W. Foley, 4 cottages, 57 North Western Ave.; cost, $5,000.

Mrs. Seidel, two-st'y dwell., 492 North Wood St.; cost, $2,600.

Wm. Lange, three-st'y store and dwell., 3206 State St.; cost, $8,000.

Garner Bros., 2 three-st'y stores and dwells., 553 and 555 Hanover St.; cost, $6,000.

F. Dierssen, two-st'y addition, 26 and 28 North Canal St.; cost, $3,500.

Geo. E. Cave, two-st'y store and dwell., 3829 South State St.; cost, $5,500.

H. Wollner, two-st'y store and dwell., 3362 Halsted St.; cost, $3,500.

J. M. Mandry, two-st'y dwell., 669 Twenty-second St.; cost, $3,800.

Lendgran, Ritchie & Ecklan, 4 three-st'y dwells., 3 to 9 Sedgwick St.; cost, $12,000.

Wm. Baragwanath, one-st'y boiler-shop, 50 to 54 West Division St.; cost, $15,000.

Mrs. J. Schmidbaum, two-st'y store and dwell., 116 Hastings St.; cost, $3,800.

Geo. Ralphs, two-st'y dwell., 33 Ewing St.; cost, $7,000; architects, Frohmann & Jebson; builder, Chas. Kreifer.

W. Thomas, two-st'y dwell., 936 Adams St.; cost, $6,000; architect, W. Thomas; builder, D. H. Hays.

Chas. Rowan, two-st'y dwell., 351 Centre Ave.; cost, $3,500.

A. Ross, 2 two-st'y dwells., 63 and 65 Florinel St.; cost, $5,000.

M. Markig, three-st'y dwell., 299 Hudson Ave.; cost, $3,800.

W. E. Dankert, two-st'y dwell., 216 Evergreen St.; cost, $3,500.

E. C. Huling, two-st'y store and dwell., 944 North Ashland Ave.; cost, $3,000; architects, Wheelock & Clay.

Mrs. E. Williams, two-st'y dwell., 3200 South Park Ave.; cost, $10,000; architect, L. G. Halberg; builder, A. G. Hageman.

T. Goodwin, two-st'y dwell., 359 West Huron St.; cost, $3,400.

C. A. Niebuhr, three-st'y store and dwell., 170 Larrabee St.; cost, $7,000; architect, Ottar; builder, M. Zipprich.

W. S. Grannis, 2 two-st'y dwells., 1033 and 1035 West Jackson St.; cost, $5,000.

J. Kruse, store, 238 Evergreen Ave.; cost, $3,000.

J. Caley, two-st'y store and dwell., 1561 Milwaukee Ave.; cost, $4,500; architect, Cockeran.

C. H. Starkweather, four-st'y dwell., 209 Third Ave.; cost, $6,500.

K. A. Langeland, two-st'y dwell., 570 Seventeenth St.; cost, $2,500.

Wm. Mullen, two-st'y dwell., 495 Thirteenth St.; cost, $2,600.

Barrett & Barrett, four-st'y warehouse, 260 and 262 Kinzie St.; cost, $8,000.

J. L. Campbell, 4 two-st'y dwells., 287 to 291 Flournoy St.; cost, $12,000.

P. Grady, two-st'y dwell., 433 West Harrison St.; cost, $4,000; architect, Halberg; builder, A. Biemort.

J. Viles, 2 three-st'y stores and dwells., 3709 and 3711 State St.; cost, $12,000.

Geo. Manning, two-st'y dwell., 391 Thirty-sixth St.; cost, $3,000.

Turner & Bond, 15 cottages, Parnell Ave., near Thirty-first St.; cost, $20,000.

H. Korlthy, 2 three-st'y stores and flats, 1146 and 1148 Southwestern Ave.; cost, $11,000.

Des Moines.

ADDITION.—Hawthorn school-house, brick and stone; cost, $6,000.

BUSINESS BLOCKS.—C. Youngman, four-st'y pressed-brick front on Locust St.; cost, $25,000.

D. Leham, three-st'y and basement brick, on Fourth St.; cost $13,000.

CHURCH.—Episcopal. Sioux Falls and red rock trimmed with buff sandstone; Gothic; cost, $40,-000.

FACTORY.—I. M. Christy, three-st'y and basement on Twenty-ninth St.; cost, $9,000.

SCHOOL.—On North Twelfth St., three-st'y brick and stone building; cost, $16,000.

HOUSES.—H. D. Hedge, three-st'y Queen Anne, on Greenmount Ave.; cost, $10,000.

L. Sherman, three-st'y frame, on Woodland Ave.; cost, $15,000.

C. Howell, two-st'y frame, in North Des Moines; cost, $4,500.

C. H. Getchell, 2 double brick residences, on North Ninth St.; cost, $7,000.

Foster & Liebbe, architects, for all the above.

Detroit.

BUILDING PERMITS.—A. C. Varney, roller skating rink, West High St.; cost, $15,000.

Galvin Brass & Iron Works, factory, cor. Warren Ave. and Twelfth St.; cost, $12,000.

A. C. Varney, double brick dwell., 301 and 303 Second St.; cost, $7,000.

A. C. Varney, block, Nos. 486-502 Brush St.; cost, $18,000.

C. W. Potter, dwell. on Garfield St.; cost, $6,600.

C. B. Cole, brick dwell., No. 89 Fremont St.; cost, $4,000.

William Parker, packing-house, Rost St.; cost, $12,000; Jos. Moross, contractor.

C. B. Cole, dwell., West Willis Ave.; cost, $5,000.

A. C. Skinner, additions to Abstract Building, Lafayette Ave.; cost, $6,000.

This is an unusually dull season for building operations in Detroit.

Milwaukee, Wis.

LUMBER.—The movement of lumber during the past season has been on a larger scale than in the same period last year, while shingles and laths show a falling off. Prices have undergone very little change, and yard rates at the close are about the same as in 1883. The cargo trade has been concentrated in a few hands, both here and at Chicago, and sales are no longer to be obtained. Stocks on hand are liberal, and dealers here sell at lower figures than are quoted at Chicago.

Wholesale yard rates at the close of the season compare with those of last year as follows:—

	1883.	1884.
First and second clear, 3-inch	$48.00	$48.00
First and second clear, 2-inch	48.00	48.00
First and second clear, 1¼ to 2 inch	45.00	45.00
Third clear, 1¼ to 1½ inch	46.00	44.00
A, select, 1¼, 1½, and 2 inch	40.00	40.00
B, select, 1¼, 1½ and 2 inch	33.00	33.00
B, select, 2 x 4	27.00	27.00
A stock-boards, 12 to 16 feet, 12-inch	40.00	39.00
B stock-boards, 12 to 16 feet, 12-inch	36.00	36.00
C stock-boards, 12 to 16 feet, 12-inch	31.00	31.00
D stock-boards, 12 to 16 feet, 12-inch	20.00	18.00
A box, 13-inch and upward	46.00	45.00
B box, 13-inch and upward	41.00	41.00
C box, 13-inch and upward	31.00	31.00
Flooring, first common, 6-inch	36.00	34.00
Flooring, second common, 6-inch	33.00	32.00
Narrow, common, dressed and match'd	17.00	15.00
Siding, first and second clears, 12 to 16 feet	22.00	21.00
Siding, first common	21.00	20.00
Siding, second common	18.00	18.00
Common boards, 18 to 20 feet, 12-inch	18.00	12.50
Common boards, 10, 12 and 20 feet, 12-inch	14.50	12.50
Common boards, 14 to 18 feet, 12-inch	14.00	12.50
No. 2 boards, 12 to 18 feet	12.00	11.00
Fencing, first, 12 to 20 feet	15.00	14.00
Fencing No. 2, 12 to 18 feet	11.00	11.00
Two-inch joist and scantling, 12 to 14 feet	13.50	12.00
Two by four, 2 x 8, 3 x 12, 12 to 16 feet	12.50	11.50
Timber, 4 x 4 to 8 x 8, 12 to 16 feet	13.50	12.00
Small timber, 2 x 4, 4 x 4, 10 to 20 feet	15.00	13.00
Cull plank, 2-inch	9.00	8.00
Pickets, flat, rough, good	8.00	8.00
Pickets, fancy head and dressed, selected	18.00	18.00
Shingles, extra A	3.00	2.50
Shingles, choice A	2.75	2.30
Shingles, standard A	2.50	2.20
Lath, dry	2.50	2.10

New York.

ENGINE-HOUSE.—Mr. George Ehret will have built an engine-house and a boiler-house on his premises, on Ninety-third St., from designs of Mr. A. Pfund.

They will be of brick and stone, and cost about $30,000.

Factories. — On Seventy-sixth St., e of Third Ave., a five-st'y brick cigar-factory, 50' x 100', is to be built for Mr. S. T. Meyer, from plans of Messrs. I. W. Marshall and J. W. Walther; and on the n e cor. of Ave. A and Seventy-fifth St., a five-st'y brick cigar-factory, 25' x 82', is to be built for Mr. P. H. McManus, from designs of Mr. John Brandt.

Schools. — The Board of Education are having plans drawn by Mr. Stagg for additional schools.

Residences. — On the s s of One Hundred and Thirty-third St., between Sixth and Seventh Aves., 3 three-st'y and basement brown-stone residences, 16' 8'' x 50' each, are to be built, at a cost of $25,000 each, for Mr. S. T. Bennet.

On the s s of Sixty-fourth St., e of Tenth Ave., Mr. David H. King, Jr., will build, on a lot 100' x 125', a number of residences, three stories and basement.

Building Permits. — *Fifty-fourth St.*, e s, 175' e Eleventh Ave., five-st'y brick tenement, tin roof; cost, $15,500; owner, Chas. Wein, 513 West Sixtieth St.; architect, M. L. Ungrich.

Eighth Ave., cor. Sixty-first St., Broadway and Circle, one-st'y brick skating-rink, gravel roof; cost, $50,000; agent and attorney for owners, Fred. B. Jennings, 57 East Fifty-fifth St. or 2 Nassau St.; architect, G. L. Morse.

One Hundred and Forty-second St., 481' 6'' e Alexander Ave., four-st'y brick tenement, tin roof; cost, $8,000; owner and builder, Augustus Gareiss, 639 East One Hundred and Forty-first St.; architect, Carl Pfeiffer.

Lexington Ave., s e cor. One Hundred and Twenty-fifth St., one-st'y brick skating-rink, tin roof; cost, $18,000; owner, Wm. A. Martin, 128 West One Hundred and Twenty-third St.; architect, Jos. M. Dunn.

Fulton Ave., e s, 227' s One Hundred and Seventieth St., 3 two-st'y frame dwells., tin roofs; cost, each, $4,000; owner, Henry Ruhl, One Hundred and Sixty-fourth St.; architect, Theo. E. Thomson.

Seventieth St., w s, 74' e Second Ave., 3 five-st'y brown-stone front flats, tin roofs; cost, each, $18,000; owner, Mrs. Ann Mulholland, 1324 Lexington Ave.; architect, John C. Burne.

Main St., Nos. 1670 *to* 1678, *West Farms*, one-st'y brick building (gas-works), slate roof; cost, $5,400; owner, The Northern Gas-Light Co., on premises; architect, H. S. Baker; builders, Brady & Zent and John Anderson.

One Hundredth St., 100' w Eighth Ave., three-st'y brick stable and wagon-house, tin roof; cost, $15,000; owner, Margaretta Eggers, 1503 Third Ave.; architect, J. Kastner.

Sixty-seventh St., n s, 190' w Third Ave., six-st'y brick and iron hook and ladder company's house, school and telegraph headquarters for Fire Department, brick and tile roof; cost, $50,000; owner, City of New York, for Fire Department, 155 Mercer St.; architects, N. Le Brun & Son.

One Hundred and Twenty-seventh St., s s, 125' e Seventh Ave., three-st'y brick stable, tin roof; cost, $30,000; owner, architect and builder, Wm. J. Merritt, 113 West One Hundred and Twenty-eighth St.

One Hundred and Twenty-seventh St., s s, 185' e Seventh Ave., four-st'y brick dwell., tin roof; cost, $15,000; owner, architect and builder, same as last.

One Hundred and Sixth St., n s, 325' w Ninth Ave., three-st'y and attic brick asylum, tin and slate roof; cost, $75,000; owners, Little Sisters of the Poor, Sister Blanche de St. Marie, 207 East Seventieth St.; architects, D. & J. Jardine; builders, J. W. Hogencamp & Son and John Geagan.

Madison St., No. 397, five-st'y brick tenement, tin roof; cost, $7,000; owner, Jas. Reed, 553 Grand St.; architect, Chas. Sturtzkober.

Seventy-seventh St., n s, 50' w Lexington Ave., five-st'y brick flat, tin roof; cost, $20,000; owner, Annie E. Kelly, 228 East Eightieth St.; architect, G. A. Schellenger.

First Ave., w s, 51' s Seventy-third St., five-st'y brown-stone front tenement, tin roof; cost, $16,500; owner, Patrick H. McManus, 110 East Ninety-first St.; architect, John Brandt.

East Eighteenth St., Nos. 520 *and* 522, two and part three st'y brick stable and dwell., tin roof; owner, John Kehoe, 522 East Eighteenth St.; architect, F. W. Klemt.

Alterations. — *Cherry St., Nos.* 297 *and* 299, raise one-st'y; cost, $8,000; owner, Amos Morrill, 6 East Sixty-seventh St.; architect, Albert Wagner; builders, Van Dolsen & Arnot and Henry Schiffer.

Barclay St., s e cor. Church St., two-st'y brick extension, tin roof; cost, $3,500; owner, St. Peter's Church, on premises; architects, Renwick, Aspinwall & Russell.

Philadelphia.

Building Permits. — *Merion Ave.*, e of Wyalusing Ave., 7 two-st'y dwells., 15' x 37'; Jno. Buteson, Jr., owner.

Mascher St., s of Ontario St., 5 two-st'y dwells., 16' and 19' x 41'; Job Rutter, contractor.

Garfield St., bet. Main and Wakefield Sts., 2 two-st'y dwells., 14' x 36'; C. O. Roop, contractor.

Broad St., cor. Reed St., one-st'y Baptist Church, 75' x 97'; R. Q. Gibbon, contractor.

Frankford Road, s of Wishart St., two-st'y dwell., 16' x 50'; Jno. S. Bald & Son, contractors.

Lehman St., bet. Little Wayne and Godfrey Sts., 2 two-st'y dwells., 14' 6'' x 30'; Wm. Axford, owner.

Marshal St., cor. Huntingdon St., three-st'y dwell., 20' x 50'; F. Albrecht, contractor.

Somerset St., near Haverford St., one-st'y workshop, 115' x 126'; West Phila. Passenger R. W. Co., owners.

Eleventh St., s of Wharton St., 3 two-st'y dwells., 15' x 42'; W. N. Rowan, owner.

North Twenty-second St., No. 203, two-st'y mill, 70' x 140'; W. L. Atkinson, contractor.

Buttonwood St., No. 908, three-st'y carpenter-shop, 20' x 50'; Thos. F. Shuster, Jr., owner.

Clark St., bet. Twenty-sixth and Twenty-seventh Sts., 2 two-st'y dwells., 14' x 36'; Jas. Hagan, owner.

Virginia St., w of Trenton R. R., three-st'y factory, 43' x 143'; Dickson Bros., contractors.

Fifth St., n of Indiana Ave., 7 two-st'y dwells., 16' x 46'; S. R. Stewart, contractor.

Cumberland St., bet. Eighth and Ninth Sts., 16 two-st'y and 4 three-st'y dwells.; T. W. Smaltz, owner.

Fifteenth St., n of Wharton St., three-st'y dwell., 18' x 60'; Alex. Beck, owner.

Tulip St., n of Tioga St., two-st'y dwell., 15' x 30'; Wm. M. Kenney, owner.

Germantown Road, n of Clearfield St., two-st'y dwell., 17' x 40'; Jno. Donnelly, owner.

Randolph St., n of Columbia Ave., four-st'y morocco factory, 20' x 85'; W. Bartholomew, contractor.

Township Lane, cor. Nice St., two-st'y dwell., 16' x 42'; T. W. Wright & Sons, contractors.

Edgemont St., n of Somerset St., two-st'y dwell., 20' x 31'; Slater & Miller, contractors.

Chancellor St., Nos. 1634 *and* 1636, four-st'y stable, 30' x 60'; D. McDaniels, owner.

Chester Ave., cor. Forty-eighth St., three-st'y dwell., 20' x 54'; J. D. Arthur, contractor.

Venango St., e of Tulip St., two-st'y dwell., 16' x 32'; Max Wilber, owner.

Bethlehem Pike, below Reading R. R., three-st'y stone house, 40' x 100'; E. Thompson, contractor.

Thirty-first St., cor. Clearfield St., three-st'y dwell., 18' x 47'; Chas. Bartle, contractor.

Thirty-fifth St., cor. Scott Lane, two-st'y dwell., 15' x 45'; Chas. Bartle, contractor.

Fitzwater St., e of Twenty-first St., three-st'y dwell., 16' x 45'; McFetridge & McConnell, contractors.

House. — Jno. Scott will erect a house at Thirty-eighth St., cor of Chestnut St.; from plans by Wilson Bros. & Co., architects.

St. Louis.

Building Permits. — Seventy-seven permits have been issued since our last report, twenty-seven of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

A. Whri, two-st'y brick dwell.; cost, $6,000; A. Whri, contractor.

Mrs. A. Kappresser, two-st'y brick tenement; cost, $2,500; Paulus & Weidemuller, contractors.

M. Doyle, two-st'y brick tenement; cost, $2,800; M. Doyle, contractor.

Fred Werner, two-st'y brick dwell.; cost, $3,800; McCarty & Watzon, contractors.

P. Finan, 2 adjacent two-st'y dwells.; cost, $3,200; Bryan & Brady, contractors.

J. C. Crothers, two-st'y brick dwell.; cost, $2,650; J. A. Stanley, contractor.

St. Louis Board of Public Schools, three-st'y brick school-house; cost, $16,975; Grundwald & Wind, contractors.

Jno. Klute, two-st'y brick dwell.; cost, $4,000; Klute & Hillebrand, contractors.

Jno. Klute, two-st'y brick dwell.; cost, $4,000; Klute & Hillebrand, contractors.

Aug. Vitrey, two-st'y brick dwell.; cost, $4,000; Klute & Hillebrand, contractors.

Jno. Ehrhardt, 3 adjacent two-st'y tenements; cost, $6,500; Frank Hermann, contractor.

Mrs. B. Koenig, 3 adjacent two-st'y tenements; cost, $6,500; Henry Rocktage, contractor.

Mr. Wotle, 2 adjacent two-st'y dwells.; cost, $2,550; J. C. Schubert, contractor.

G. Wurtz, two-st'y brick dwell.; cost, $3,000; A. Anderson, contractor.

Wm. Desmond, two-st'y brick dwell.; cost, $3,000; Craegen & O'Brien, contractors.

Louis Kuebler, two-st'y brick dwell.; cost, $2,500; Hermann & Schumacher, contractors.

Caul & Hasse, two-st'y brick carriage factory; cost, $20,000; A. Beinke & Co., architect; E. T. Hoffman, contractor.

Toledo.

Asylum. — Messrs. Malone & Co., are now well begun on their large asylum contract, and the work will be pushed as vigorously as the coming fall and winter weather will permit.

It is expected that a number of the buildings will be enclosed before snow falls.

Memorial Building. — The foundation and basement walls of the Soldier's Memorial Building, cor. Adams and Ontario Sts., are completed, and are a very fine piece of work; the cut-stone being furnished and set by Mr. Geo. Driver, reflecting great credit upon his skill.

The City Council have just approved the contract entered into by Messrs. Dawson & Anderson, for enclosing the structure; Hunter Bros., having the contract for the brick work. The cost for the enclosing, above the basement, will be upwards of $22,000; and it is expected the work will proceed at once. The plans were prepared at the office of Gibbs & Co., of this city, and the structure gives the promise of being very effective, and an ornament to the city.

Stable. — Cor. Madison and Twenty-third Sts., brick stable, for Mr. H. S. Walbridge; cost, about $3,000; N. B. Bacon, architect; Platfoot & Co., builders.

Warehouse. — Five-st'y brick wholesale building, with basement, for Mr. D. R. Locke ("Nasby") adjoining new *Blade* building. The building is 30' front on Superior St., by a depth of 114' to alley. This is intersected by a building having frontage of 40' on Jefferson St., and a depth of about 90'; N. B. Bacon, architect; J. V. Sanfleet has the contract. The cost to be about $32,000; and will be finished March 15, 1885.

Houses. — Mr. A. Burger is having constructed on Adams St., a Queen Anne frame dwell., to cost about $3,500; from plans by Mr. F. Eurich.

Mr. H. W. Barkdull is having constructed a frame dwell., costing about $3,000; from plans by Messrs. Gibbs & Co.

Mr. W. Hodge, cor. Warren and Prescott Sts., frame dwell., costing about $3,200; E. H. Kuhlman, builder.

General Notes.

Algona, Io. — Two-st'y brick school-building; Foster & Liebbe, architects; cost, $16,000.

Ames, Io. — Buildings for State Agricultural College,

Beach Haven, N. J. — Cottage for Jno. Converse; Wilson Bros. & Co., architects, Philadelphia, Pa.

Boomer, Io. — Webb, Moore & Miller, brick business block, four fronts; Foster & Liebbe, architects; cost, $20,000.

Hotel, three-st'y; Foster & Liebbe, architects, cost, $16,000.

Buffalo, N. Y. — For the Young Men's Library and Art Society a building, with a frontage of 307', with a depth of 50', of Philadelphia brick with brown-stone and terra-cotta trimmings, is to be built at a cost of $225,000, from designs of Mr. Cyrus L. W. Eidlitz, of New York.

Causo, N. S. — Office, operating station, and several dwells.; Edward Chester Smith, architect.

Cedar Rapids, Io. — Masonic library-building, brick and stone; Foster & Liebbe, architects; cost, $25,000.

Charles City, Io. — A. G. Case, two-st'y frame dwell. Foster & Liebbe, architects; cost, $7,500.

C. H. Baldwin, two-st'y frame house; Foster & Liebbe, architects; cost, $4,500.

Grinnell, Io. — H. L. Spencer, two-st'y business block, frame; Foster & Liebbe, architects; cost, $4,500.

C. H. Beyer, two-st'y frame house; Foster & Liebbe, architects; cost, $4,500.

Guthrie Centre, Io. — Col. Dewey, two-st'y frame house; Foster & Liebbe, architects; cost, $5,000.

Harlan, Io. — C. Escher, two-st'y frame house; Foster & Liebbe, architects; cost, $5,000.

Kansas City, Mo. — Ermine Case, Jr., brick residence, 48' x 120', two-st'y, 1222-1224 Broadway; cost, $7,500.

I. F. Richards, business block, 40' x 106', four-st'y and basement, 1329-1331 Union St.; cost, $15,000. Foster & Liebbe, architects; cost, $25,000.

Minneapolis, Minn. — Irving A. Spear, two-st'y wooden dwell., n cor. Fifteenth Ave., s e, and Sixth St.; cost, $3,000.

Mark D. Spear, two-st'y wooden dwell., s e cor. Stevens Ave. and Thirty-second St.; cost, $3,000.

J. D. Blake, two-and-one-half-st'y brick veneered dwell., Mount Curve Ave., cor. Groveland and Twenty-third Sts.; cost, $25,000.

H. W. Phelps, four-st'y brick warehouse, 57' x 62', s s of First Ave., north, between Washington Ave. and Second St.; cost, $20,000.

A. Von Ende, four-st'y brick and stone building, 55' x 75', w s of High St., between Hennepin and First Aves.; cost, $20,000.

Jos. Boswell and W. Vaughan, frame dwell., First Ave., s.; cost, $3,000.

Montclair, N. J. — A frame Sunday-school building is to be built from plans of Mr. C. D. Marvin, of New York.

Muncie, Ind. — The contract for the building of a new court-house will be let Thursday, September 4. The building will be of stone externally, constructed of iron, and thoroughly fire-proof. It will be a first-class building in every respect. The architect is B. S. Tolan (successor to T. J. Tolan & Son), of Ft. Wayne, Ind.

Muscatine, Io. — P. M. Musser, brick residence, three-st'y; Foster & Liebbe, architects; cost, $20,000.

Muskegon, Mich. — Chas. Van Sickle, wood dwell.; cost, $2,000; D. S. Hopkins, Grand Rapids, Mich., architect.

PROPOSALS.

JOINER'S WORK AND WOOD FLOORING.
[At Kansas City, Mo.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., September 17, 1884.

Sealed proposals will be received at this office until **2 p.m., on the 15th day of October, 1884,** for furnishing and fixing in place complete, all the joiner's work and wood flooring required for the custom-house and post-office building at Kansas City, Mo., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
458 Supervising Architect.

COURT-HOUSE.
[At Galesburg, Ill.]

Office of the County Clerk,
Galesburg, Ill., September 11, 1884.

Sealed proposals will be received at this office till **11 o'clock, a. m., on the 3d day of October, 1884,** for supplying all materials and workmanship, and completing every class of work required in the construction of the new court-house at Galesburg, Ill., to be erected according to the plans, specifications, and detail drawings of E. E. Myers, architect, which can be seen upon application at this office after the 18th inst.

Bidders will be required to furnish samples of the several kinds of materials to be used in the construction of the building, and shall inclose with their bids a copy of this "Notice to Contractors and Builders," and also a certified check payable to Knox County, for the sum of $1,000, as a guaranty that the bidder, if successful, shall, within ten days after the award, enter into the contract as required; and a failure to do so within the time specified shall forfeit all claim to said contract and certified check.

The contractor will be required to give bond in the penalty of twenty per cent of his bid, with security to be approved by the Court-House Committee, for the fulfilment of his contract.

Specifications, schedules, forms of proposals and contracts will be furnished upon application to this office.

Bids will be made separately for each class of work, or for the work as a whole, and must be indorsed "Proposals for Building the New Court-House," and be addressed to W. Selden Gale, the Chairman of Building Committee, at Galesburg, Ill., stating the time within which the work bid for shall commence and be finished.

All proposals must be addressed to the undersigned, and no proposal will be considered unless accompanied with a full and complete itemized schedule, and made on the blanks furnished by the county.

The Court-House Committee reserves the right to reject any or all proposals, and to let the work as a whole or separately, as they may deem it best.

W. SELDEN GALE,
457 Chairman of Building Com.

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CONTENTS.

A SINGULAR accident took place not long ago in Southern France, where a portion of an unfinished railroad bridge, all of iron, was blown bodily off the piers which supported it, and thrown into the ravine below. The bridge forms part of a new railway line in the Department of Creuse, and is an engineering structure of considerable interest and importance, the central span being two hundred and ninety-seven feet high above the water of the river which flows beneath it, and three hundred and twenty-five feet long in the clear between the supporting piers. The roadway is supported by two large lattice girders, with horizontal wind-bracing, and at the time of the accident one of the shore spans had been completed, and the next, which was the central span, was in process of construction by building out from the finished work, something more than half having been put together and overhanging the chasm. The winds in that mountainous region are very severe, storms having been known to blow railway-cars off the track; but the unfinished bridge having resisted one tempest without the slightest apparent movement, it was considered safe. On the night of the twenty-sixth of last January, however, a still stronger wind attacked it, and in the morning all the iron-work of the incomplete span, with the completed one next to it, was found piled up on the rocks below, at some distance to leeward of the piers. The wreck contained four hundred and fifty tons of iron, and various theories have been advanced to account for the lifting of this enormous load from its supports, by the force of wind alone, and the displacement to a horizontal distance of forty-four feet, which was necessary to clear it from the piers. According to *Le Génie Civil*, the most reasonable supposition is that the unfinished span, projecting one hundred and seventy-two feet from the pier, vibrated to some extent under the effect of the gusts of wind, and this vibration, if it once became regular, might easily have been increased by successive impulses, until it became strong enough to tear away the rivets by which the parts were held together. In addition to this, the upward force which, as *Le Génie Civil* says, is always exerted by very severe winds, may have lessened the friction of the mass on the pier, so that the combined effort was sufficient to throw it entirely over.

THE New York *Tribune* gives a brief account of the natural gas-wells now in operation in and about Pittsburgh, from which it appears that the new fuel is likely to cause important changes in many details of manufacturing in that city. The first gas-well in the Pittsburgh district was opened by accident. A party of oil-hunters, while boring a well at Murraysville, twelve miles southwest of the city, struck, at the depth of twelve hundred feet, a vein of gas, which escaped under such pressure that the work of boring could not be continued, and the well was abandoned. The gas from the deserted well, being, it is said, heavier than air, soon accumulated in the low parts of the surrounding country, forming a disagreeable miasma, and attention having been perhaps again called to the well by this circumstance, an attempt was made to burn the gas in an enclosed space, to form lampblack. The result of this was the speedy destruction of the buildings about the mouth of the well, and the enterprise was given up, but the gas was allowed to burn, to keep it from infecting the air. Meanwhile, gas had been obtained in smaller quantities from several smaller wells, and utilized for fuel, and a new company was formed to collect and sell the product of the first well. As the quantity was very large, it was decided to convey it in pipes to Pittsburgh, where the demand would be practically unlimited. As soon as the pipes had been laid for this purpose, the proprietors of other wells began to imitate the example of the first company, and a combination was formed for the purpose of keeping up the price of the gas. Although it formed a clean and excellent fuel, the price at which it was sold by the producers rendered it little, if at all, cheaper than coal; and some of the larger consumers in Pittsburgh bored wells of their own, and were successful in reaching gas-veins. The earlier apprehensions as to the limitations of the supply have been removed by further experience, and the people of Pittsburgh believe that, even if their wells should prove less constant than those of Fredonia, N. Y., which have furnished gas for lighting the town for fifty years, they will give a supply sufficient for their needs for twenty years at least; and in consequence of this opinion the furnaces in manufactories, and cooking and heating stoves in dwelling-houses, are being rapidly altered to use the new fuel.

A REPORT was recently made, at the request of the Corporation of the city of Philadelphia, upon the comparative merits of various systems of paving. The report was drawn up by General Q. A. Gillmore, assisted by Messrs. Green and North, two well-known engineers, and appears to have a great deal of interest for other communities besides Philadelphia. Besides giving a description of the principal varieties of pavement now in use, the three engineers make recommendations as to the best sorts to be used under various circumstances. In their opinion, the new wooden pavement laid on a foundation of Portland cement concrete, about which so much has been said of late, is not the most desirable, considering its cost. Most of our readers know something of the singular contract under which this pavement is now being extensively laid in Paris, the company agreeing to lay and keep it in repair for eighteen years, in consideration of the payment by the city of a certain annual instalment of the price during that time. As the Philadelphia report informs us, instead of the trifling expense for repairs which the descriptions of the new pavement seemed to indicate as one of its advantages, the company furnishing it expects to renew the whole every four or six years, according to the amount of travel over it. The sum of the annual instalments, at the end of the eighteen years, counting interest, will be very little less than seventeen dollars per square yard, for which the city of Paris will, it is true, have had its streets kept in order during the time; but its condition is very likely to be such, when the last instalment is paid, as to render the relaying of the whole pavement immediately necessary.

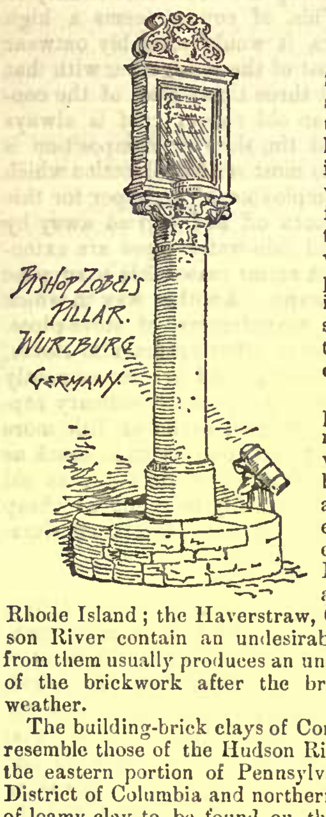
SUCH a pavement as this does not seem to the Corporation advisers of Philadelphia economical, and there are other objections to it, which lead the engineers to prefer in all cases pavements of impervious materials. Among these they choose three sorts, each of which is adapted to certain conditions. For all streets less then twenty feet wide from curb to curb, or where heavy wagons are likely to pass at the rate of more than fifty an hour, they recommend a pavement of granite blocks, set on edge, from three to four inches thick, six, seven, or eight inches deep, according to the amount of travel, and eight to ten inches long. These should be laid on a six-inch bed, either of concrete or of clean gravel, rolled to a smooth surface, and the blocks should be set in three inches of washed sand; and finally, the joints between them should be filled with a mixture of clean, dry pebbles, which should be heated if laid in damp weather, and coal-tar, of the variety known in the trade as Number five. This filling of the joints with impervious material is looked upon by the engineers as very important. If water can be prevented from penetrating the joints between the blocks, a substratum of gravel, or even of earth, thoroughly compacted, is, except for the heaviest traffic, nearly as good as concrete. So long as it is kept dry, the earth or gravel will remain in place, and no settlement can occur, and it is not until water reaches it that movements take place, resulting in inequalities of the pavement. Still, the risk of dislocations of the joints by the shocks from the wheels of heavy wagons is considerable, and in places where it is exposed to these the pavement does best upon a base of concrete. For wide streets, lined with dwelling-houses, and with grades generally not steeper than fourteen feet to the mile, the report advises the use of either the Swiss rock asphalt or the artificial product made with powdered stone and Trinidad bitumen, spread in a thin layer over a foundation of concrete. As a cheaper substitute for asphalt, the report suggests the use of compressed asphalt blocks, on a foundation of gravel, which, though unsuited to resist heavy traffic, answer well for streets of a quiet character. For suburban streets the engineers find nothing better than macadamizing, if done in a proper way, instead of in the usual feeble and inefficient manner. With ten inches of broken trap-rock, as they advise, on a bed of sand or blast-furnace slag, for drainage, all well rolled down, without the use of soft binding material, we know that a road can be made such as the dwellers in ordinary suburban districts seldom see, and it would be well worth while for some of the improvement societies which are doing so much good all over the country to inform themselves as to the economy of such work in comparison with that about them.

THOSE persons who are interested in meteorology may derive a suggestion from the description given in *Engineering*, of a "sunshine recorder," exhibited in the meteorological section of the Health Exhibition, by Mr. Leckey, of London. In substance the instrument consists of a solid ball of transparent glass, mounted in a frame which carries also portions of three rings, joining at their edges. The middle ring is a portion of the surface of a cylinder, the axis of which is parallel to the axis of the earth, while the breadth of the ring is so great that the image of the sun thrown upon it by the ball, acting as a lens, will fall always within it for about a month at each equinox. The other rings are portions of the surface of cones, whose common axis is parallel to that of the earth, and passes through the centre of the glass globe. The rings are made with grooves, so that cardboard slips, divided for hours and half-hours, can be inserted in them. On setting the instrument in such a position that the image of the sun at noon will fall upon the proper division of the card, not only does the movement of the image serve to indicate the time, but the concentrated rays scorch the card where they touch it, producing a brown line, which shows accurately the duration of sunshine on any given day, and the hour when clouds may have come up or cleared away. The records made by the instrument are easily preserved, and must have considerable scientific value. A series of such records, taken in Bedfordshire during the past three years, is given, and contains some interesting information. According to this, the gloomiest part of the year in that part of England is winter, the three winter months being nearly equal in regard to the proportion of clouds to sunshine. In 1883, the darkest month was December, which had only twenty-three and three-quarters hours of sun during the entire month. In 1882, December was also the darkest month, but in 1881, February, which is often one of our brightest months, was the darkest in England, the sun shining but eighteen and one-half hours in the forenoon, and nineteen hours in the afternoon. The whole of 1883 was gloomy, the average for the year, which no month much exceeded, baving been less than one day of sunshine to every two of cloud. Some parts of England would probably show a brighter climate than that of the spot where the record was taken, but the southwest coast would be quite likely to be darker still.

ONE of our exchanges thinks it worth while, considering the present low price of copper, for those interested in metalwork of various kinds to consider whether this excellent material may not, with advantage, be used in place of iron for purposes to which the latter is but imperfectly adapted. As every one knows, many roofs still exist in perfect condition in our eastern cities, which were covered with copper fifty or sixty years ago, and to all appearance they will be good for as many years more; while some in Europe have remained for five hundred years. Although the first cost of such roofs was in their day very considerable, their durability has made them by far the most economical sort that could have been used in the trying climate of the Atlantic seaboard, and, as the price of copper is probably less than half as great now as it was then, it is well worth considering whether the fashion may not be revived. The journal which makes the suggestion sets the present value of rolled copper sheathing at seventeen cents a pound. This would make the cost, for material alone, of a roof of ten-ounce copper, ten dollars and sixty-two cents per square, and for sixteen-ounce copper, a very strong and durable material, seventeen dollars per square. The copper could probably be put on for eight dollars more, making the total cost twenty to twenty-five dollars a square. This, of course, seems a high price, but, independent of repairs, it would probably outwear half a dozen tin roofs, and the cost of these, together with that of painting them, would be about three times that of the copper. Moreover, the material of an old copper roof is always salable at a good price, while old tin, slate or composition is worse than valueless. In fact, the most serious objection which mechanics usually make to the employment of copper for this purpose is that it is likely to be torn off and carried away by thieves; but as copper gutters and rain-water pipes are extensively used without such results, it seems reasonable to suppose that plain roofing might also escape. Another way in which copper might be used is in the manufacture of stove-pipes. Such pipes are often made for tiled or other ornamental stoves, and handsomely finished by polishing, and are consequently expensive; but if made in the usual way, out of ordinary copper sheathing, their cost for equal weights would be little more than that of Russia iron pipe, and less than twice as much as that of plain iron. In fact, considering their value as old material, the copper pipes would probably be really as cheap as those of ordinary iron, even in first cost, while their durability would make them far more valuable.

AN old problem of the psychologists has been revived by a letter to *La Nature*, written by a French business man, who mentions that for years he has been in the habit of waking himself at any hour in the morning that he wished, simply by impressing upon his mind, before going to sleep, the fact that he must wake at that time; and saying further that he seldom varies five minutes from the moment which he had assigned himself. The New York *Evening Post*, in speaking of this letter, says that Napoleon I is related to have had the same faculty, but adds that its existence has never been verified. We imagine that this experience is not so rare as the *Evening Post* supposes, and that a person need not be a Napoleon to be favored with this useful "faculty." We have a very distinct recollection of many instances in which we have ourselves tried the experiment with success, and at one time, when it was necessary for a considerable period for us to wake on certain days of the week at a very early hour, to take the first train to the place where our services were then needed, we had an opportunity of studying the circumstances under which this peculiar species of self-control is most easily exercised. During this period we found no difficulty in waking regularly within about five minutes of the time necessary to enable us to reach the train comfortably, although for a portion of the time this involved getting up long before daylight; but we discovered, also, that in order to wake with precision at the right moment, and to rest quietly until it arrived, it was necessary to look at our watch just before going to sleep. If we neglected this precaution we were apt to sleep uneasily, waking first an hour or more before the proper time, and allowing ourselves, in consequence, only short naps afterward until the minute arrived for getting up. Whatever part of our mind it might have been that took charge of waking us seemed to begin its count of the hours from the time at which we composed ourselves to sleep, and if we did not inform ourselves of this, our unconscious reckoning was correspondingly uncertain, and the effort to wake vague; but if we took a clear note of the time in the evening, we could sleep peacefully through the whole of the allotted interval, sure of being aroused at or very near its expiration. Another condition of waking we found to be the occurrence of some small external event, through which, as it were, the internal effort could take effect upon our senses. A very trifling circumstance — the flutter of a leaf outside the window, the chirp of a bird, or any other of the unnumbered sounds of early morning, was sufficient, if it happened at the right time, to wake us, by a sort of magnifying process which at that moment gave the power of startling us by a noise which would at other times be unnoticed; but without such sensible impression we think we should not have waked. In fact, on one or two occasions we remember to have been impressed with a dim consciousness of waiting for something to happen before waking, and a moment later a trifling sound would open our senses with a little shock. To the necessity of waiting for this impression, small as it might be, we were disposed to attribute the variation of a minute or two either way from the exact moment assigned for waiting, which might otherwise be kept with exact punctuality.

BRICK-CLAYS AND BUILDING-BRICKS.



CLAY suitable for the manufacture of building-bricks is an abundant material, and it is found, combined with other substances, in beds of varying depths, the term clay being applied to hydrous silicates of aluminum, and is produced for the most part by the wearing down and decomposition of felspathic rocks, and the precipitation in basins, from the suspension in water, of the finely-divided impalpable particles. The rocks containing a good proportion of oxide or salts of iron form red clays, and those having only traces form white clays.

The hydrous silicate of alumina or pure clay is infusible, even in the most intense heat; but when mixed with the alkalies or alkaline earths, it becomes fusible in proportion to the admixture. There is a great difference in the nature and quality of clay found in various localities. In Maine the clays are light; but they are more fatty in Massachusetts and Rhode Island; the Haverstraw, Croton, and other clays on the Hudson River contain an undesirable quicksand, and the stock made from them usually produces an undesirable efflorescence upon the face of the brickwork after the bricks are laid and exposed to the weather.

The building-brick clays of Connecticut and northern New Jersey resemble those of the Hudson River; but the belt extending along the eastern portion of Pennsylvania, down through Maryland, the District of Columbia and northern Virginia, contains the finest grade of loamy clay to be found on this continent, producing a superior quality of bricks of the greatest hardness and of a cherry-red color.

Baltimore and Philadelphia lead in regard to the quality and color of the finer grades; but the ornamental bricks produced in Philadelphia are of the highest rank.

The clay commonly used in Chicago and vicinity is not only limy, but contains lime-pebbles, which render it very difficult to work. Around St. Louis the material is of a loamy nature, with veins of what are called "joint clay," which makes the bricks crack and check in drying, and split in burning. In the neighborhood of Milwaukee the clays are of a smooth, plastic nature, and owing to the slight traces of iron burn nearly white or a light cream color.

In many portions of Canada the clays are good for making building-bricks; they are especially so in the neighborhood of Amprior, Bellville, Bell's Corners, Brantford, Dundas, Glenwilliams, Kincardine, Loudon, Pembroke, Ramsay, and Yorkville in Ontario; and near Little River, Montreal, Quebec, and St. John, in Quebec; also at St. John and many portions of New Brunswick. The clays found near Halifax, Springville and Woodstock, in Nova Scotia, are passably fair for making building-bricks.

Cuban and South American clays are generally poor, both as regards strength and color. In the northern part of France the clays are loamy and of a fair quality for brick-making; they are not deep, averaging only about two metres in depth; but they gradually improve in both quality and depth toward the southern portion. The Italian clays are of a superior quality for brick-making; they are naturally plastic and require no sanding.

In England, in the vicinity of London, the principal supplies of brick-clays are obtained from the alluvial deposits lying above the London clay, the blue clay not being much used for brick-making. The material employed is a kind of granite loam, weak on the surface, and formerly gradually passing into either a strong clay or marl, or, as it is usually called, "malm," which is an earth suitable for making bricks without any additions; but now there is little natural malm to be had, as this class of clay is about exhausted. For making the best quality of bricks, which are called "malms," an artificial substitute is obtained by mixing together chalk and clay, previously reduced to a pulp in a wash-mill; this pulp is run off into shallow pits, where it remains until it has become of sufficient consistency for subsequent operations, but this process is only resorted to for the best quality of bricks, as the expense is too great for the commoner kinds.

The clays of Germany are plastic and produce a superior quality of bricks. The Dutch clinkers, or paving-bricks, have for many centuries been of the hardest kind and of a superior quality, and are manufactured principally at Moor, a village about two miles from Gouda, in South Holland, the principal brick-fields being on the banks of the river Yessel, from which the chief material is derived. This is no other than the slime deposited by the river on its shores and at the bottom. The slime of the Haarlem Meer is also extensively used for this purpose, and the men who collect this in boats have long poles with a cutting circle of iron at the end, also a bag-net with which they lug up the slime; and the hard paving-bricks used for the streets in many portions of the Netherlands are made with a mixture of this slime and sand.

The London brick-makers obtain their supply of sand from the bottom of the river Thames, near Woolwich, where it is raised into boats used for that purpose.

The manner of taking material for brick-making from the bottoms of rivers and lakes with poles is not of modern origin, as will appear from the inscription which once stood upon the brick pyramid of Howara, ten leagues from Cairo; for Herodotus cites the following as at one time standing upon it, the translation reading: "Do not undervalue me by comparing me with pyramids of stone, for I am better than they, as Jove exceeds the other deities. I am made of bricks from clay brought up from the bottom of the lake, adhering to poles."

Clay of a superior quality for brick-making abounds in nearly every portion of Russia, and although brick-kilns are scattered all over the empire, the total production for 1880 was only about 750,000,000, which quantity would not more than supply the demands of the city of London in a busy building year.

By reason of the country's great wealth of timber, the production and consumption of bricks are by no means in proportion to the population of Russia. Wooden buildings are the rule and those of brick construction the exception, nor do the disastrous and too constantly recurring fires, with their attendant train of misery and suffering, seem to have much effect in enlightening the people.

Clay is the only substance in the mineral kingdom that possesses plasticity, and if sand be in large proportion in loam, or if calcareous matters predominate in marl, so as to deprive either material of plasticity, it is no longer clay.

Those clays which possess a high degree of plasticity are called long or fat, but when having but little plasticity they are termed short, meagre or lean; but in the language of the brick-yard the first is called "strong clay," and the latter "weak clay."

Mixed with considerable water, clays are more or less plastic, the degree of plasticity depending on their purity and peculiarities of composition, and, if possible, they should not be hauled into the brick-yard, dried by a scorching sun or drying wind, but in their moist and natural condition; for as they shrink and harden in drying, the labor of tempering them into brick pug is largely increased, and then it is not so good, the plastic nature of the clay being less smooth and free than before.

Oxide of iron, lime, magnesia, potash, silica, bitumen, and fragments of rock are substances that impair the plasticity of clay, and they impress upon it certain characters that are of much importance to the manufacturer, and as the plasticity of clay, or its power of yielding with water a mass that may be moulded, is of much importance in a practical point of view, and besides is interesting as a subject of scientific inquiry, we shall enlarge upon it somewhat.

Bischof explains the plasticity, and Aron the shrinking of clay as follows: Aluminum hydrate, like silicic acid, is capable of assuming the gelatinous form, in which, owing to the peculiar arrangement of the atoms, these compounds are able to take up a large quantity of water, swelling out to an extraordinary degree, and thus enveloping or binding together sandy or earthy matter in a fine state of division. On removing the water by drying, the original plastic mass shrivels up; this is termed shrinkage.

Either on drying in the air or on burning, the atoms of clay approach one another more closely, the accompanying admixed constituents also at the same time being drawn together. An increase of density and diminution of bulk thus occur.

The capacity for absorbing water in different clays varies as greatly as their plasticity, which increases with their tendency or power to crumble (possibly with the formation of aluminum hydrate). Meagre clays readily absorb water, and easily attain the desired degree of plasticity; fat clays, on the contrary, become very friable. The former become softer by working; the fat clays stiffer. Many fat clays exhibit the phenomenon technically known as "water stiffness," that is, when softened with a certain quantity of water, they have no inclination readily to absorb more. Shortness or meagreness depends more upon the presence of undisintegrated mineral particles than on that of sand; a clay rich in sand may, however, be fat; but one rich in unreduced mineral matter never can be.

By gradually drying at a temperature increasing to 266° Fahrenheit, the weighed portions of clay being placed on a glass plate, and two parallel marks cut upon it, and the distance between the marks repeatedly measured, it was found that the shrinking did not continue until the clay was quite dry, but ceased before this point was attained.

To a certain point the shrinkage exactly expressed the loss of water; at this point it suddenly stopped, just as the clay particles came into contact. Aron terms this point the "limit of shrinkage," and distinguishes the water dissipated to this point as the "water of shrinking," and that subsequently driven off as the "water of porosity." The sum of the two is total water. The cubical amounts of shrinking of a pasty mass of clay were found to be equal to the volume of water evaporated.

The proportion of pores in the dry clay is constant, that is, independent of the water originally contained. From the fact that the proportion of pores in several chemically different clays is nearly equal, it may be inferred that the smaller atoms of clay have a regular spherical shape, and this view is confirmed by microscopic observations.

In a plastic mass of clay there is thus a vast number of these little spheres, at equal distances, suspended in water. The distance between these particles is so small that the attraction between them is considerable, and so a system of capillary tubes is formed, in which the expulsion of water by pressure is so opposed that neither the power of attraction of the spherical atoms for one another, nor their vertical downward pressure, will permit the water to penetrate through the tubes. Plasticity commences with increase of the distance between clay atoms, and ceases when that increase has attained a certain amount. In shrinking, as water evaporates on the surface, a fresh supply is drawn from the interior of the mass, through the fine capillary tubes mentioned above, the particles approximating throughout the whole mass, in obedience to their power of attraction; and this process continues until the atoms come in contact, and then room for water is afforded only in the spaces between the particles (water of porosity). In meagre clays these fine spherical atoms envelop the irregular-shaped particles of foreign matter. On trying the effect of additions of very fine sand to some washed clay, it was found that, to a certain point, the shrinking power of the clay increased with its progressive meagreness (the water being constant), and the porosity decreased. This point is termed the "point of greatest density of the mass."

From the point of greatest density, further impoverishment diminishes the shrinkage for an equal amount of water in the pores, but increases the porosity.

The best building-brick clays are composed of silica three-fifths, alumina one-fifth, and the remaining one-fifth of iron, lime, magnesia, soda, potash and water; if there is an excess of alumina over the silica, the bricks are likely to crack in the kiln, but the presence of a proper proportion of silica remedies this, by rendering the bricks more porous, and good building-bricks have been produced when the proportion of silica reached as high as eighty-five per cent of the whole body.

When sand is added to the clay intended for common bricks, it should be clean, sharp, fusible, and not too fine; right selection and proportion insures a hard, strong, ringing brick of good size and color, but for pressed, ornamental, and other higher grades of bricks, a finer sand should be used.

To be acquainted with the chemical qualities of brick-clays is of course useful in their manipulation; but the physical tests of this class of clays are of vastly more importance. Analyses answer well for comparisons in theory; but the physical trials and results are the ones which govern their employment in industry.

The actual quantity of sand or other substances to be employed, and which are required for any clay, can only be determined by actual experimental mixing and burning. Sandy clay or loam, and calcareous clay or marl, are largely used for brick-making; but if too much lime be present, the compound becomes too fusible. Oxide of iron is always present in building-brick clays to a more or less degree, and in the process of burning it is converted into peroxide, and imparts to the whole its color, more or less deep red, according to the degree of heat which the brick receives in burning, and the amount of oxide that the clay contains.

Clays that are rich in lime or in the alkalies are not good for brick-making, and are the worst that can be used for that purpose; in fact, when a clay contains even three per cent of lime, a good quality of brick cannot possibly be made from it.

Carbonate of lime, diffused limestone and lime-pebbles, when they are present in brick-clays, are a decided hindrance to the production of even a passable quality of building-bricks, for in the kiln the limestone and lime-pebbles are converted into caustic lime, and when the bricks are used below ground, or for exposed walls, the moisture and carbonic acid, which penetrate to every part of a brick, slack the nodules of lime, the swelling causing the bricks to burst and break to pieces. Should such bricks be used for "filling in," or inside or unexposed walls, the dampness from the mortar used in laying them, and also that contained in the plastering, would, by producing the same bursting and breaking, destroy the finished face of the inside walls.

These are some of the evils which result from the badly-made bricks so freely used in Chicago, and arise from the large amount of lime-pebbles in the clay, and the neglect of finely pulverizing or thoroughly sifting the clay, which easily can be done by machinery, at but a small additional cost. Oyster-shells and iron pyrites are not uncommonly present in clays, and in order to make a durable and well-colored brick, they must be separated from the clay.

Clay taken from the seashore, or without or beneath the sea-washes, or from places in or near salt formations, will not burn into good bricks. Before they receive sufficient heat to burn them into hard bricks they will fuse, warp, twist, and agglutinate together upon the surface, and in the arches of the kiln they "run" or melt quickly into unshapely masses of molten clay, and form "burs" or clinkers.

A very interesting, but unfortunately a very little understood, class of phenomena takes place when bricks made from the material which we have just considered, or those that contain small quantities of it, are exposed to certain conditions. I mean the saltpetre exudations which effloresce on the exposed faces of brick walls. But we cannot enter upon a discussion of that matter in the present article, for want of space, but hope to treat it separately at a future time.

Clays containing a large amount of carbonaceous matter naturally mixed with it are very objectionable, as bricks when made from such clays will, when wetted in the wall, pass out soluble compounds, which discolor the walls, whether they are painted or not, and plastering or stucco-work is discolored by them the same as when bricks which have once been used in the inside of a chimney-flue, and become blackened, are re-used in new work.

It would be useless to attempt decorative work of any description upon brick walls the materials of which contain a large amount of carbonaceous matter, or if the bricks be made from the alluvial mud of the embouchures of rivers, as no possible precaution can prevent the entire destruction of the work.

The argillaceous earths that are generally suitable for the manufacture of building-bricks may be divided into three classes, viz.:—

1. Loams, which are light, sandy clays.
2. Pure clays, principally composed of alumina and silica.
3. Marls, which are earths that contain an unusual proportion of lime.

It is not often that earths are found that are suitable *per se* for brick-making; they generally require mixing with something else, as the loams are usually so open that, in order to bind the earth, a flux in the nature of lime has to be added, and if it happens that a loam requires no mixing, the difference in the working of adjacent strata in the same field is so great that in order to produce regularity in the size and color of the bricks, it is necessary to mix and temper two or three different kinds together, and for the same reason, and to prevent "checking," the pure clays also require mixing with some milder earth, loam or sand.

In working marls, great trouble is experienced from skerry or impure limestone, which abounds in marl; for should a very small piece be allowed to remain in the clay, it is certain to destroy the brick into which it finds its way. To obviate these bad results, heavy iron rolls are used to pulverize the marls and the limestone found in them.

No class of clay freshly taken from its bed is in a condition to be at once moulded into tempered bricks, even if it be of suitable composition, and it should first be exposed to the action of frost, the water diffused through the substance expanding by freezing, and breaking it in every direction.

The longer the exposure is continued, the more effectually is the clay reduced, and the more easily tempered and moulded. But the digging of clay in the autumn is not always attended to; but to neglect it, however, is to run a great risk of having bricks made by the hand-process unsound, as well as faulty in shape. The entire process of brick-making by the hand-process may be classed under six heads; viz., 1, preparation of the clay; 2, tempering; 3, moulding; 4, drying; 5, setting the bricks in the kiln; 6, burning.

The preparation of the clay commences in the autumn, immediately after the other work of the brick-yard ceases. The vegetable soil is stripped from the top of the clay and carried to the level places where the bricks are moulded, called the "floors," and uniformly spread over them to the depth of two inches, and by the return of the brick-making season, about the middle of April, the soil has become solidly packed. The face of the clay-bank having been "trimmed" so as to present a vertical face, it is then measured off in "benches," that is, in sections usually sixteen feet long, and running the height of the clay-bank. In yards making bricks by the hand-process, all work is done by the task or contract, and the clay is dug by "the thousand," and the usual price is fifteen cents for each thousand of clay dug, "one thousand" meaning clay sufficient to make one thousand bricks.

In computing clay it is estimated that there is required sixty-four cubic feet of clay to make one thousand bricks; but it does not require in fact more than fifty cubic feet of clay, on an average, to make one thousand bricks; sixty-four cubic feet to the thousand was about the quantity when our bricks were made of the same size as those of England.

Benches of clay are laid off sixteen feet long, and four feet wide, every foot in height counting as one thousand of clay. In the United States the common manner of digging clay is to undermine the face of the bank of clay, leaving small pillars called "legs," one at each corner, and one in the middle; chambers are next cut into the bank at each corner, the legs of clay are next picked out, a sharp watch being kept by the laborer to see that the bank of clay does not fall unawares. If it should not fall while the legs of clay are being picked out, the laborer gets on top of the bank, and driving a crow-bar into the clay, on a line in several places, about four feet back from the face of the bank, "throws" the bench of clay. The material is then picked into lumps and thrown back with the hands, the fine clay being thrown back with the shovel; and the face of the bank is picked regularly, and the bottom leveled, after which the laborer is ready for another "fall."

While the clay is being dug, strips of clay about eight inches wide are left between the separate benches, they are not dug, and are called "combings;" and if the laborers are not very trustworthy there will be more "combings" than dug clay.

The second step is that of tempering the clay. To temper clay means to thoroughly mix it, and prepare it for the use of the moulder, who must have it in a condition not too soft, nor yet too hard; but in a suitable state of plasticity to be easily and solidly moulded into bricks.

The ancient mode of tempering was by treading the clay by the feet of men or beasts; but clay is now tempered by one of three ways: the first being by hand, the second by the pug-mill, and the third in a ring-pit. The hand-method of tempering is often employed for the manufacture of pressed or front bricks, and sometimes in country places it is employed in the production of common bricks.

The man who reduces the clay to a proper state of plasticity is called the temperer, and in the hand-method of tempering it is his place to throw the clay into a pile the day previous to its being used; and while he is spading the clay into a pile, he at the same time throws water upon it; this pile of clay, when finished for common bricks, contains material sufficient to make 2,333 bricks, and is called "a soak heap."

The next morning, before the moulder is ready to commence work, the temperer pulls a part of the "soak heap" down with a hoe; the portion of the clay thrown down is wetted with water, and turned over many times with a spade. Having done this for a while, he next trims the small pile of clay into shape, and commences to cut through it with an instrument called a "slasher," and any stone that he may strike with the slasher is picked out of the clay. After "cutting and hacking" the clay for a time in this way, it is again turned over with the spade, after which it is ready for the moulder. This operation is continued until all the clay in the "soak heap" is worked out, after which the temperer throws up another similar pile of clay which is allowed to soak through the night.

When hand temperers are employed, in addition to the work just described, they are required to turn up ten rows of the moulded bricks on edge, and, after they are sufficiently hard to wheel and pack them in the drying-shed. The common bricks made from hand-tempered clay are not so good as when made by the other methods of tempering as the clay is not packed together by any pressure in hand-tempering; and the bricks after being burned, are very open or porous. When the process is used for making pressed-bricks, the result is different, as the bricks after being moulded are pressed very solidly in a hand-press.

The next process for tempering clay is by the pug-mill, and to explain this method, I shall here have to explain the organization of the "moulding gangs" in yards producing bricks by the hand-process.

Each gang is composed of one moulder, one wheeler, and one boy called an off-bearer. The moulder shapes the bricks in thin cast-iron moulds from the clay brought to him by the wheeler, who obtains it from an opening in the bottom of the cylinder as it issues from the pug-mill; the boy "off-bears" or carries the bricks from the moulding table and lays them in rows on the ground called the "floor," where they are left to dry.

The pug-mill is an iron shaft with knives of the same material about eighteen inches long, two-and-one-half inches wide, and three-eighths of an inch thick, extending from the shaft in four directions, but so placed that one does not follow directly under the other. To trace the knives around the shaft would be like following the thread of a screw. At the bottom of this shaft, and all on the same level following consecutively are four broad curved pieces of iron called sweeps, pressers, or pushers, which terms are synonymous, and their use is to force the tempered clay through an opening near the bottom, in the side of the cylinder or box inclosing the pug-mill.

The pug-mill and cylinder enclosing it are so placed that the pivot or spindle at the bottom of the mill will be in the centre of the diameter of a semi-circular pit, which to contain clay for three "gangs," measures eight feet from the centre of the pug-mill shaft to the face of the pit, which is four feet deep. This semi-circular pit is usually walled around with bricks, which should be hard burned, and the bottom formed of two-inch oak planks, cut wedge shape.

Directly in front of the pug-mill there is a fan-shaped hole or pit, which allows the wheeler to cut the clay away with a spade as it issues from the hole in the side of the cylinder at the bottom, inclosing the mill.

If the pug-mill is turned by a horse, it is usual, if the clay bank is too far away to be conveniently filled with wheelbarrows, to harness the animal to a cart, and haul the clay to fill the pit, after the work of grinding has been completed, which usually requires about six hours. A long pole fixed in a yoke in the top of the shaft is the leverage by which the pug-mill is turned.

The pit around the pug-mill, when the clay is ground by horse-power, holds usually material sufficient to make 7,000 bricks; after the pit is filled it is the duty of the temperer to let sufficient water to the clay to soak it.

The third manner of tempering clay is by the ring-pits, which are circular, and about twenty feet in diameter, two feet in depth, and they hold clay sufficient to make 14,000 bricks; they are cased around with hard-burned bricks, and the bottom is usually covered with oak planks, cut wedge-shape.

In the centre of the pit there is a pedestal firmly planted, upon which the machinery that operates the tempering-wheel is placed. Ring-pits are operated both by horse and steam-power. There is a gearing of wheels so arranged as gradually to push the tempering-wheel from the centre to the outer edge of the pit, while the wheel is revolving around the circle, and when it reaches the outer edge to again draw it towards the centre.

After the clay is tempered in ring-pits, it is covered with large battened panels, made of light pine wood nailed together, the object being to keep the clay moist, and prevent it from drying on the top before it is used.

Laborers in the brickyards like to have the clay tempered in ring-pits, as they can go in separate gangs at any time, and commence work without waiting for a complement of gangs, which has to be done when pug-mills are used for tempering the clay. It is not unusual for brickyard gangs in the hot season of the year to commence their task at about twelve o'clock at night, when the moon gives sufficient light, and have their day's work of moulding done before seven o'clock in the morning; the ring-pits facilitate this more than does any other mode of tempering the clay.

The third step in the process of producing hand-made bricks is that of moulding the clay after it has been tempered, and this is performed in most of the Eastern States in light cast-iron boxes, having both the top and bottom open and unobstructed, and these moulds contain one brick, and are commonly slightly more than twice as long as they are wide.

The laborer, called the wheeler, brings the tempered clay to the moulder, and piles it upon a wooden stand in front of him. The stand, which is called a "moulding table" is about four feet square, and made in height to suit the moulder.

On the left-hand corner of the table there is securely screwed a piece of cast-iron, one-half inch thick, nine inches wide, twelve inches long, and turned up at one end and down at the other; this iron presents a smooth, plain surface for the bottom of the mould, and it is called the "moulding cleat."

The moulder in forming a brick pulls down on the table with both hands a lump of the tempered clay, then takes a handful of moulding sand in his right hand, from a tub close by, throws the sand over the lump of clay, works the clay and sand into a peculiar shape called the "warp," and dashes it with great force down into the mould which rests upon the moulding cleat, using both hands in the operation. Having done this and patted the clay into the corners of the mould, the moulder then takes an instrument somewhat resembling a plasterer's trowel, and called a plane, which he dips in water, and afterwards strikes off the clay piled above the top of the mould.

The boy called an off-bearer now takes the mould and the enclosed bricks, lays the brick on the "floor," scrapes the inside, and particularly the corners of the mould with a knife suspended by a string from his side. The off-bearer places the cleaned brick-mould in a tub of sand convenient to the moulder, and by the time another brick is made, he is ready to place it alongside of the other on the "floor." This is continued until there are fifty-eight bricks in the row, and the rows are continued until they number forty; then part of a row containing thirteen bricks is made, which completes the "task" of moulding. Each gang, for a day's work, produces 2,333 bricks, three gangs 7,000, six gangs 14,000 bricks, and so on.

The art of perfect moulding by hand consists in filling uniformly every portion of the brick-mould, and in so manipulating the clay and moulding-sand thrown into it, that the bricks shall contain no cracks or "sand flaw," and in so "planing" off the clay from the top of the mould that neither hollow nor swelling called a "belly," is made on the flat part of the brick. The usual time for a good gang to accomplish a day's task of moulding is from five to five and one-half hours.

A difference in the thickness of hand-made bricks is often caused by the wearing of the moulds, new moulds generally being used in the spring of the year, which generally wear thinner, until in the autumn they have lost from one-eighth to three-sixteenths of an inch in depth, and bricks made in the fall of the year being consequently correspondingly thinner than those made in the spring. The loss of one-eighth of an inch in the thickness of a brick may appear to be a very small affair; but is not so insignificant as it may at first sight seem. To lose one-eighth of an inch in one course of bricks in its thickness, is to lose one inch in height in every eight courses, or one foot in every twenty feet of elevation. In a medium-sized house, say twenty-five feet front by sixty feet deep, and sixty feet in height from foundation, to finish the walls being one brick and one-half in thickness, which, with chimneys and ordinary inside walls would girt about two hundred lineal feet, the loss would be about six hundred cubic feet of brickwork, or more than 10,000 bricks. The loss would also be in laying that extra quantity of bricks, and as the bricks and laying would cost in the neighborhood of, say $15 per thousand, a needless loss of about $150 would be inflicted either upon the owner or the builder, which would depend upon the circumstances governing the case.

This fact should be remembered, and engineers and architects having in charge large undertakings requiring a long period for completion, and great quantities of bricks, should expressly require that all moulds that are subjected to loss of depth, whether they be hand moulds or machine moulds, shall be renewed not less than three times in each season. This should be done for the protection of their clients, if they should happen to be furnishing the bricks, and if not, then for the good of the contractor; and also for the purpose of keeping the courses level and uniform throughout the work.

The fourth step in the process of manufacturing hand-made bricks is that of drying, and the first step in this operation is to turn those upon edge that were made the day previous. If there be no indications of rain the bricks are "turned up" early in the morning, and allowed to stand upon edge, exposed to the air and sun, until about four o'clock in the afternoon, when each member of the moulding gang "takes in his share," and carefully hacks them in the drying shed; usually there are each day hacked about eight courses high on edge, and the hacks kept separate to allow circulation of air. There is a space left between the bricks of one-half inch, and a "head" or pier is built at each corner of the "rows."

After remaining in the drying sheds for about two or three weeks, the bricks are generally in condition for setting in the kiln; but during rainy seasons it often requires a longer period to thus naturally dry the bricks. The fifth step is that of setting the dried bricks in the kiln preparatory to being burned, and this work is generally done by a force of five men, called the "setting gang," which is composed of one foreman called the "setter," and four men called the "wheelers and tossers."

A day's work of this gang is usually to take 20,000 bricks out of the drying sheds, and wheel them to the setter, who places them in the kiln in a proper manner for burning.

In "setting out a kiln" the first bricks are set in the back arch, and arch bricks in setting are divided into four classes, viz.: the straight courses, pillar, hangers, and skintle bricks, the names depending upon the position which they occupy in the arch.

The arch is generally fourteen courses high, the bricks being set on edge, and one-half inch apart; the bottom eight courses of the arch are usually called the "straight courses," on the top of which are placed the projecting six courses forming the arch proper, and which are called the "over-hangers."

The "pillar" bricks are the ones between the straight courses, and the "skintles" are bricks set diagonally in order to tie the "over-hangers together. The row of bricks first set on the top of the arch is called the "tie course," and the fourteen courses, including the "tie course" first set on the top of the arch is called the "lower bench," and the next fourteen courses, which usually finish the height of the kiln, are called the "upper bench." "Forty-two high" is the way that the height of a kiln arranged as has been described is usually spoken of.

The bricks are now ready to be burned, or converted from a perishable into an imperishable substance, and this completes the sixth or final step in their manufacture.

There are various plans for burning bricks, such as hot-air, and combinations of gas and gaseous fuels, super-heated steam, and other devices such as annular kilns, etc., which although they are all good require a highly scientific knowledge of heat, its mechanical action, and many other things.

The old-fashioned open kiln is the kind commonly employed, and in these the bricks are burned either by wood or coal. The usual time for burning a kiln containing from 150,000 to 500,000 common bricks is about six days, and the period allowed for the kiln to cool is about the same length of time. Charles T. Davis.

THE REYNOLDS MEMORIAL IN PHILADELPHIA.

Philadelphia, September 18, 1884.

Ironwork to Entrance Gate of Parisian House (modern)

THE equestrian statue of General John F. Reynolds, erected by an association representing several departments of the Grand Army of the Republic, and aided very largely by the generosity of Mr. Joseph E. Temple, was unveiled and presented to the city with appropriate ceremonies to-day.

The statue is of bronze, is about twelve feet high, and rests upon a plain pedestal of polished granite of the same height. It stands at the left of the northern entrance to the new city-hall. It is the work of Mr. John Rogers, with whose work on a smaller scale the American public is familiar already, and was cast by Bureau Bros., of this city.

The occasion is one which invites to reflection on one or two questions, which assume considerable weight whenever a work of this importance is undertaken — whenever, in fact, the significance of a work of art which makes any serious claim to being regarded as ornamental, is considered in the light of the purpose which it embodies, as distinguished from the peculiar merit of the work itself.

The disparity between the artistic value of this statue and the feeling on the part of the community which has led to its erection, is so pronounced that one asks himself again how much it matters, after all, whether the work be good or bad, if only the spirit in which it is offered be the true and generous one.

General Reynolds is to Philadelphia and to Pennsylvania an ideal of soldierly and gentlemanly worth. He shares with General Meade the honors of Gettysburg, and his memory is perhaps associated even more closely with that field than that of his companion, from the fact that he lost his life upon it.

The city and State which he honored so much, the generation of men which knew the extent of the service he rendered, and the soldiers who followed him, unite to erect a memorial that shall speak to those who come after them of the esteem in which his memory is held. How much, asks the critic who wants to be good-natured, does it matter whether they erect an eyesore or not? How far is the idea embodied to be accepted in place of a tribute fittingly expressed?

The stammered and artless eulogy is sometimes the most eloquent of all. Shall not the faults of the sculptor also be forgiven in the same spirit? How far does the protest against art for art's sake merely, which some of us think cannot be made too strongly, mean something like this? For my own part I think that no better opportunity than the present to examine these questions is likely to occur for many a day.

As far as meeting the requirements of a work of great art is concerned, the statue in question is not much better than an eyesore; there will hardly be much discussion on that point. The conception is a school-boy's, the lines are awkward and angular, and from nearly every point of view from which it is possible to see the group, the mass is so utterly wanting in dignity as to be almost ridiculous. It is not the sculptor's fault, perhaps, that the statue is elevated on a pedestal which is too high for a work intended to be seen so near as this must always be; but it is somebody's fault, all the same, and is none the less to be noted because it is the commonest kind of a mistake in the treatment of equestrian statues.

The figure of the man is too small in proportion to that of the horse, and the loss of dignity which is apparent from this cause is still more emphasized by the unfortunate repetition of the lines of the rider's body by those of the neck of the horse. The head and the raised fore-foot of the latter are also very weak, and the surface modelling throughout is spiritless in the extreme.

It is to be hoped that the likeness of the General is good. I cannot answer for that, but have no doubt it is well enough, and only know that the head is commonplace, and is badly set on a body for the *woodenness* of whose treatment the modern dress, exacting as it is, cannot be held responsible.

How far are its artistic or inartistic faults to be forgiven or ignored, in praising the spirit which has raised it? For my own part, I think they ought all to be forgiven frankly, if the statue as it stands — that is, if it were fairly representative of American art — could be fairly taken as an example of what we in America can do at the present time. For after all, that is what the work ought to stand for, and we ought to be willing to have those who come after us judge our tastes and our attainments by just such monuments as this is. They will do so, whether we are willing or not.

The pity is that we have taken inferior work, when we might have done so much better. The thing to be sorry for is that in the selection of an artist for this important work another blunder has been added to a list that was quite long enough before. For there are sculptors in America who would have done much better than this, if they had been given the opportunity, and everybody who loves the arts has a right to complain when their claims are disregarded, and the honors and the plums go to inferior men. That is all. Let us set up the statue by all means. No form of memorial is so effective, moralize about it and hunt for substitutes all we like. Poor ones are better than none, and often have an interest that is quite pathetic, when they are characteristic and representative of those who erect them. Only let them be the best we can get, and don't let each new commission be another instance of failure to recognize ability when we see it, and of contented acceptance of mediocrity, when excellence is within our reach. L. W. Miller.

THE ILLUSTRATIONS.

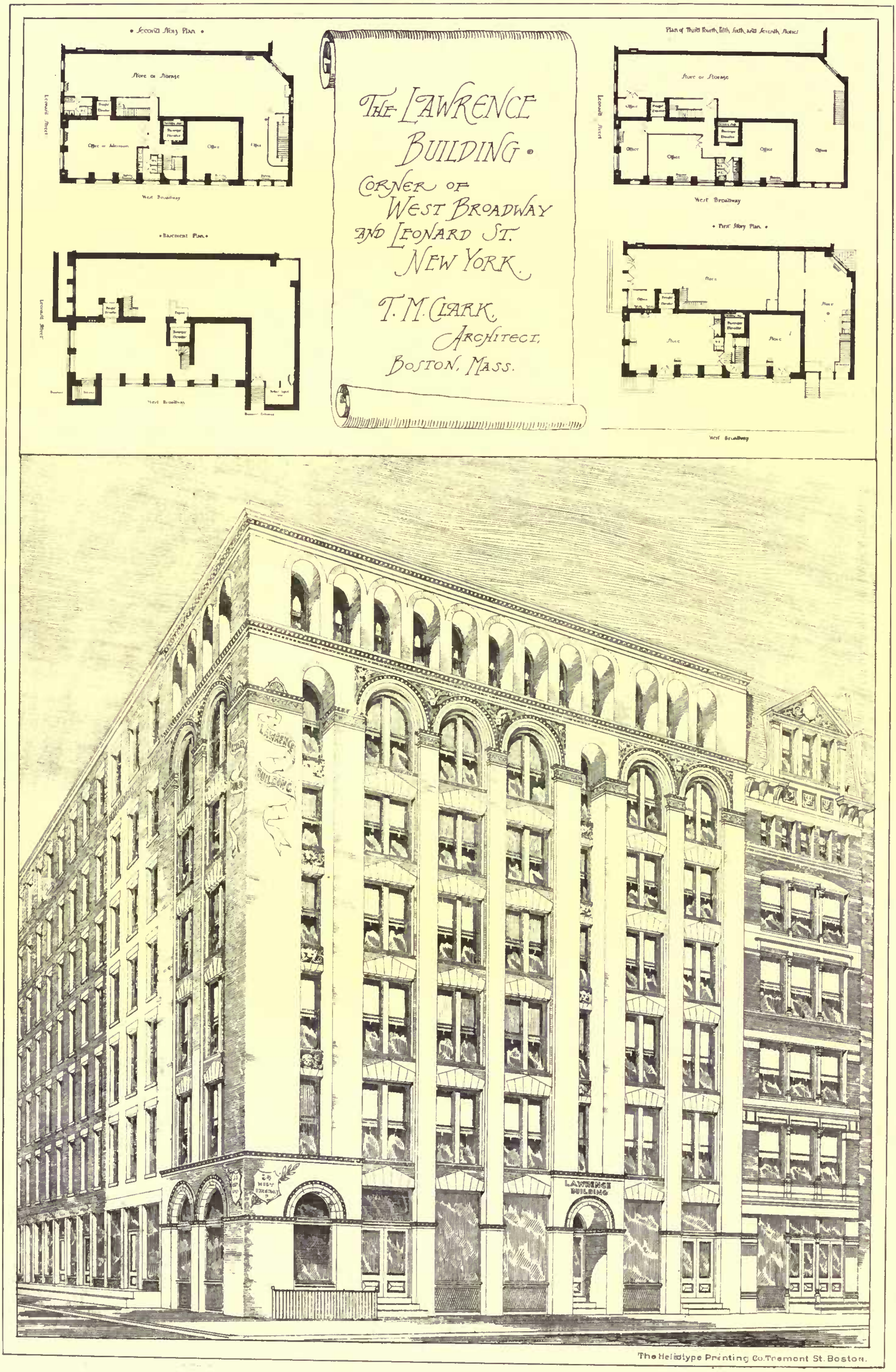
LAWRENCE BUILDING, NEW YORK, N. Y.

THIS building, which is just receiving the finishing touches, is situated on the north-west corner of Leonard St. and West Broadway. The materials used, and the system of construction, give it a certain interest. The exterior is faced throughout with light buff brick, from Perth Amboy, and these, in order to incorporate them thoroughly into the piers, are bonded with courses of headers about once in fifteen inches.

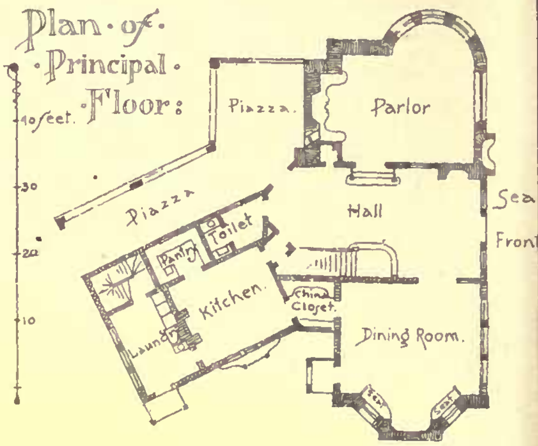
The enrichments of the cornices, string-courses and spandrils, and the door and window dressings, are of terra-cotta, made from the same clay as the bricks, and matching them in color. Stone is used only in the window-sills and copings. The interior of the building exhibits the so-called "mill-construction" of an exceptionally solid type. In order to gain as much light as possible, the girders were spaced nine feet four inches from centre to centre, and the span being considerable, it was found necessary to make them 16 x 20 inches in section, to sustain with perfect safety the estimated load of 200 pounds per square foot. The timbers were obtained of these dimensions from Georgia, without much difficulty, but they are perhaps the heaviest floor beams in New York. The weight of the floors being thus concentrated at points somewhat widely spaced, the piers supporting the girders, although calculated throughout for a load of fifteen tons to the square foot, including the facing, were necessarily somewhat cumbrous, especially in the lower stories, and the plan was adopted of setting the mass of brickwork which composes them with its longer diameter toward the street, so as to give as much window space as possible between them. Thus, in the basement, the main piers are two feet four inches on the face by five feet in depth, the depth diminishing by four-inch offsets in each story above. This arrangement of piers gives a series of shallow bays on the street side, but enables the openings to be made much larger than is usual in brick buildings, without detracting in the least from the solidity of the structure; and the bays themselves are utilized in the first story for bulk-heads, which give light and ventilation to the basement, and a place for displaying goods on top, and in the upper stories are found convenient for placing radiators and other furniture. The planking over the girders is of splined spruce, four inches thick, and this again is finished with an upper flooring of one-inch narrow maple. The whole of the surface of planking and girders is wire-lathed and plastered. Both elevators run in brick shafts, which are carried up high

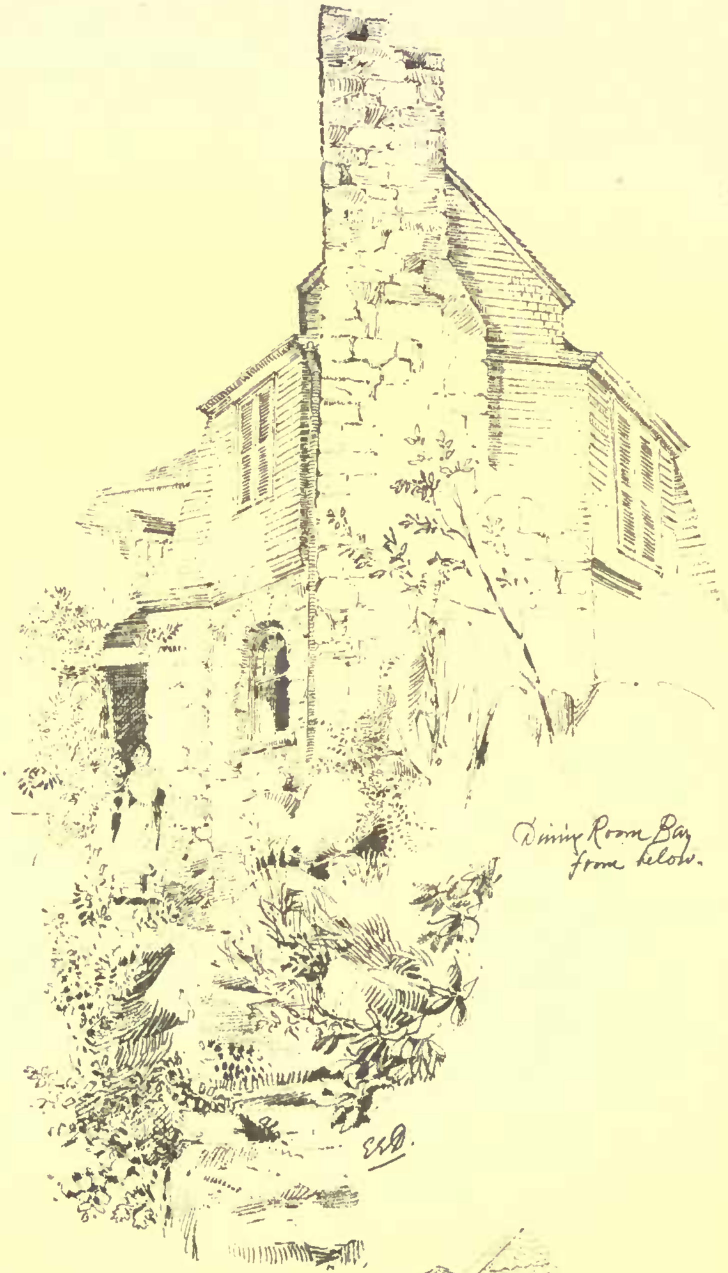
PHOTO CAUSTIC. HELIOTYPE PRINTING CO. BOSTON.

General John F. Reynolds, Philadelphia, Pa. John Rogers, Sculptor.



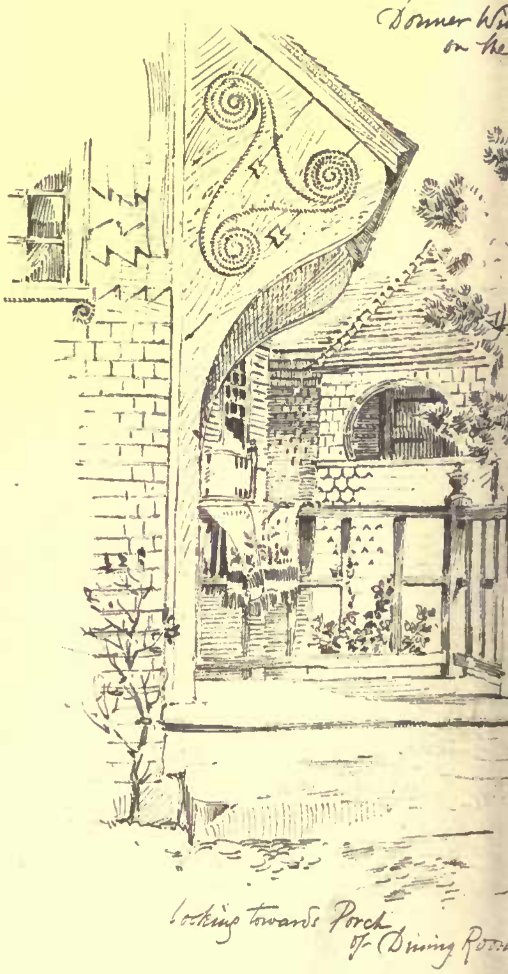
The Heliotype Printing Co. Tremont St. Boston.




Dining Room Bay from below.


Dormer Wi on the

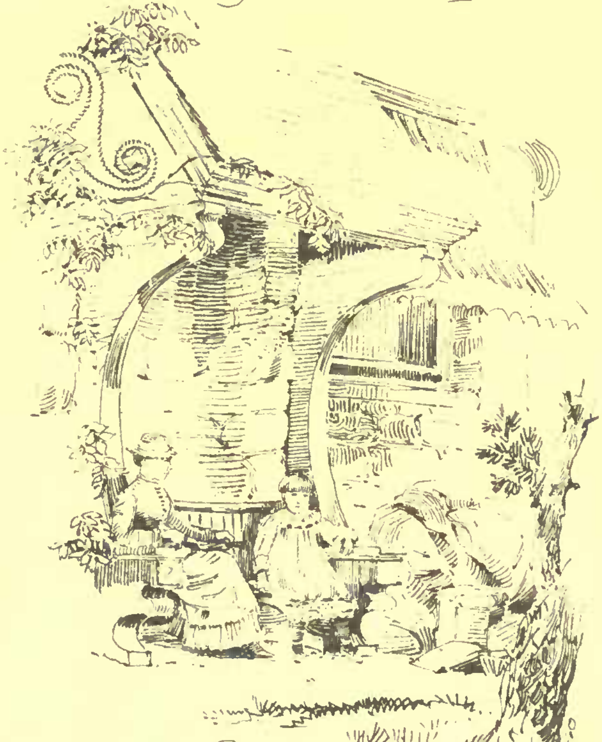

Principal Entrance.


looking towards Porch of Dining Room

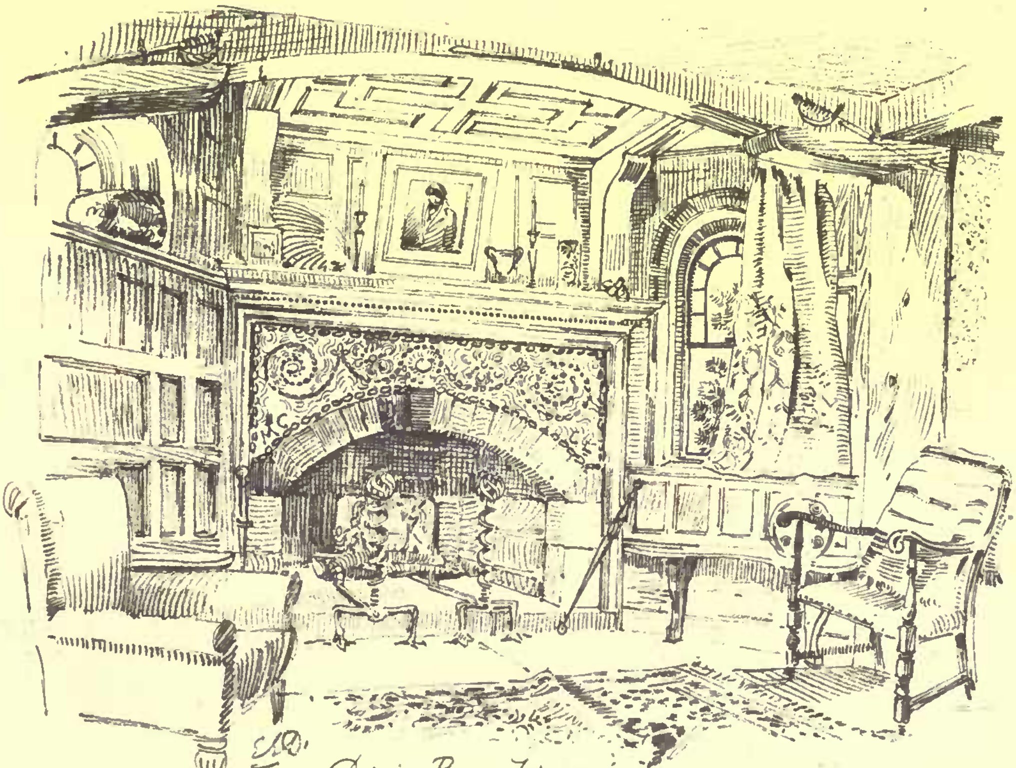
J. R. Osgood & Co.

Pencil Sketches in & around Manchester by the Sea:
House of Genl. Chas. G. Loring. Mass:
Mr W. R. Emerson. Archt. Pride's Crossing. by . E. Eldon Deane:

Gen'l Loring's House Pride's Crossing.

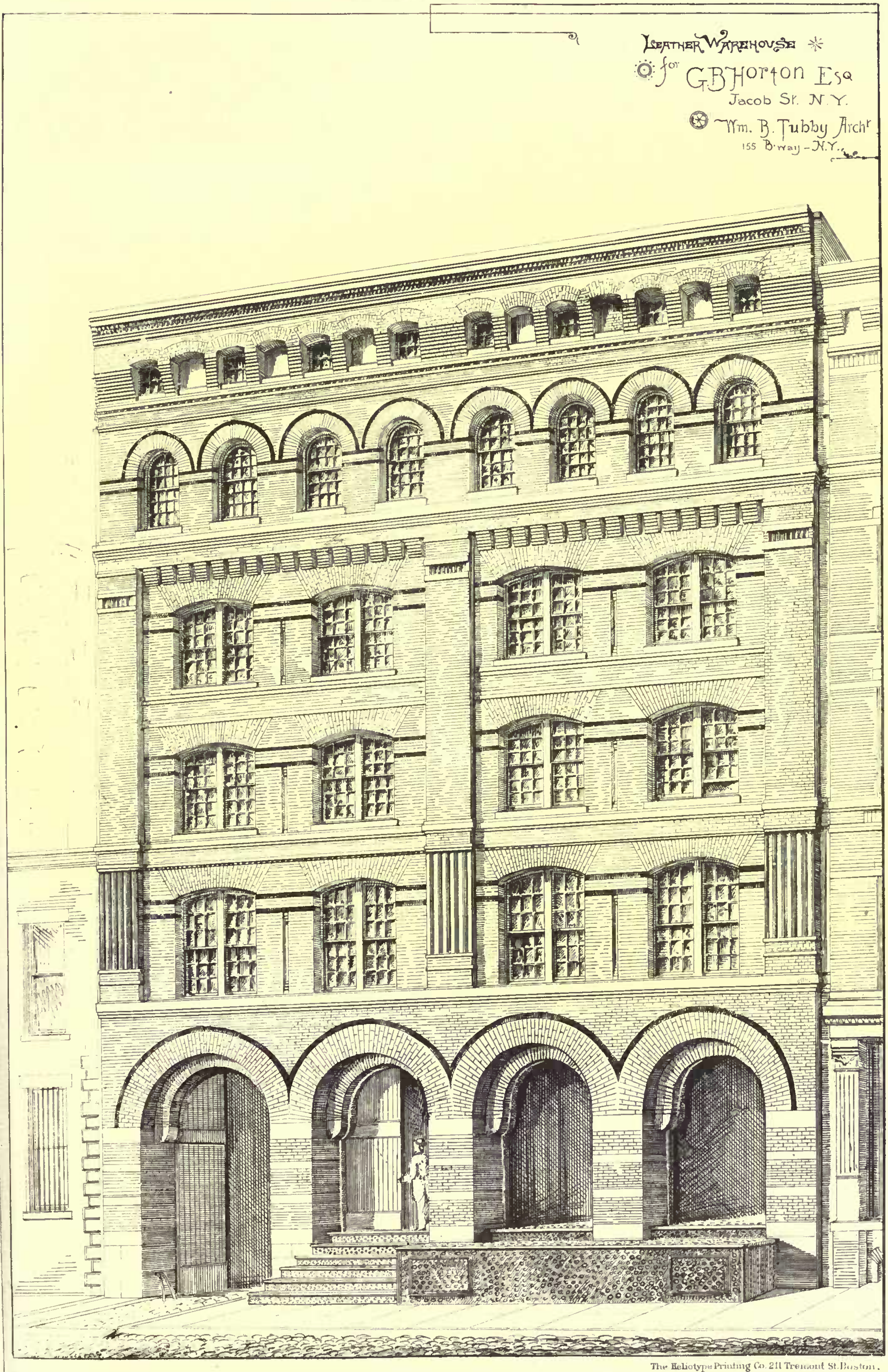


Rustic Seat on Sea Frontage.

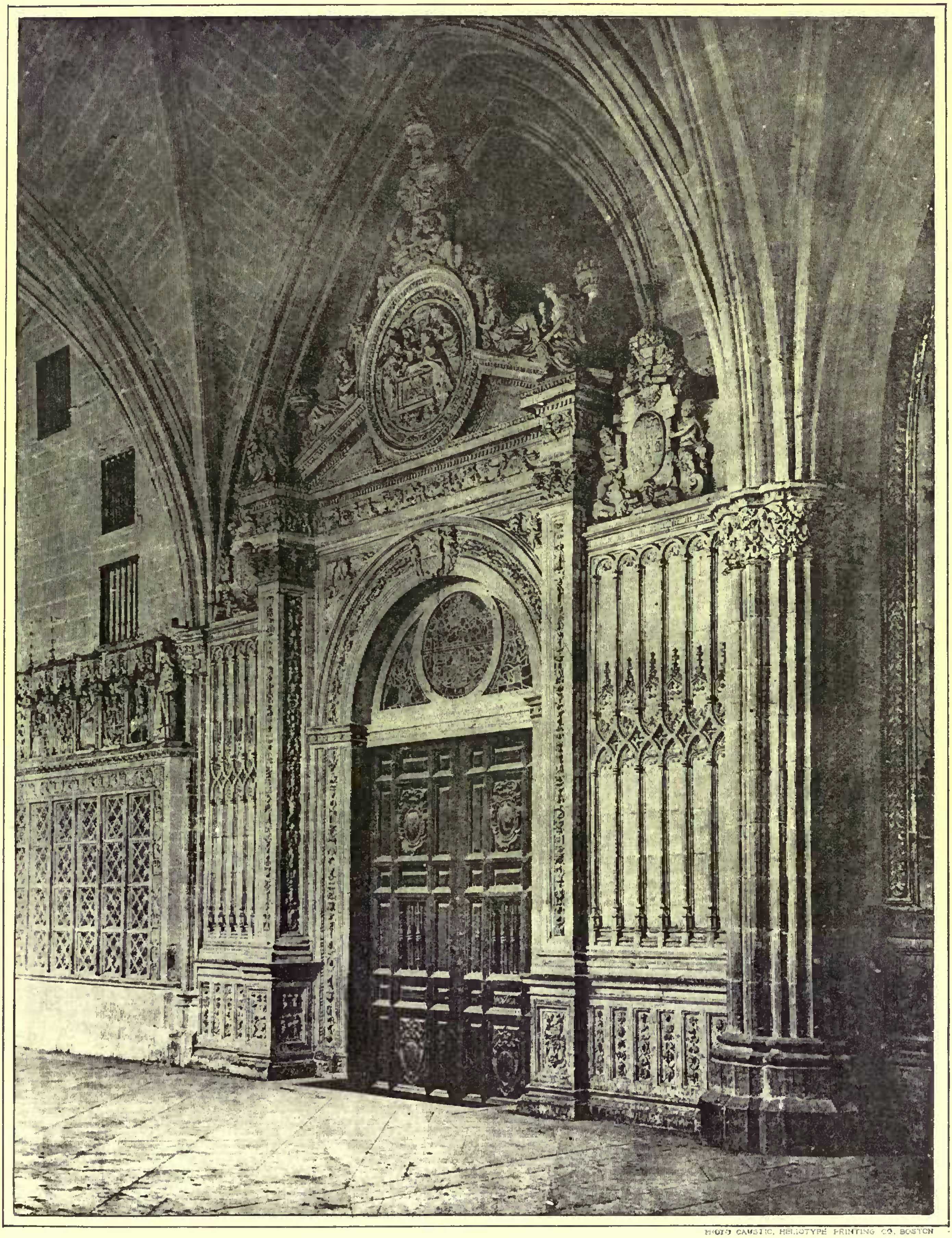


Dining Room Fireplace.

The Heliotype Printing Co. 211 Tremont St. Boston.



The Heliotype Printing Co. 211 Tremont St. Boston.



Doorway in the Cathedral Cloister, Toledo, Spain.

enough to enable passengers and goods, or materials for repairs, to be landed on the roof.

The heating is done by steam, on the direct-indirect system, each radiator taking a supply of fresh air from the outside through openings upon the windows; and a thorough ventilation is maintained by means of a shaft of fifteen square feet sectional area, which runs up at the back of the passenger-elevator shaft.

In addition to this, the plumbing fixtures, which are exceptionally abundant, are all ventilated downward through the outlets by means of a galvanized-iron shaft, heated by the exhaust from the engines, which runs through its whole length. This is not entirely a new device, but is sufficiently unusual to merit attention; and it has probably never before been carried out quite so efficiently and systematically as in this building.

One novelty is to be found in the doors to the shaft in which the passenger elevator runs.

The freight elevator shaft is prevented from acting as a conduit for fire in a sufficiently common way, by tin-covered doors to each opening, arranged to close automatically in every story, except the one in which the elevator may be actually in use at any time; and similar doors, made ornamental by covering them with polished brass, in a single sheet to each side of the door, guard all the openings to the passenger shaft. Light enough is obtained for illuminating the car, which is a very large one, from the skylight at the top of the shaft; but small, thick bulls' eyes of glass are inserted in the brass-covered door, to enable persons outside to observe the approach of the car.

The finish is of California redwood and native chestnut in alternate stories. The basement is made thoroughly water-tight by New's patent process, and has a floor of Swiss rock asphalt over a bed of concrete eighteen inches thick. Hot and cold water are laid into all the toilet rooms, and the building has been prepared throughout for electric-lighting by incandescent lamps, as well as for gas. The passenger elevator is arranged to run at the rate of two hundred and fifty feet a minute.

HOUSE OF GEN. CHAS. G. LORING, PRIDE'S CROSSING. MR. W. R. EMERSON, ARCHITECT.

THE sketches are sufficiently indicative of the artistic features of this house. Perched on a prominent eminence overlooking the sea, resting on big boulders, the peculiarity of which determined its plan, it is approached on the sea-front by circuitous paths and rustic steps, cut out of the precipitous rocks, sheltered amidst rugged pines, so that only occasional peeps can be obtained of those happy bits suggestive of the artistic treatment of the whole, which one realizes on reaching the summit and examining this sea and woodland home. The fine pine woods lying between the house and Pride's Crossing on the Eastern Railroad, and through which the drives alone indicate the approach to these summer homes, are left in their natural and wild condition, so that a still feeling of restfulness and change dims the busy world we have left outside from our mind and gaze. There are several houses well worthy of the architectural student's observation and pencil, scattered along this coast, some of which will in due sequence be to some extent represented in these pages.

Sombre greens and browns predominate in the shingle covering of this house. A little touchy effect is obtained here and there in scroll ornament, of common rope nailed on to the boarding, oiled and painted. The interior finishings harmonize throughout. All the mantels are of refined design. The dining-room fireplace and mantel is most effective; the arch-stones are in the rough, with marble keystone, the scroll-work above being formed of colored pebble-work on the rough plaster, wavy indentations following the curves, a little powder color being thrown in as the work proceeded. This latter piece of ornament was the characteristic work of the architect's own hands.

EQUESTRIAN STATUE OF GENERAL JOHN F. REYNOLDS, PHILADELPHIA, PA. MR. JOHN ROGERS, SCULPTOR.

FOR description see preceding article.

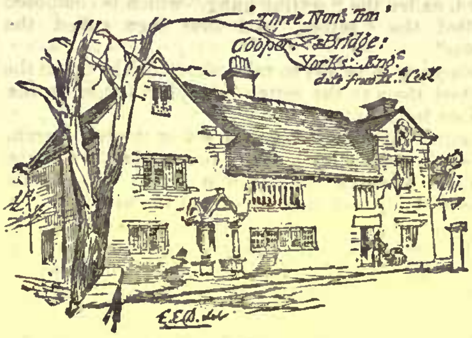
LEATHER WAREHOUSE, FOR G. B. HORTON, ESQ., NEW YORK, N. Y. MR. WM. B. TUBBY, ARCHITECT, NEW YORK, N. Y.

DOORWAY IN THE CLOISTER OF THE CATHEDRAL, TOLEDO, SPAIN.

For description, see "Article on Spanish Architecture," No. VIII in *American Architect* of January 26th, No. 422, page 39.

THE PROPOSED JORDAN CANAL.— It seems that the proposed Jordan canal, the plans for which have appeared in the foreign scientific journals, is not to be, in any proper sense, a canal, but rather a large inland sea, some three hundred miles long, with an average of ten to fifteen miles in breadth. The waters of the Dead Sea would be raised from their present level about 1,300 feet, and its area, of course, be largely increased. The river Jordan, the Dead Sea and Lake Tiberias would all disappear with some square miles of land, principally on the western side of the Jordan valley as now existing, and in their place would be a vast inland sheet of water, fertilizing the neighboring desert with the rainfall produced by the evaporation from its surface. According to this plan, therefore, there would be, instead of a simple canal, a wide open channel, traversing Palestine from north to south, navigable in every sense of the term, with safe harbors here and there on either side.— *Philadelphia Evening Bulletin.*

CEMENTS.



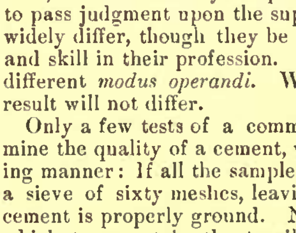
THE cement trade of the United States has passed through the two stages of infancy and youth, and now in the nineteenth century walks as a stalwart man. In years gone by, science paid little attention to the manufacture of hydraulic cement. The parties producing it were to a certain extent ignorant of what they produced. They manufactured the article in a mechanical way. Nature had laid in the bowels of the earth a stratum of rock, the composition of which was allied with that class of material which experience said would make a fair cement. Old-fashioned crushing mills were built near these pockets of calcareous rock, the ordinary lime kilns were erected in a rude style, as close to the raw material as possible, and when all was in receiving order, the rock was brought from the quarry or tunnel, and dashed into the kilns at intervals, each layer being thoroughly covered with some combustible. Every twenty-four hours the kilns were drawn, the rock allowed time to cool, and then conveyed to a crusher which reduced it to granules; from there to a set of burs, where it was ground to the fineness of wheat flour; from these burs it was transferred to a large spout, and from thence to the delivery, where it was put up in barrels, holding three hundred pounds net, and in this form it was put upon the market.

Still, science prompted by competition asks for a superior article, something with more strength and durability, than can possibly be obtained from cement stones treated by the above process. We are glad to state that our manufacturers have answered the call, have remodelled their works, and are making cement by the most approved method, with the best adapted machinery, and are giving us an article which comes up to the standard of the nineteenth century. Notwithstanding all this improvement in manufacture, there are still afloat in our market inferior articles, against which we must protect ourselves. Now to do this with justice to all parties concerned, a standard by which to judge cements must be adopted; for without a code, recommended by the profession or scientists, those who attempt to pass judgment upon the superiority or inferiority of a cement will widely differ, though they be men of unquestionable good judgment and skill in their profession. The reason for this is, each one has a different *modus operandi.* We want similarity in treatment, the result will not differ.

Only a few tests of a commercial nature are necessary to determine the quality of a cement, which can be carried out in the following manner: If all the samples submitted for test will pass through a sieve of sixty meshes, leaving not more than five per cent, the cement is properly ground. Next proceed to make a briquette from which to ascertain the tensile strength. This operation requires some skill to obtain the best results in a legitimate manner from the article tested. An excess of water should not be used, neither should you have a deficiency; for the bonding of cement is a chemical action, and if too much water is used it is impossible to get a square inch of cement in the mould, because of the evaporation of water, hence porosity. While on the other hand if you have a deficiency, you set on foot a chemical action, which will be unable to complete itself; so it is evident that the result of your test will depend largely on the manner in which you have gauged your cement. Next comes the difficulty to tell when your sample is "set." The simplest and best manner to detect a "set" is to find that period, when by gentle taps with the soft part of the forefinger, the elasticity of the mass ceases, and the water cannot be raised to the surface by this gentle motion. The object to have in view in making a fair test, is to get the best results from all samples, representing the various brands; for made in any other manner, it will prove no criterion as to the quality of the cement. "R. W. B."

WASHINGTON, D. C., September 13, 1884.

IRON AND CONCRETE CONSTRUCTION.[1]



SEVERAL experiments were made in London, in 1876, by Mr. Thaddeus Hyatt, assisted by Mr. Thomas Kirkaldy, author of the text-book entitled "*Experiments on Wrought-Iron and Steel,*" on Mr. Hyatt's invention of combining wrought-iron bars as tie metal, and so prepared as to prevent any slipping when placed into and near the bottom (the weak part) of a Portland cement concrete beam in which they were enclosed, and became united to it.

The first application of the tie metal is capable of furnishing all

[1] Read before the Technical Society of the Pacific Coast, by P. H. Jackson.

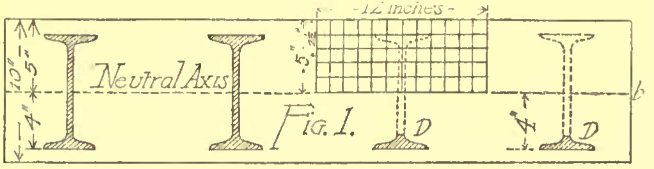
the tensile strength needed to balance the compressive resistance of the other material, so that all metal may be dispensed with but the tie only, and either hard-baked bricks and cement possess in themselves cohesive power and strength sufficient to perform the functions ordinarily performed by a metallic web.

The improvement consists in preparing or making the iron ties with bosses or raised portions formed upon the surface of common bar or hoop iron, roughened or studded with pins, or several blades threaded on wires; the binding power of the cement holding them firmly in position, preventing the possibility of any slipping or sliding of the material one over the other, when the beams or structure is under strain.

For resisting the thrust of a bow-string girder or arch, a tie may be made dependent on the two end fastenings only; but with a straight beam the tie must be qualified to resist cross-strain equally well at any part, and it must of necessity be attached to the web practically throughout its entire length as firmly at one point as at another.

The object of such fastenings not being to prevent the tie from bursting away from the web in a downward direction because of such tendency, but to counteract the tendency of the shearing stress.

This discovery of the true relations existing between a tie and its web, also demonstrating the sufficiency of the cohesive power of the



web itself to hold the tie in connection to the top of the beam, whether such web is concrete or metal, is due to the difference of the thickness necessary for this purpose.

Where the web is of concrete instead of metal, being proportionate to the difference between the cohesive strength or power of metal and concrete.

It is important to make use of ties having the greatest friction surface for side adhesion, hence flat, thin ties with projections are preferable; but the invention comprises other shapes where the surface is roughened, or may be crimped, corrugated, indented, or with pins, bosses, or projections of any kind.

There is not that tendency to buckle or lateral inclination when under strain with a concrete beam as in that of an iron one, due to the thickness of the web.

The arrangement of the blades or ties as shown in the gridiron, from Plate 22, and others being the most effective and simple.

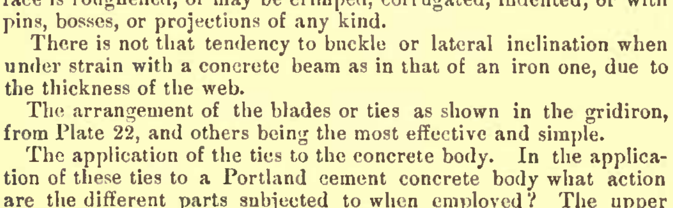
The application of the ties to the concrete body. In the application of these ties to a Portland cement concrete body what action are the different parts subjected to when employed? The upper portion of a concrete body resists compression of which Portland cement is known to possess this property to a great degree compared to its property to resist separation. General Gilmore says, the proportion at the age of nine months is fourteen of resistance to compression, to one of resistance to extension, while cast-iron is but six-and-one-half to one of tension.

In General Gillmore's work, entitled "*Coignet Beton and other Artificial Stones*," on page 34, is as follows: —

The strength of English Portland cement to resist compression from trials made of a block nine months old was 5,973 pounds per square inch; with one volume of sand, same age, 4,568 pounds per square inch, and on pages 53 and 54 is as follows: —

It is known that the strength of Portland cement mortars does not reach its maximum limit within a period of two, or perhaps three years.

Neat cement in blocks of the size of an ordinary brick, at the age of nine months, the compressive to its tensile strength becomes in the ratio of fourteen to one. With a mixture of one of cement and two of sand, the ratio will be found between the limits of fourteen to one and nineteen to one. This exhibits the tensile weakness of Portland cement, compared to its great resistance to crushing, and by the



application of the ties in the manner employed by Mr. Hyatt renders the feeble part equal to its strong compressive property.

When a beam or slab of this, or any other material of like nature, is loaded on its top surface, the upper part being in compression, is greatest at the top surface, and diminishes gradually until it ceases about midway of its depth, or wherever the neutral axis may be; and from there extension or tendency to separate the parts begins in the least, and increases gradually until the bottom surface is reached, which is the greatest.

These iron ties with projections close together, or roughened surfaces, extend the length of the tie, and for holding to the cement and side adhesion to the body of the tie, are placed as near to the bottom of the cement or concrete body as practicable, so as to be firmly held there.

It is intended to have that part of the concrete body to resist compression fully up to, and may be in excess of, the tensile strength of the iron ties, as the formulated calculation is based on the tensile strength of the ties.

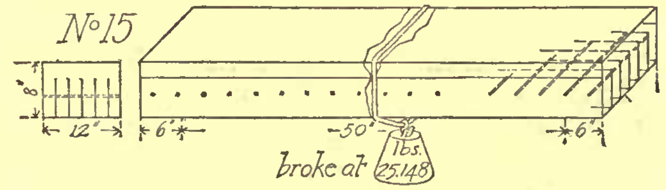
We have by this combination a cheap and simple method of utilizing the strength of a Portland cement concrete body, compressively considered, without its weak tensile resistance entering into the calculation.

The formula for computing its strength, providing the ties are kept at a proper distance below the neutral axis, is as that for computing the strength of a make-up wrought-iron beam or girder; that is, after the top and bottom sections, each way from the neutral axis, are adjusted in their respective resistances.

Mr. Hyatt's disquisition on the results of his experiments with this construction is set forth, entitled "*An Account of Experiments with Portland Cement Concrete combined with Iron as a Building Material*," of which the following is an extract:

Figure 1 represents a section of a Portland cement concrete floor, with rolled wrought-iron beams built in it. When employed, what function do the several parts perform? The top surface resists the greatest compressive force, which gradually diminishes downward until the neutral axis, *a*, *b*, is reached, where it ceases to exist. From there commences the minimum of tensile strain, which increases until the bottom surface is reached, which is the maximum of the tensile strain. Referring to Figure 1, what sustaining function does the concrete flooring with the integral parts thereof perform? The parts of iron beams above the neutral axis, *a*, *b*, are worthless, and a consequent useless expense, as their resistance at that place to compression is not brought into action; the Portland cement concrete unassisted, as will be shown, has a greater power of that resistance than the case requires. To the right, in Figure 1, the part laid off in square inches from the neutral axis *a b* to the top surface is five inches, and a width of twelve inches, making an area of sixty inches.

If we take the compressive resistance of Portland cement concrete at 2,000 pounds per square inch (in General Gilmore's experiment nine months old one of cement, and two of sand crushed at 3,631 pounds per square inch), we get a mean of 1,000 pounds acting two-and-a-half inches, or half-way between the neutral axis and top surface; therefore we have sixty square inches of 1,000 compressive pounds to the inch, equalling 60,000 pounds acting on the end of a lever, two-and-a-half inches from the fulcrum, the neutral axis, *a b*,



$60 \times 2\frac{1}{2} \times 1{,}000 = 150{,}000$ pounds to resist compression, and to balance tension below the neutral axis.

This is without that part of the iron beam above the neutral axis doing any duty.

Then if we take the metal *D* (the bottom flange of the beam only, the shaded part) held in the concrete in the manner described, at two inches wide, and one-quarter of an inch thick, equal $2 \times \frac{1}{4} = \frac{1}{2}$ inch of iron, and assuming the tensile resistance of wrought-iron at twenty-five gross tons, or 56,000 pounds per square inch, then the half-inch tie represents 28,000 pounds, multiplied by the leverage of four inches down from the neutral axis, which is the fulcrum to both, we have 28,000 pounds multiplied by four inches leverage equals 112,000 pounds.

The compressive surface of the concrete, 150,000 pounds, is therefore in excess of the demands of the tie metal, and the top flange and web of the iron beam are useless, and only the bottom flange is employed. Therefore, three-quarters of the beam is of no avail.

Many have questioned the possibility of uniting metal to concrete as a bottom flange is held to its web in a rolled or riveted beam, and as to whether when under strain the two materials will act in concert.

The answers to these queries is by reference to Nos. 15, 16, 17, 18, and 19, as being five examples in thirty-one experiments. Several trials were made without projections on the ties, which in every case pulled through the concrete.

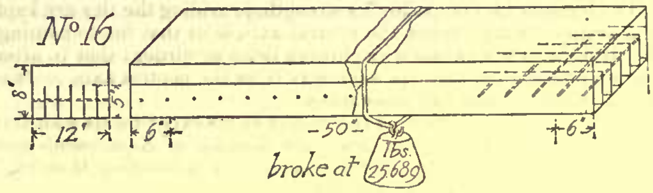
A study of them shows from the breaking of the metal: Firstly, that all the blades of the iron were perfectly held in the concrete body, while the beam was under strain. Secondly, that in both cases the two materials worked in perfect harmony. Thirdly, that the proportionate power of the metal increased regularly as it became tie metal.

The 2 × 1-16-inch blades of beam, No. 19, exhibited a greater tensile power in proportion to cross section than No. 16, where the blades were five inches in depth; the higher the blades, the more they lose as a tie, as the strain proportionately diminishes the nearer the tie metal is to the neutral axis. Therefore, the ties in all cases must be a proportionate distance below the neutral axis.

When a beam of any kind is subjected to a bending stress, it becomes more or less curved, by virtue of which the lower portion is lengthened, and the upper portion shortened, in proportion to the depth of the beam or the difference of length between the radii of the curves.

Were the beams made up of horizontal layers the effect of the stress would be to cause these to slide one upon another, but the beam being solid the particles are held together by their own cohesion, the shearing strains being thus opposed by cohesive force.

The primary strains in the beam or the lines of compression and extension being upon curved lines the disturbed particles must of necessity tend to arrange themselves in harmony with the radial lines of circles, all below the neutral axis seeking extension, and all above compression. How slight are the *duties* of the *web* of a *beam*



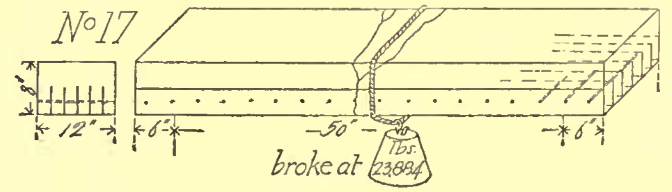
under these circumstances may be seen from the exceeding thinness to which it is possible to reduce it, which fact seems to confirm the view that the web of a beam possesses cohesive power sufficient to resist the shearing strains resulting from a bending stress; it is equal to all the duties required of it, all other strains upon it being secondary and inferior.

It is not difficult to understand how a metal tie is held in the embrace of a concrete web, nor how a web of concrete four or five times as thick as metal webs are usually made, should be quite able to perform its part and become equally serviceable.

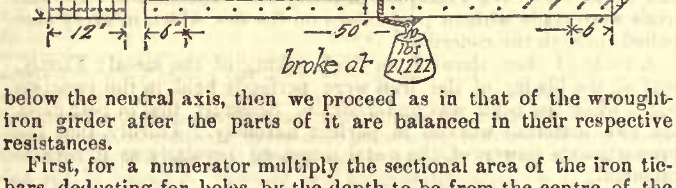
A flat tie, as is exhibited in Figures 26, 28 and 30, plate *J* (omitted) on account of the large holding surface presented for the concrete as on that of the bottom flange of the rolled beam dwelt on in the fore part of this, in Figure 1, is probably the best form in which iron can be used.

When placed edgewise, as in Figures 15, 16, 17, 18 and 19, and the illuminating-tile, it seems to be the most convenient tile that can be employed; the wires that connect the bars, called the gridiron tie, serve as stops to prevent the metal sliding when the beam is under strain. This evidences that the tie becomes attached to the web practically throughout its entire length, and as firmly at one point as at another.

The formula for computing the strength of this Portland cement



concrete beam, providing the ties are at a sufficient distance below the neutral axis, should be as in that for computing the strength of a wrought-iron plate girder. With the latter we first proportion the top and bottom flanges in metal quantities, correspondingly to their resisting power to compression and extension. Wrought-iron being about thirty-five per cent the weaker in resisting compression, than much more metal must be in the compressive member than in the tensile one. After proportioning the beam, no more attention is given to the part subject to compression, but only to ascertain the section of the bottom flange subject to extension, and the depth of the beam; and as our tensile member in the Portland cement concrete combined with iron is of wrought-iron, and is held to the web and exercised in the same way as in that of the plate-girder, and all other parts are in the same relationship, the constant must be the same. Therefore, after the concrete beam is proportioned to have sufficient concrete material for compressive strength to balance the tensile capacity of the ties held in place, and at a sufficient distance



below the neutral axis, then we proceed as in that of the wrought-iron girder after the parts of it are balanced in their respective resistances.

First, for a numerator multiply the sectional area of the iron tie-bars, deducting for holes, by the depth to be from the centre of the tie-bars to the top of the beam, and multiply the product by the constant of 80, as in the formula of the wrought-iron girder.

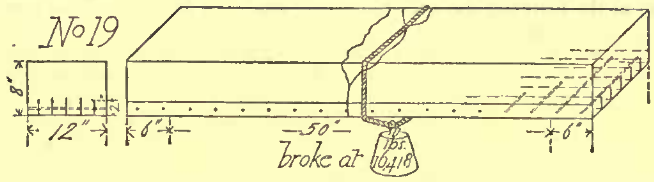
For the denominator take the number of inches between the supports; the quotient will be the breaking load in tons in the centre of the beams. All parts performing their respective duties is equally applicable in this composite construction as in that of the wrought-iron girder.

It is the basis in supporting power serviceable in so many applications in buildings and other constructions, as supporting walls for floors, slabs, sidewalks, beams, girders, etc.

No. 2 was a beam of concrete without iron, and broke at 1,484 pounds, and, taken as a unit in contrast with the following, that were tensilely strengthened by iron ties, as shown in Nos. 15, 16, 17, 18 and 19.

No. 19 had 21 pounds of iron, which increased its strength eleven and one-half times of the plain concrete beam (No. 2 and computed by the formula given) broke at one per cent in excess of formula.

These tie-bars were kept at a proper distance below the neutral



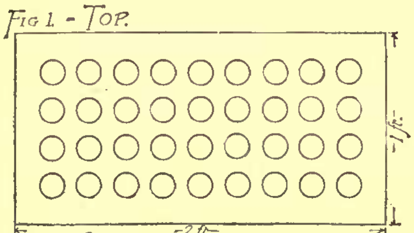
axis, which was not the case with the others; had the tie-bars been a greater distance below the neutral axis, undoubtedly better proportionate results would be attained.

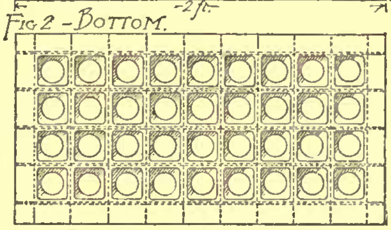
No. 15 had 62 pounds of iron, which increased its strength seventeen times.
No. 16 had 52 pounds of iron, which increased its strength seventeen and four-tenths times.
No. 17 had 41 pounds of iron, which increased its strength sixteen times.
No. 18 had 31 pounds of iron, which increased its strength fourteen and three-tenths times.
No. 19 had 21 pounds of iron, which increased its strength eleven and one-half times.
No. 26 had 31 pounds of iron (flat ties), which increased its strength.
No. 28 had 23 pounds of iron (flat ties), which increased its strength.
No. 30 had 40 pounds of iron (flat ties), which increased its strength.

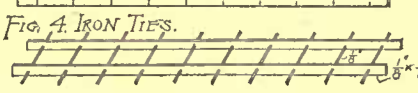
With these three latter, being four inches greater in depth, could not compare results with No. 2.

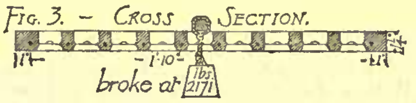
In all cases the iron ties broke and were firmly held in the concrete body in the manner that a bottomless flange of an iron beam is held to its web.

In San Francisco, November 3, 1883, at No. 231 First Street, a Portland cement illuminating tile, combined with iron ties, as here shown, was tested, but being only twenty days old, was not old enough for great strength, but was still in excess, at that green age, of the heaviest cast-iron illuminating-tile, three-fourths of an inch thick and tested centrally in the same way, which broke at 2,105 pounds, while the new cement tile broke at 2,171 lbs. Both of these tests were witnessed by J. Haustein, James B. Lane, and L. Girolt.









On November 28, 1883, at the same place, a trial was made of the same size Portland cement illuminating-tile about forty days old, as shown, and the fractured tile presented, of which Figure 1 is the top, and Figure 2 the bottom, Figure 3 is a cross-section, and Figure 4 shows the iron ties, five in number, one-eighth by five-eighths of an inch flat iron, threaded on ten 3-32 of an inch steel wires, — subsequently 3-16 of an inch iron wires were used — total weight of iron and steel three and one-quarter pounds, tested by an octagon steel bar of one inch in diameter, presenting a half-inch surface bearing centrally across the tile.

At 1376	pounds	deflection	noted,	5-32	inch.
" 1545	"	"	"	7-64	"
" 1717	"	"	"	1-8	"
" 1906	"	"	"	5-32	"
" 2017	"	"	"	3-16	"
" 2150	"	"	"	13-64	"
" 2300	"	"	"	1-4	"
" 2405	"	"	"	9-32	"
" 2600	"	"	"	3-8	"
" 2710	"	"	"	29-64	"
" 2750	"	broke.			

Witnessed by Mr. John Wright, Mr. G. W. Percy, and Mr. W. P. Moore, architects, of San Francisco.

The Portland cement, combined with iron illuminating-tile one and one-fourth inches thick, bore 635 pounds more than the heaviest cast-iron illuminating-tile used over areas three-fourths of an inch thick, both tested in the same manner.

A trial was made at the Industrial Iron Works, on Beale Street, San Francisco, January 19, 1884, of a Portland cement concrete slab, with iron, such as will be used for sidewalks and floors, dispensing with supporting arches. It was 3 inches in thickness, and 4 feet 6 inches square = 20 feet 3 inches, resting on two end supports, each 3 inches, leaving the distance between supports 4 feet, and by 4 feet 6 inches = area 18 feet.

The ties consisted of nineteen 1-inch wide by one-eighth inch thick bars, placed $2\frac{3}{4}$ inch centres, and threaded on nine $\frac{1}{4}$-inch diameter iron rods, placed 6 inches centres; total weight of iron, 41 pounds.

The top of the flat bars were $1\frac{5}{8}$ inches below the top of slab. Age of slab, 62 days.

This was tested in the presence of Mr. G. W. Percy and Mr. John Wright, architects, as follows, loaded with: —

18,234	pounds	pig-iron	deflected	9-32	of 1 inch,	or	900	pounds	per foot.
21,111	"	"	"	5-16	"	"	1,042	"	"
24,140	"	"	"	3-8	"	"	1,192	"	"
26,885	"	"	"	7-16	"	"	1,328	"	"
29,544	"	"	"	1-2	"	"	1,459	"	"
32,747	"	"	"	9-16	"	"	1,617	"	"
35,006	"	"	"	5-8	"	"	1,725	"	"

36,375 broke at 1,797 pounds per foot.

At 32,747 pounds, or 1,617 pounds per foot, and nine-sixteenths deflection, a small crack was first observed.

The question was asked as to the stability of this construction to resist impact.

The speaker said that when the deflection caused by force of impact was within a certain safe limit of the elastic force of the material, it is equally as serviceable as in other substantial constructions. In the computation as to the safe bearing load of any construction, the most severe service it may be subjected to must be considered, so that the strain in such service is within a certain recuperative force of the material. With cast-iron beams it is safe to employ them at rest at one-third the breaking load. In this construction for sidewalks and floors, etc., I take it that one-fourth of the breaking weight will be a safe employed load.

For fire-proof walls and other surfaces and purposes, Mr. Hyatt has found that mixing a small percentage of sulphur with a body of Portland cement, and then heated to a red heat, will stand the effects of cold water when thrown upon it.

I have made the trial with this composition, made in brick form, and, when heated red hot and thrown into a pail of cold water, it retained its form nearly equal to fire-brick; while a body of neat cement of the same form and age, and by the same treatment, partially dissolved like sugar when placed in the water. Mr. Hyatt has secured these combinations by two United States patents, of which Mr. Jackson has the right for this coast.

HOW TO STUDY ARCHITECTURE.

Springfield, Mass., September 22, 1884.

To the Editors of the American Architect: —

Dear Sirs,—I want to ask you what method I should pursue in the study of architecture. I am a young man of 20, and have decided on this as my life-work. I know that I am in every way fitted for it, and was so told by Nelson Sizer, the Phrenologist.

I suppose the first necessity is a knowledge of mechanical drawing. Are there any text-books written for students of this science? If you will please give me your advice, with a course of study, you will greatly oblige Yours very respectfully, E. C. Plummer.

[The profession of architecture involves a good many things besides mechanical drawing. Much the best and most economical way to fit one's self for such a career is to enter a good technical college where architecture is taught, and pursue the course faithfully. By such systematic study, under judicious masters, more real advance will be made in a year, than in three years of self-instruction, which, although it indicates a creditable energy on the part of the pupil, is a tedious and wasteful mode of learning anything. — Eds. American Architect.]

SOLID IRON COLUMNS.

St. Paul, Minn., September 20, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I have often heard parties say that a solid cast-iron column is not as strong as a hollow cast-iron column of same diameter, by parties who should know. As this is contrary to what I have always understood, I would ask you to give your valued opinion in the next number of the paper. A Reader.

[A solid column of iron is stronger than a hollow one of the same diameter. The same weight of metal, however, will give more strength in a hollow than a solid column, and this is probably what the persons referred to intended to say. — Eds. American Architect.]

THE POSITIVE BLUE PROCESS.

St. Louis, Mo., September 22, 1884.

To the Editors of the American Architect: —

Dear Sirs, — The formula given in your last issue for *blue lines on white ground* proved unsatisfactory when I used it; the preparation was made under direction of a chemist; could it be that there is some omission in the formula? I get a blue ground with a darker blue line after the baths on exposure. I cannot get the *orange* ground mentioned, though the image is as you say, a light canary.

If you could give me any further advice, I would be grateful; perhaps you could forward this to the author of the article you published. I am thoroughly familiar with the *negative* process.

Very truly yours, Kivas Tully.

[We cannot from personal knowledge explain the cause of our correspondent's failure; but trust that some other reader may be able and willing to help him.—Eds. American Architect.]

A PLUMBER ON PROTECTION.

Wilmington, Del., September 22, 1884.

To the Editors of the American Architect: —

Dear Sirs, — The *Sanitary Engineer* of the 18th inst., under the head of the Plumbers' and Dealers' Trade Protection Controversy claims "that the *American Architect* greatly overrates the power and influence of the men claiming to speak for the Plumbers of the United States." We take issue with the controllers of this journal on this subject, and speak the sentiment of the leading plumbers in this section of the country in believing that the *American Architect* is viewing this matter in its proper light. It is alleged that the editors or controllers of the *Sanitary Engineer* are interested in the manufacture and sale of plumbers' supplies, and hence their judgment must necessarily be more or less biased. Architects and plumbers alike are interested in protecting their customers or clients. What protection has the consumer against extortionate prices, when an architect specifies any particular make of goods? for example, the Meyer, Sniffen Co.'s, to be used in the plumbing of a building, the plumber is compelled to buy this make of goods at whatever price the Meyer, Sniffen Co. place upon them. If the *Sanitary Engineer* was edited, owned, and controlled by parties having no interest in the manufacture or sale of plumbers' materials, then it might reasonably claim to speak as independently as the *American Architect.*

Justice.

NOTES AND CLIPPINGS.

The Hardening of Cements.— Herr Frühling, in a communication to one of the German technical societies, says the *Mechanical World,* makes some important comparisons between the rate of hardening of hydraulic cements, and upon the nature of this process. According to this investigator, a Portland cement, (which requires from twelve to fifteen hours to set) will, inside of three days, have acquired a greater hardness than the far more quick-setting Roman cement (which requires only from five to fifteen minutes to set). He makes the further assertion that, while the hardening process with the quick-setting Roman cement continues for many months, or even years, this process with a genuine Portland is substantially completed within the first fifteen days; for the amount of increase in hardness which takes place thereafter, he affirms, is quite insignificant in comparison with the figures representing the hardening of the first fifteen days. In this statement Frühling is not in accord with all writers on the subject, who are unanimous on the point that Portland cement continues to gain notably in hardness and tenacity for the period of a year, or even considerably longer. He discards also the generally accepted explanation that the hardening of cements depend on the formation of silicates. He considers a hardened cement to possess, both chemically and physically, the properties of a dense hydrate of lime. He bases these statements on the following facts: The natural hydrated silicates of lime do not exercise any decomposing action on solutions of ammonium salts —the chloride, or sulphate for example — while, as a rule, the entire quality of lime in a cement, whether it be derived from a Portland or a Roman cement, will act upon the above-named ammonium salts, precisely like hydrated lime, to decompose them. He argues that in the production of a cement the rule should be followed not to endeavor to introduce the largest possible quantity of silicic acid, but the largest possible quantity of lime. If the proper limit is overstepped, so that, for instance, three or four per cent more silicic acid is introduced than experience has shown to be sufficient, the result is not a better hardening cement, but, on the contrary, one that is almost worthless. The formation of a hydrate of lime, according to Frühling, is the basis of a binding quality of the cements; and, in comparison with lime, he claims that silicic acid and alumina play a very subordinate *rôle.*

Irrigation Works in Italy.—The irrigation system of Italy is probably the most complete in the world, and still it is constantly being increased; it forms a part of the elaborate system of defence against floods necessitated by the conformation of the Northern Provinces. According to the latest official statistics, the irrigation canals of Piedmont alone give 125,550 gallons per second, distributed over 1,340,000 acres, and those of Lombardy 95,355 gallons per second, distributed over 1,680,400 acres. These great works have not been, comparatively speaking expensive. The Cavour canal, constructed within the last few years, draws its supply from the rivers Po and Dora Baltea. It gives a flow of 29,200 gallons per second, waters nearly 40,000 acres, and cost 1,600,000*l.*, about 32,200*l.* per mile. It was constructed in four years, and measures are now under consideration for increasing its debit by 5300 gallons per second, A smaller canal, subsidiary to it, gives 18,540 gallons per second, and cost 24,154*l.* per mile. The largest canals are the Cavour, and its subsidiary canal just mentioned; the Muzza, and Agliano and Naviglio Grande. The smaller of these gives 13,200 gals. per second. Below this point the canals become very numerous, and interspersed all over the country. These canals are not only used for purposes of irrigation, but also to supply motive power, by which again the water is raised to districts lying upon a higher level. On the steep slope of the Dora Baltea, not far from Turin, three canals (the Torea, Agliano and Rotho) flow parallel to each other, on different levels, while the water is used at the top of the hill, 62 feet above the highest of them. The arrangement adopted is as follows: A stream of 154 gallons per second is diverted from the Torea canal, and carried down the hill in a leaden pipe, until it meets the Agliano Canal. Here it is pumped up to the summit level by eight pumps, worked by four turbines, driven by a fall of water taken from the Agliano canal, and allowed to flow down into the Rotho. By joining this latter it is used for irrigation, and thus not a drop is wasted. The great principle of Italian engineers is to work on a large scale, thus attaining at the same time efficiency and economy, avoiding constant alterations and additions; and it is by such means that the extraordinary fertility of Northern Italy is produced and maintained.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

305,419. HATCHWAY-ELEVATOR. — John William Birely, Frederick, Md.
305,426. DOOR-KNOB ATTACHMENT. — John K. Clark, Buffalo, N. Y.
305,428. RECLINING FOLDING BACK FOR SEATS. — Lewis B. Covert, Elgin, Ill.
305,429. BACKING FOR VENEERS. — Leonard H. Cremers, Pullman, Ill.
305,443. OPENER AND FASTENER FOR DOORS.—Augustus M. Freeman, Ocean Grove, N. J.
305,455. CURTAIN-FIXTURE.—Daniel E. Kempster, Boston, Mass.
305,457. SMOKE AND GAS CONSUMING FURNACE. — Mathias Krudewig, Frankfort-on-the-Main, Germany.
305,461. FURNACE.—Lewis Metesser, Indianapolis, Ind.
305,471. WEATHER-STRIP. — Emmeline W. Philbrook, Boston, Mass.
305,480. WATER-GRATE FOR FURNACES.— Richard P. Shackelford, Jerseyville, Ill.
305,485. MACHINE FOR SHAPING SASH-RAILS. — Geo. W. Steele, Paterson, N. J.
305,489. WINDOW.—William C. Tucker, Alden, N.Y.
305,500. WINDOW-BEAD FASTENER. — William H. H. Barton, Brockton, Mass.
305,516. STEP-LADDER. — Nathan Fisher, Coatesville, Ind.
305,512-513. ELEVATOR. — William Stevens, Philadelphia, Pa.
305,549. HINGE FOR AWNING-BLINDS. — Henry S. Tucker, Faulkner, Mass.
305,558. MANUFACTURE OF DOOR-KNOBS.— Williston L. Alvord, Bridgeport, Conn.
305,559. DOOR-KNOB.—Williston L. Alvord, Bridgeport, Conn.
305,571. FENCE-POST.—James W. Cheney, Detroit, Mich.
305,574. FILTER.—James A. Crocker, Boston, Mass.
305,582. FIRE-ESCAPE.—Jane Finnegan, Litchfield, Ill.
305,584. PORTABLE HOUSE.—Lorenzo Forrest, Minneapolis, Minn.
305,589. GRATE-BAR. — August Haarlander, Allegheny, Pa.
305,650. FURNACE. — Thos. C. Zetzsche, Okawville, Ill.
305,681. SHUTTER-FASTENER.—Cuningham Drake, Philadelphia, Pa.
305,682. FENCE.—Joseph Du Bois, Waverly, N. Y.
305,683. WEATHER-STRIP. — Daniel Seth Early, Harrisburg, Pa.
305,684. LOCK.—Alvan B. Ewing, Lewisburg, Tenn.
305,687. AUTOMATIC SASH-HANGER. — Winfield S. Greening, Decatur, Ill.
305,688. ELECTRIC FIRE-ALARM AND CALL-BELL SYSTEM.—P. Gugerty, Waterford, N. Y.
305,689. SAFETY DEVICE FOR ELEVATORS.— Lewis W. Hewett, Sumner J. Leonard, and Philip B. Shaw, Williamsport, Pa.
305,691. HEATING STOVE AND FURNACE.—Michael T. Hines, South Boston, Mass.
305,693. WINDOW-CURTAIN FIXTURE.—Charles E. Kemp, Baltimore, Md.
305,713. HEAT CONDUCTOR AND RADIATOR.— Matthew Ryan, Washington, D. C.
305,716. MANUFACTURE OF PLATE-GLASS. — Herman Schulze-Berge, Rochester, Pa.
305,720. GLASSWARE.—August Sperber, Wellsburg, W. Va.
305,726. ELECTRIC DEVICE FOR LIGHTING GAS. — Horatio N. Williams, Providence, R. I.
305,728. BRICK-MACHINE. — Charles A. Wyman, Hutchinson, Minn.

SUMMARY OF THE WEEK.

Baltimore.

STORE AND DWELLING. — Louis J. Ginter, architect, has prepared plans for a store and dwell. for Andrew Wirth, Esq., to be erected on the n w cor. Pennsylvania Ave. and Pitcher St., to cost $3,500; Edward A. Smith, builder.

DWELLING-HOUSES. — Plans have been prepared for a handsome row of square dwells., to be erected on Lafayette Ave., near Lafayette Square, 16′ x 44′ each, to cost about $3,000 apiece, for Wm. Collett, Esq.; Louis J. Ginter, architect.

BUILDING PERMITS. — Since our last report fifteen permits have been granted, the more important of which are the following: —

M. A. Caldwell, 2 two-st'y brick buildings, e s Wilcox St., s of Chase St.

B. Fallon & J. Ward, 2 three-st'y brick buildings, s s Chase St., e of McKim St.

Martin Schuler, three-st'y brick building, s s Columbia Ave., between Sterrett and Scott Sts.

Maria L. Small, 2 two-st'y brick buildings, s s Elbow Lane, between Greene and Warner Sts.

C. L. & J. S. Clark, 8 two-st'y brick buildings, commencing s e cor. Chase and Wilcox Sts., fronting on s s Chase St.

The labor quotations for October remain unchanged.

Boston.

BUILDING PERMITS. — *East Fifth St., Nos.* 704 *and* 706, Ward 14, for H. B. Stratton, 2 brick dwells., 22′ x 50′, flat; H. B. Stratton, builder.

Brooklyn.

BUILDING PERMITS.—*Spencer St.*, w s, abt. 350′ s Myrtle Ave., three-st'y frame (brick filled) tenement, tin roof; cost, $4,800; owner and architect, Henry Schwartz, 671 Quincy St.; builders, Caspar Wahlen and John Rueger.

Lynch St., n s, abt. 240′ e Lee Ave., 2 three-st'y frame (brick filled) tenements, gravel roofs; cost, each, $2,000; owner, John Jeffers, 152 Marcy Ave.; architect, C. Wells.

Stockton St., n s, 100′ w Lewis Ave., 8 three-st'y frame (brick filled) tenements, tin roofs; cost, each, $4,500; owner, T. J. Moore, 72 Sumner Ave.; architect and builder, John Erickson.

North Eighth St., s s, 315′ w First St., two-st'y brick storage, gravel roof; cost, $12,000; owners, Dick & Meyer; builder, James Rodwell.

Hancock St., s s, 225′ e Reid Ave., two-st'y brick dwell., tin roof; cost, $3,800; owner, Emma Naul, 853 Herkimer St.; architect, Amzi Hill; builders, F. H. Stout & Bro.

Stockton St., No. 316, s s, 228′ 6″ e Sumner Ave., three-st'y frame tenement, tin roof; cost, $4,000; owner, Mr. Proestler, on premises; architect, Th. Engelhardt; builders, Ulrich Maurer and D. Kreuder.

Ninth St., s w cor. Fourth Ave., 5 three-st'y brick flats, tin roofs; cost for all, $35,000; owners and builders, Assip & Buckley, 77 Waverly Ave.; architect, M. Goats.

First St., e s, 100′ s Grand St., 2 five-st'y brick stores and tenements, tin roofs; cost, each, $7,500; owner, D. Aliers, cor. Sixth St. and Broadway; architect, E. F. Gaylor; mason, Thomas Gibbons.

Fulton St., s e cor. Howard Ave., 2 three-st'y brown-stone stores and flats, gravel roofs; cost, $7,250 and $8,000; owner and architect, Benj. T. Robbins, Northport, L. I.; builders, E. K. Robbins and John Remsen.

Quincy St., n s, 330′ e Reid Ave., 4 two-st'y brown-stone dwells., tin roofs; cost, each, $1,500; owner, A. Stewart Walsh, Madison St.; architect and builder, A. Miller.

Decatur St., n s, 90′ e Lewis Ave., 6 three-st'y brown-stone dwells., felt and gravel roofs; cost, each, $5,000; owner and architect, John C. Bushfield, 675 Herkimer St.

Hancock St., Nos. 202 *and* 204, s s, 250′ w Marcy Ave., 2 three-st'y brick dwells., tin roofs; cost, each, $12,000; owner and builder, Geo. H. Stone, 301 Jefferson St.; architect, G. A. Schellenger.

Jefferson St., Nos. 309, 311, *and* 313, n s, 310′ e Marcy Ave., 3 three-st'y brown-stone dwells., tin roofs, wooden cornices; cost, each, $11,000; owner, etc., Geo. H. Stone, 301 Jefferson St.

Clifton Pl., s s, 100′ e Clason Ave., two-st'y brick stable and dwell., tin roof; cost, $6,000; owner, A. J. Pouch, 315 Greene Ave.; architects, Eastman & Daur; builders, P. J. Carlin and Long & Barnes.

Schenectady Ave., n w cor. Pacific St., two-st'y brick factory, tin roof, brick cornice; cost, $10,000; owner, James Winship, Buffalo, N. Y.; architect, Phineas M. Smith; builders, A. A. Fardon and Phineas M. Smith.

Clinton Ave., e s, 27′ s Lafayette Ave., three-st'y and mansard brown-stone dwell., slate and tin roof; cost, $100,000; owner, Robert Graves, Fulton St., near Carlton Ave.; architect, W. A. Mundell; builder, Cornelius Cameron.

Herkimer St., s s, 200′ e New York Ave., 3 two-st'y brick dwells., gravel roofs; cost, each, $2,000; owner, E. R. Betts, Pacific St.; architect and builder, D. H. Fowler.

ALTERATIONS.—*Court St.*, s w cor. Harrison St., mansard roof removed, and front wall carried up with stone and brick, roof to be raised, etc.; cost, $3,000; owner, Samuel E. Shaw; architect, Henry J. Dudley, 1300 Broadway, New York city.

Chicago.

BUILDING PERMITS. — A. K. Blair, three-st'y flats, 292 and 294 Illinois St.; cost, $8,000.

Russel Bros., two-st'y flats, 717 to 721 Wells St; cost, $17,000; architect, G. L. Halberg.

W. Schmidt, four-st'y store and dwell., 75 and 77 Clybourne Ave.; cost, $15,000.

F. W. Luebs, two-st'y dwell., 12 Fry St.; cost, $6,000.

W. Sprunck, two-st'y store and dwell., 217 Clybourne Ave.; cost, $6,000; architect, F. Berlin; builder, F. Nehls.

Williams & Carson, 2 two-st'y dwells., 278-282 Idaho St.; cost, $7,000; architect, A. Williams.

A. Johnson, three-st'y dwell., 247 Polk St.; cost, $8,000; architect, A. Smith; builder, N. Cameron.

C. Schlecht, two-st'y dwell., 577 South Morgan St.; cost, $4,000; architect, P. W. Ruehl.

F. A. Ruck, three-st'y stores and flats, 273 Wells St.; cost, $8,500; architects, Bauer & Hill; builder, C. Hellmann.

A. C. Young, three-st'y store and dwell., 3036 Wabash Ave.; cost, $12,000; architect, L. D. Cleaveland; builder, Wm. Barton.

M. Brand & Co., two-st'y store and dwell., Noble and Augusta Sts.; cost, $7,000.

G. H. Wheeler, two-st'y barn, 1812 Prairie Ave.; cost, $4,000; architects, Burnham & Root.

C. Weilder, two-st'y store and dwell., 111 Fulton St.; cost, $4,000; architect, Schnoor.

E. B. Baker, two-st'y dwell., 868 Fulton St.; cost, $5,000; architect, Longhurst.

J. Pepper, three-st'y store and dwell., 406 Ogden Ave.; cost, $4,300; architect, H. Copeland; builder, McKay.

H. Thurston, two-st'y dwells., 22 and 24 Will St.; cost, $4,600; architect, H. Copeland; builder, McKay.

John Popp, two-st'y dwell., 101-105 Twenty-fifth Pl.; cost, $3,000.

J. M. Beers, addition, 785 Elston Pl.; cost, $3,000.

Mrs. Erlandson, three-st'y dwell., 50 West Ohio St.; cost, $2,500.

J. A. Anderson, two-st'y flats 458 West Huron St.; cost, $4,000.

A. J. Snell, 11 three-st'y dwells., 1 to 15 Elizabeth St.; cost, $45,000; architect, A. Smith; builder, F. Hansen.

P. H. McElroy, two additional stories, 528 Indiana St.; cost, $5,000; architect, W. H. Drake; builder, J. Connell.

F. Seelow, two-st'y dwell., 663 Twenty-second St.; cost, $3,600; builders, Rossman & Roeder.

D. Cahn, three-st'y store and dwell., 114 Chicago Ave.; cost, $7,500; architect, T. V. Wadskier.

Geo. Rupp, three-st'y dwell., 2929 State St.; cost, $4,000; architect and builder, Geo. Rupp.

J. Theurer, two-st'y dwell., 1809 Indiana Ave.; cost, $16,000; architect, E. Baumann.

G. Veidt, two-st'y dwell., 505 Marshfield Ave.; cost, $4,300; builder, C. Geger.

Celia & Malatesta, 2 three-st'y stores and dwells., 3812 and 3814 State St.; cost, $9,000.

Remodelling livery-stable for J. J. Brown, West Madison St.; cost, $8,000; C. H. Haskell, architect.

Flats on Monroe St.; cost, $7,500; John Anderson, owner; C. H. Haskell, architect.

Cincinnati.

BUILDING PERMITS. — W. C. Wehrman, two-and-one-half-st'y brick building, e s of Loth St., near Mulberry St.; cost, $3,400.

G. Strotmann, three-st'y brick building, 76 Coleman St.; cost, $4,500.

J. T. Siever, three-st'y brick building, 61 Liberty St.; cost, $5,600.

Mrs. E. Bredniger, 3 two-st'y brick buildings, n s of Poplar St., n of Linn St.; cost, $5,500.

Mrs. J. J. Wright, three-st'y brick building, 40 Mason St.; cost, $2,800.

A. Walton, four-st'y brick building, 330 West Sixth St.; cost, $5,000.

Minneapolis, Minn.

BUILDING PERMITS. — J. H. Davenport, two-st'y wooden dwell., Vine Pl.; cost, $6,500.

City of Minneapolis, two-st'y brick engine-house, n s Twelfth Ave., between Washington Ave. and Third St., north; cost, $9,540.

Chas. J. Martin, executor, one-st'y brick boiler-house, s w cor. Seventh Ave. and Canal St., south; cost, $6,000.

A. H. Edsten, two-st'y brick store and flats, w s Cedar Ave., between Fourth and Fifth Sts., south; cost, $5,000.

James McMullen, alteration to two-st'y dwell., n e cor. Fourth St., between Sixth and Seventh Aves., s e; cost, $3,800.

F. T. Dinsmore, two-st'y wooden dwell., cor. Third Ave. and Lake St., s; cost, $3,000.

St. Paul & Northern Pacific R. R. Co., brick round-house; cost, $30,000.

John Kelley, two-st'y store and flat; cost, $3,000.

Mrs. Robert Anderson, two-st'y building; cost, $4,500.

St. Paul & Northern Pacific R. R. Co., brick freight-house; cost, $50,000.

St. Paul & Northern Pacific R. R. Co., three-st'y brick freight-office; cost, $5,000.

J. H. Thompson, two-and-one-half-st'y double tenement, brick veneer, e s Highland Ave., near Royalston; cost, $8,000.

Roman Catholic church, three-st'y stone parish school-building, w s Second St., between Eighth and Ninth Aves., n e; cost, $10,000.

New York.

CHURCH.—On the 28th of September, the corner-stone of the Church of our Lady of Mt. Carmel was laid by Archbishop Corrigan. The building is being erected under the superintendence of the rector the Rev. Dr. Kirner; from plans of Mr. L. J. O'Connor.

FACTORY.—A silk factory 50′ x 125′, and 2 five-st'y brick tenements, 25′ x 82′ each, are to be built for Mr. Jacob New on the s s of Fifty-fifth St., e of Eleventh Ave.; from plans of Mr. J. H. Valentine.

STRIKES.—The continuance of the building strikes has virtually stopped new work; several plans have been drawn for work which will go on, should matters with the men be satisfactorily settled.

BUILDING PERMITS. — *West Fifty-fourth St., No.* 353, four-st'y brick factory, tin roof; cost, $9,000; owners, J. & W. Williams, 361 West Fifty-second St.; architect, Geo. W. Hughes.

East Fifty-fourth St., No. 544, four-st'y brick tenement, tin roof; cost, $9,000, owner and builder, Geo. T. Leaird, 6 West Fifty-first St.; architect, M. V. B. Ferdon.

Marion Ave., w s, 200′ s John St., two-st'y frame dwell., shingle roof; cost, $3,000; owner, Michael Hart, 2569 Marion Ave.; architect, F. D. Miller.

Sixty-second St., s s, 182′ e Madison Ave., two-st'y brick stable, gravel roof; cost, $10,750; owner, Phineas C. Kingsland, 24 East Sixty-first St.; architects and builders; Chas. Buck & Co.

One Hundred and Fourteenth St., s s, 270′ e First Ave., 2 four-st'y brick tenements, tin roofs; cost, each, $12,000; owner, Peter McCormick, 416 East One Hundred and Fifteenth St.; architect, J. H. Valentine.

Sixteenth St., s s, 282′ 8″ e Eighth Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $17,000; owner, Annie Fettretch, 960 Park Ave.; architects, Cleverdon & Putzel.

One Hundred and Sixty-sixth St., s s, 150′ e Franklin Ave., two-st'y frame dwell., tin roof; cost, $3,500; owner, Thos. S. Morris, 1106 Franklin Ave.; builder, Simon Wright.

One Hundred and Third St., n s, 260′ e Third Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $13,000; owner, Caroline Yost, 316 East One Hundred and Twenty-fifth St.; architect, A. Spence; builder, A. Yost.

Henry St., No. 93, five-st'y brick tenement and store, tin roof; cost, $15,000; owner and carpenter, P. A. Fogarty, 409 West Fourteenth St.; architect, John P. Leo; mason, Thos. Cockerell.

Avenue A, e s, from Fifty-fourth to Fifty-fifth St., 8 five-st'y brick tenements and stores, tin roofs; cost, each, $12,000; owner, Geo. W. Totten; architects, A. B. Ogden & Son.

Delancey St., Nos. 292 *and* 294, 2 five-st'y brown-stone front tenements, tin roofs; cost, each, $18,000; owner, Manhattan Construction Co., 120 Broadway; architect, Alfred Kehoe.

Bailey Ave., e s, 75′ s Old Boston Road, two-st'y frame dwell., shingle roof; cost, $3,200; owner, Jas. M. Miller, Kingsbridge; architect and builder, Samuel L. Berrian.

Concord Ave., e s, 22′ s Clifton St., two-st'y frame dwell. and store, tin roof; cost, $3,500; owner, Henry Eberhardt, cor. Concord Ave. and Clifton St.; architect, Adolph Pfeiffer.

Wooster St., Nos. 39 *and* 41, three-st'y brick store, with one-st'y extension, tin roof; cost, $——; owner, Wm. Collins, 59 East Ninety-first St.; architect, Jos. M. Dunn.

East Twelfth St., No. 518, rear, four-st'y brick workshop, tin roof; cost, $3,000; owner, John H. Menkens, on premises; architects, Berger & Baylies; builders, Miller & Doerfler.

ALTERATIONS. — *Second Ave., No.* 34, *and No.* 43 *Second St.*, raise one st'y; cost, $4,500; owner, Levy Rothschild, 429 East Eighty-fifth St.; architect, A. H. Blankenstein.

St. Marks Pl., No. 67, raise attic to full st'y, new flat roof; also, a four-st'y brick extension, tin roof; cost, $8,000; owner, Moses Zimmerman, 318 East Houston St.; builder, Julius Boekell.

One Hundred and Thirty-fourth St., s s, 150′ s Lincoln Ave., one-st'y brick extension, gravel roof; cost, $3,500; owner, N.Y. Wood Turning Co., on premises; architect and builder, Wm. J. Merritt.

Broadway, w s, 21′ s Fifty-third St., five-st'y brick extension, tin roof; cost, $8,000; owners, George H. Schastey & Co., 9 East Nineteenth St.; superintendent, Aug. Schastey.

Philadelphia.

BUILDING PERMITS. — *Lehigh Ave.*, e of Fairhill St., 2 two-st'y dwells., 17′ x 52′; R. B. Gorman, contractor.

Orthodox St., cor. Race St., two-st'y store and dwell., 16′ 6″ x 57′; W. Cunningham & Son.

Thirtieth St., n of Chestnut St., two-st'y stable, 30′ x 80′; A. T. Richards, contractor.

Tulip St., cor. Wissanoming St., two-st'y dwell., 37′ x 46′; J. S. Taylor, contractor.

Main St., n of Jefferson St., 2 three-st'y dwells., 18′ x 40′; J. D. Caldwell, contractor.

Palmer St., e of Frankford Ave., two-st'y dwell., 20′ x 58′; A. T. Richards, contractor.

Hope St., No. 1710, three-st'y dwell., 18′ x 30′; Englebert & Schmidt, contractors.

Reed St., No. 1327, three-st'y dwell., 16′ x 48′; Jno. Gibson, contractor.

Reed St., e of Twenty-first St., 2 two-st'y dwells., 16′ x 40′; M. Kennedy, owner.

Paul St., w of Meadow St., 2 two st'y dwells., 15′ x 44′; B. H. Foulkrod, contractor.

PROPOSALS.

CURBING.

[At Providence, R. I.]

BOARD OF PUBLIC WORKS, OFFICE, CITY HALL, PROVIDENCE, R. I., September 23, 1884.

Sealed proposals will be received at this office **until 11 o'clock, A. M., Thursday, October 9, 1884**, for furnishing, delivered in this city, 20,000 lineal feet of straight curbing.

The delivery to commence on or before November 1, 1884, to continue in regular monthly quantities, and be completed on or before October 1, 1885.

A bond, satisfactory to the Board in the sum of one-tenth of the estimated amount of the proposal, as liquidated damages for failure to execute the contract within ten days, if awarded, will be required of each bidder, and a satisfactory bond in the sum of one-quarter of the estimated amount of the contracts, conditioned upon the faithful fulfillment of the contracts will be required of the successful bidder.

Specifications and forms of proposals may be obtained upon application at this office.

The Board reserves the right to reject any or all proposals. CHAS. E. CARPENTER, CLINTON D. SELLEW, Board of Public Works.
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COTTAGES FOR KEEPERS OF LIFE-SAVING STATIONS.

[At Washington, D. C.]

OFFICE OF GENERAL SUPERINTENDENT, U. S. LIFE-SAVING SERVICE, TREASURY DEPARTMENT, WASHINGTON, D. C., September 6, 1884.

Sealed proposals will be received at this office **until 2 o'clock, P. M., of Thursday, the 9th of October, 1884**, for the construction of three frame cottages for keepers at the following-named life-saving stations on the Pacific coast: one at the Shoal-water Bay life-saving station, near light-house; one at the Cape Disappointment station, Baker's Bay (both in Washington Territory); and one at the Golden Gate Park station, San Francisco, Cal. The proposals may be for one or more of the cottages.

Bidders will state the time within which they will agree to have the buildings completed.

Each bid must be accompanied by a bond in the sum of $500, with two good and sufficient sureties, conditioned that the bidder shall enter into contract without delay and give such bonds as security for the faithful performance thereof as may be required if his bid be accepted, or by a deposit of $500 United States currency or bonds, to be returned to the unsuccessful bidders after the award of the contract, and to the successful bidder after his contract and bond for the faithful performance of the terms thereof shall be approved by the Secretary of the Treasury.

Specifications and plans, forms of proposal, contract and bond can be obtained at the offices of the Collector of Customs at Astoria, Or.; Capt. J. W. White, Assistant Inspector of Life-Saving Stations, East Oakland, Cal.; and of T. J. Blakeney, Superintendent Twelfth Life-Saving District, Room 25, Appraisers' Building, San Francisco, Cal.

All proposals must be indorsed "Proposals for the Construction of Keepers' Cottages," and addressed to the General Superintendent of the United States Life-Saving Service, Washington, D. C.

The right to reject any or all bids, or to waive defects, if deemed for the interest of the Government, is reserved. W. D. O'CONNOR, Acting General Superintendent.

PROPOSALS.

PIERS.

[At New York, N. Y.]

Proposals for repairing Piers 43 and 44, and the piers at East Thirty-first and Thirty-second Sts., East River, will be received by the Dock Department, 117 and 119 Duane St., New York, **until Wednesday, October 8, 1884, at 12 o'clock, M.**

For full information see *City Record*. Copies for sale at No. 2 City-Hall.

IMPROVING APPOMATTOX RIVER, VA.

[At Norfolk, Va.]

U. S. ENGINEER OFFICE, NORFOLK, VA., September 23, 1884.

Sealed proposals, in triplicate, will be received at this office **until noon of October 23, 1884**, and opened immediately thereafter, in the presence of bidders, for dredging one hundred and thirty-five thousand (135,000) cubic yards more or less, and for furnishing small quantities of piles, lumber, gravel, brush, binding poles, bolts, and spikes for the improvement of Appomattox River, Virginia.

Specifications, instructions to bidders, and blanks for proposals can be had on application to this office.
460 F. A. HINMAN, Capt. of Engineers, U.S.A.

CONCESSIONS AND PRIVILEGES,

[At New Orleans, La.]

The management of the World's Industrial and Cotton Centennial Exposition at New Orleans invite sealed proposals for concessions and privileges, to be indorsed "Proposals for Privileges," and addressed to E. A. Burke, Director General, New Orleans. Circulars containing detailed information can be obtained from the offices of the World's Industrial and Cotton Centennial Exposition as follows: Chauncey Dunnmore, cor. of Broadway and Chambers Sts., New York, N. Y.; B. S. Pardee, 31 Milk St., Boston, Mass.; S. R. Nutt, Continental Hotel, Philadelphia, Pa.; J. W. Ryckman, Palmer House, Chicago, Ill.; F. F. Hilder, 620 Chestnut St., St. Louis, Mo.; T. M. Barda, care of the Southern Exposition, Louisville, Ky.; A. J. McWhirter, Nashville, Tenn.; Colonel A. Andrews, San Francisco, Cal.; Thomas Christian, Richmond, Va.; Homer Hamilton, Cleveland, O.; E. L. Roche, Charleston, S. C.; T. F. Plunkitt, Hartford, Conn.; F. M. Williams, 33 Sycamore St., Cincinnati, O.

GLOBE LANTERNS AND EXTRA GLOBES.

[At New York, N. Y.]

DEPOT QUARTERMASTER'S OFFICE, NEW YORK CITY, N. Y., September 16, 1884.

Sealed proposals, in triplicate, subject to usual conditions will be received at this office **until 12 o'clock, noon, October 16, 1884**, at which time and place they will be opened in presence of bidders for furnishing and delivering at this depot, free of charge for cartage and packages, 400 globe lanterns and 800 extra globes for the same. The lanterns must be arranged to burn both oil and candle, and be of a pattern and size to use the same style and size of globes, wicks and candles as the standard sample, which can be seen at this depot. Samples must accompany proposals. The Government reserves the right to reject any or all bids, or to accept as may be most advantageous to the Department. Preference will be given to articles of domestic production and manufacture, conditions of price and quality being equal, and such preference given to articles of American production and manufacture produced on the Pacific coast to the extent of the consumption required by the public service there.

Blanks and information as to bidding, etc., will be furnished by this office on application.

Envelopes containing proposals should be marked "Proposals for Lanterns," etc., and addressed to the undersigned. HENRY C. HODGES,
458 Lieut.-Col. Deputy Quartermaster General.

INDUSTRIAL SCHOOL BUILDING.

[At Devil's Lake Agency, Dak.]

DEPARTMENT OF THE INTERIOR, OFFICE OF INDIAN AFFAIRS, WASHINGTON, D. C.

Sealed proposals, indorsed "Proposals for the construction of an Industrial School Building at Devil's Lake Agency, Dak.," will be received at the office of the agent of the Devil's Lake Agency, Fort Totten, Dak., **until October 14, at 12 o'clock, M.**

The building is to be frame, 35′ x 100′, two stories. Complete plans and specifications of the work can be examined at the office of the *Inter-Ocean*, of Chicago, Ill., the *Pioneer Press*, of St. Paul, Minn., and at the agency.

The contract to be awarded to the lowest responsible bidder or bidders, subject to the approval of the Secretary of the Interior. The right is, however, reserved to reject any and all bids, or any part of any bid, if deemed for the best interests of the service.

Time required to complete the building will be taken into consideration, and proposals must state the length of time required for the completion of the building after the approval of the contract.

Each bid must give the name of all the parties interested in or parties to it, and a copy of this advertisement must be attached to bid, with post-office address.

Each bid must be accompanied by a certified check or draft upon some United States depository, payable to the order of John W. Cramsie, U. S. Indian agent, which check or draft shall be not less than five per centum on the amount of the bid, and shall be forfeited to the United States in case any bidder receiving an award shall fail to execute promptly a contract with good and sufficient sureties, according to the terms of his bid; otherwise to be returned to the bidder.

Bids not accompanied by a certified check or draft will not be considered.

Parties receiving awards will at once enter into contract.

The contract will provide for three payments, two of which will be made at such stages of the work as will fully protect the United States; the last payment to be made when the building is completed and accepted.
COMMISSIONER.

PROPOSALS.

WING-DAMS, ETC.

[At Augusta, Ga.]

UNITED STATES ENGINEER OFFICE, ARMY BUILDING, NEW YORK, September 18, 1884.

Sealed proposals, in triplicate, to be opened **at 12 o'clock, noon, on the 17th day of October, 1884**, are invited for the construction of wing-dams in the Savannah River, below Augusta, Ga., and in the Altamaha River, Georgia. The proposals for each of the works must be separate, and the indorsement on the envelope must name the work for which the proposal is offered. A bidder may propose for one or both of the works at his option. Specifications, instructions to bidders, and blank forms of proposals may be obtained at this office. Q. A. GILLMORE,
459 Col. of Engineers, Brevet Maj.-Gen., U.S.A.

STEAM-PIPE AND FITTINGS.

[At Boston, Mass.]

NAVY PAY OFFICE, 45 MILK ST., BOSTON, September 29, 1884.

Proposals, in duplicate, sealed and endorsed "Proposals for Steam-Pipe and fittings," will be received at this office **until October 6, 1884, at 12 o'clock, M.**, to be opened immediately thereafter in presence of bidders, for furnishing at the Navy Yard, Boston, and subject thereto the usual Government inspection, the articles called for on requisition No. 16, consisting of steam-pipe and fittings. The price bid to include delivery at the Boston Navy Yard.

Specifications and blanks for bids furnished by this office. Two satisfactory sureties must accompany the bid, guaranteeing a faithful execution of the offer if accepted. The right is reserved to reject any and all bids not considered advantageous to the Government.
460 C. W. ABBOT, Pay Director, U. S. Navy.

COURT-HOUSE.

[At Cincinnati, O.]

OFFICE BOARD TRUSTEES TO REBUILD COURT-HOUSE, HAMILTON COUNTY, O. COURT-HOUSE YARD, CINCINNATI, O., Oct. 1, 1884.

Sealed proposals will be received at this office **until 9 o'clock, A.M., on Saturday, the 18th day of October, 1884**, for furnishing and setting in place all the wrought and cast iron work required for the rebuilding of the Hamilton County, Ohio, Court-House, according to plans and specifications on file in this office, and also at the office of James W. McLaughlin, architect, 46 and 47 Johnston Building, Cincinnati.

All bids to be made upon printed forms furnished on application to this office, and subject to all the conditions therein provided. No others will be considered.

The Board reserve the right to reject any and all bids. By order of the Board.
458 J. CLIFFORD GOULD, Clerk.

STONE AND BRICK WORK.

[At Council Bluffs, Iowa.]

OFFICE OF SUPERVISING ARCHITECT, TREASURY DEPARTMENT, WASHINGTON, D. C., September 27, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 18th day of October, 1884**, for all the labor and material, stone, brick, mortar, etc., and building complete the basement and area walls of the post-office, etc., building at Council Bluffs, Iowa, in accordance with drawings and specification, copies of which may be seen and any additional information obtained on application at this office or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening, will not be considered. H. G. JACOBS,
459 Acting Supervising Architect.

DAM.

[Near Frankfort, Ky.]

U. S. ENGINEER OFFICE, 82 WEST THIRD ST., CINCINNATI, O., September 1, 1884.

Sealed proposals, in triplicate, will be received at this office **until noon, local time, on Monday, October 20, 1884**, for furnishing all materials and labor for constructing Dam No. 5, Kentucky River, about seventeen miles above Frankfort, Ky.

Approximate estimate of materials: —
126,764 lineal feet of timber,
96,000 pounds of iron, drift-bolts and spikes,
8,350 pounds of iron anchoring-bolts,
19,000 cubic yards of rip-rap stone,
352,588 feet B. M. of sheeting,
6,000 cubic yards of gravel backing.

Specifications, printed forms of proposals, and information will be furnished on application to D. L. Sublett, at Frankfort, Ky., or to the undersigned.
459 JAMES C. POST, Captain of Engineers.

LUMBER.

[At Santee Agency, Neb.]

SANTEE AGENCY, NEB., September 2, 1884.

Sealed proposals endorsed "Proposals for lumber," will be received at the office of the United States Indian Agent, Santee Agency, Neb., **until 1 o'clock, P. M., of Thursday, October 9, 1884**, for furnishing the Santee Agency with, the Ponca Agency with, and the Flandreau Agency with a variety of lumber, windows, doors, etc., for forty (40) houses (thirty for Santee and ten for Flandreau) to be delivered at Santee and Flandreau Agencies, Nebraska and Dakota, a list of which can be obtained upon application at this office.

All articles delivered under contract will be subject to a rigid inspection by some proper party to be designated by the department.

All bids must be accompanied by certified checks on some United States depository or cash for at least five (5) per cent of the amount of the proposals; which check or cash will be forfeited to the United States in case any bidder or bidders fail to execute a contract with good and sufficient sureties, otherwise to be returned to the bidder.

The right is reserved to reject any or all bids, or any part of any bid if deemed for the best interest of the service. ISAIAH LIGHTNER,
458 United States Indian Agent.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XVI. Copyright, 1884, JAMES R. OSGOOD & Co., Boston, Mass. No. 459.

OCTOBER 11, 1884.

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CONTENTS.

A DISCUSSION which recently took place in Boston in regard to the possibility of employing irrigation as a method for disposing of the sewage of that city, seems to have excited, as such discussions generally do, a great deal of interest. It is hardly necessary to say that any proposition for applying a system of utilization to the waste waters of so large a city is opposed by the most experienced engineers, not, usually, on account of any prejudice on the subject, but because they know better than any one else the difficulties which must be overcome in dealing with so great a volume of liquid, and, considering the present state of knowledge, they are right. If those who, like ourselves, hope some time to see the fertilizing products of organic life generally restored to the soil from which they have been derived, would turn their enthusiasm and energy toward the propagation of their views in small towns and among individual proprietors, where experiments at a small scale could be carried on with little trouble or expense, they might be sure of doing great and immediate good, and, by familiarizing the public mind with the idea of sewage utilization, as well as by the accumulation of knowledge concerning the best methods of carrying it out, they would prepare the way for applying it, years hence, with an adequate knowledge of the results to be sought and the means for securing them, to the wastes of large communities.

THE form of drainage apparatus which concerns the greatest number of people, and most needs reform, is not the intercepting-sewer, the tidal-outfall, or the inverted-siphon, but the cesspool. At this moment hundreds of people are moaning or shrieking in the delirium of typhoid fever, which they have contracted through the intervention of one of these reservoirs, and will probably communicate it to some of their friends and neighbors by means of another one; and no one could do a greater service to his fellow-men than to show them the way to abolish forever the source of so many evils, by the substitution of a satisfactory and inexpensive system of irrigation. A great deal has already been accomplished in this way, without special effort, but there is much work to do yet among householders of moderate means, who fear to introduce new appliances, of which they do not know the cost or the permanence, as well as among the timid, who are still haunted by the absurd notions set afloat in the early days of sewage utilization. We have learned to laugh at the idea of celery-stalks at Gennevilliers spouting sewage when cut, and Pasteur's experiments have long ago set at rest our apprehensions that cholera or typhoid germs might be liberated from sun-dried sewage and float in the air to our injury; but every one has not followed the progress of sanitary knowledge, and those who have not are sure to be glad of information, and will generally be ready to follow, to the extent of their ability, any reasonable plan for improving the health of their families. Those who would be the missionaries of the new movement must, however, first make themselves thoroughly acquainted with facts. It is worse than useless to make hasty assertions, without actual experience to confirm them, and no one ought, in so important a matter as house-drainage, to advise the adoption of any plan which he has not himself tried successfully.

MR. KEELY has given a new proof of his extraordinary capacity for keeping up the spirits of those who furnish the money for carrying on his "studies," by collecting a large number of them at the Government station on Sandy Hook to witness some experiments with a "vaporic gun," which he has been for some time constructing. It seems that the "generator," which formed the subject of the great inventor's original efforts, after costing the stockholders of the company sixty thousand dollars, has been sold as old metal for two hundred, and the present exhibition appears to have been ingeniously planned for removing, at a small expense, the unfavorable impression which might have been produced by the previous piece of financial management. According to the reporter of the New York *Times*, who accompanied the party to Sandy Hook, Mr. Keely's new artillery consisted of a gun with a bore of one and one-quarter inches, mounted on wheels; an iron receiver a yard and half long, containing "five gallons of vaporic force," and a small intensifier. On reaching the testing ground the receiver was connected with the gun by a small wire tube, apparently resembling the steam-hose often used for similar purposes, and a bullet was inserted. The gun was then, after rapping the receiver with a hammer "to stimulate the vaporic force," pointed, and a handle was turned, upon which the bullet was projected, with a slight noise, to a distance of three hundred yards. The next shot struck the target, and several others were fired, three of which, by test with the Government instruments, showed the initial velocity to be one third as great as that of a ball from a Springfield rifle. The pressure used, according to the reporter's rendering of Mr. Keely's explanation, was "seven thousand feet to the square inch," but he remarked that a much greater force could be obtained.

A DAY or two afterwards, the great inventor condescended to explain to a reporter of the Philadelphia *Press* some of the properties of the apparatus used in his experiments in gunnery. According to the reporter's account, Mr. Keely professed to have succeeded in developing a "power of projection" "thrice greater than that of gunpowder," although he did not state why this "power of projection," as exhibited, was only a fraction of that which gunpowder would have given under the same circumstances. However, he did better than that, in taking from his satchel and showing to the reporter what he called a "vibrator," the source of his extraordinary power. This vibrator, which was shaped like a short round stick, contained as he said, a "hollow coil of steel," which, on the stick being held near the reporter's ear, gave out a humming sound. This humming, the inventor went on to say, proceeded from vibrations in the steel, induced "by the flow of vapor through it," and was due to vibrations, taking place at the average rate of three hundred thousand per second. As this, according to a little calculation which we have made, would correspond to the rapidity of vibration of a string producing the highest note of a piano ranging six octaves above the usual key-board, our readers may imagine for themselves the character of the "humming," but it appears that this, whatever it might have been like, was capable of producing in the stick a continuous force of five hundred horses. With unusual confidence, Mr. Keely then proceeded to explain the method of preparing the "vaporic force" used in the Sandy Hook trial, saying that six drops of water, and about a pint of air, had sufficed to produce five gallons of "etheric vapor," of such lively disposition that after firing by means of it about twenty bullets, the power in the reservoir was found to have increased, rather than have diminished, "just as a race-horse needs to be warmed up before he can do himself justice." The way in which the ether is applied to the gun, as he says, is "to get the chord of vibration of the gun to agree with the chord of the vibrator." This is done, after allowing the "interatomic ether to pass into the gun" behind the bullet, by striking the gun with a mallet. At the same time the steel coil is attached, which "increases the intensity of the vibrations fifteen-fold," and the bullet is consequently shot out of the gun with much force. Much more of this lucid information was given to the reporter by the condescending genius, but what we have quoted will be quite enough to show the general drift of the discourse. In point of fact, the vaporic artillery seems to have been nothing more nor less than a stout air-gun, fired in a well-known way by compressed air from the reservoir. The latter, being evidently of great strength, might be charged with air enough to fire a large number of bullets, and, although the tension would decrease as the air was consumed, a suitable control of the discharge valve could readily be made to give a greater initial velocity to the last bullet fired than to the first, and thus produce the impression that the motive force had got "warmed up" toward the end of the exhibition. The coiled steel vibrator, which was attached to the gun to "increase the intensity of the vibrations," was probably a mere blind, to take the attention of the spectators away from the obvious character of the apparatus.

THE last chapter of the Des Moines episode is a sad, yet not an unexpected one. The actual writer of the extraordinary circulars of the Des Moines Architectural Association, which we have felt called on to publish as being the official utterances of an architectural society, has been placed in an insane asylum, where we hope he will find cure or relief for his terrible affliction. That a man beside himself should have written these circulars we can readily understand, but we cannot conceive how his condition could have escaped the observation of his associates so far as to allow them to accept his compositions as sane utterances, and, moreover, adopt and issue them with all the pomp of official signature and counter-signature. It is possible that the hallucination of the unfortunate man was such that he believed his circulars were accepted, and then issued them at his own expense and responsibility. But even then we cannot see why some of our readers in Des Moines did not advise us of the true state of the case; unless, indeed, the Des Moines Architectural Association itself is the phantom of a diseased brain and, of course, no one could have knowledge of its proceedings.

THOSE sentimental persons who fancy they would like to live in a picturesque Swiss châlet may like to know that their taste can now be gratified at a small expense; a company at Interlaken, in the very heart of the portion of Switzerland most distinguished for its beautiful wooden houses, having undertaken the manufacture of châlets for sale, the parts being fitted together, numbered, and packed in small compass, ready for setting up wherever the purchaser may fancy. This method of manufacture is peculiarly adapted to the Swiss houses, since the whole principle of their construction is that of fitting together, by ingenious mortising and dovetailing, without the use of nails, which, even at this day, have very little to do with châlet-building. Viollet-le-Duc believed that these houses were practically identical in style and construction with those built by the Aryan invaders of Europe, ages before the discovery of iron, but however that may be, there is something extremely interesting in the way in which the beautifully wrought and carved rafters and side planks are brought, completely finished, to the ground, and put together like the parts of a child's puzzle. Although not very well adapted for winter residence in our cold and windy climate, the Swiss châlets make charming summer houses, and a person able to afford the cost of duties and transportation might give himself much pleasure, and excite a lively sensation among his friends, by importing one to use as a seashore or mountain cottage for the warm season.

THE *Sanitary Engineer* relates a story which surpasses anything we have yet heard as an illustration of the reckless folly shown by many people in regard to matters affecting their own health or that of their neighbors. It seems that a number of residents in one of the suburbs of Liverpool, in the neighborhood of one of the wells which are used to furnish the water-supply of that city, found, soon after the deep corporation well came into use, that their own private ones were drying up, and it finally became evident that the pumping from the deep well was draining all the shallower ones in the neighborhood. As they could not prevent the pumping, they were at last compelled either to take water from the corporation or go without it, and concluded to adopt the former alternative. After the service-pipes had been put in, having no more need of their wells, they were inspired with the economical idea of utilizing them for cesspools, and forthwith connected their drains with them, apparently without concerning themselves about the fact, which they had just had proved to them, that the contents of the wells, whatever they might be, flowed immediately into the corporation supply. Such people as this deserve to live in Newark or Jersey City, where they can enjoy the flavor of arsenic, petroleum and carbolic acid in their water, or in that Massachusetts village whose inhabitants, moved by a similar prudent economy, appropriated the old town cemetery as a school-house lot, and dug the cellar of the building where their children were to pass their days among the noisome relics of their ancestors.

AN interesting account is given in *Le Génie Civil* of the experiment made last month at the workshops maintained near Paris by the French Government for the study of military aërostation, in which a balloon about one hundred and sixty-five feet in length, carrying a weight amounting, with that of the balloon itself, to more than four thousand pounds, was steered for twenty-three minutes in various directions through the air, at a height of a thousand feet above the ground, and after a voyage of about four miles, much of which was traversed at the rate of twelve miles an hour, was steered back, and landed on the very pasture from which it set out. This is by far the most successful attempt ever made at aërial navigation; no balloon, however well furnished with propellers or wings, ever before having been able to return to its starting-place, although several have succeeded in deviating, by the action of their rudder and propeller, to a considerable distance from the direction in which the wind was carrying them. The new air-ship, which was constructed under the direction of M. Renard, captain of engineers, and director of the establishment, and his associate M. Krebs, captain of infantry; has very much the shape of a cigar, tapering toward each end, but having its thickest part very near the front. The car is also long and tapering, and is hung quite close to the underside of the balloon. The propeller, or two-bladed screw, works at the front end of the car, and the rudder is hung at the other end. The whole is balanced and based as well as possible, to prevent swinging or oscillation of the car. The motive power is derived from a secondary battery, acting upon a light electric motor, the weight of the battery and motor, independent of the propeller, being about eleven hundred pounds. Further trials are to be made, and the results are likely to be of great importance.

MANY of our readers have probably amused themselves with the "heliotrope," a semi-scientific toy, consisting mainly of a small, movable mirror, by which the sun's rays can be flashed with considerable precision toward a given point, so as to convey, by means of a suitable code of signals, messages between elevated points at considerable distances from each other. The same principle is now, according to the *Revue Industrielle*, to be applied to regular telegraphing between the islands of Mauritius and Reunion, in the Indian Ocean, east of Madagascar. The islands are one hundred and fifteen miles apart, but there are mountains of considerable height in Mauritius, and snow-capped peaks in Reunion, and between these it has been found possible to flash signals successfully. The population of the two islands amounts to something like four hundred thousand, and there are naturally many occasions for communication between them; but besides this, Mauritius is now, or soon will be, connected by cable with all parts of Europe and Asia, and the official heliotrope will serve to include Reunion in the system, without the expense of laying a cable between the two islands, so that preparations have been made for establishing signalling-stations immediately on the most elevated points, connected by land-telegraph lines with Port-Louis and Saint Denis, the principal towns of each. Another incidental advantage of the sun-telegraph will be the opportunity given by it for transmitting intelligence from either island to the other of the approach of cyclones, which are common and very destructive there.

WE owe an apology to our readers for publishing, rather too hastily, a week ago, a letter from a certain plumber, signed "Justice," which, though written apparently in good faith, expressed an idea, in regard to the management of one of the best technical Journals in this country, which we know to be entirely unfounded. We do not like to amend or interfere with what our correspondents write, but ought in this case to have appended a distinct correction to the letter itself.

SANITARY PLUMBING.[1] — XXIX.

(*f*) *The Plain Adjustable Flange-Joint. — General Considerations.*

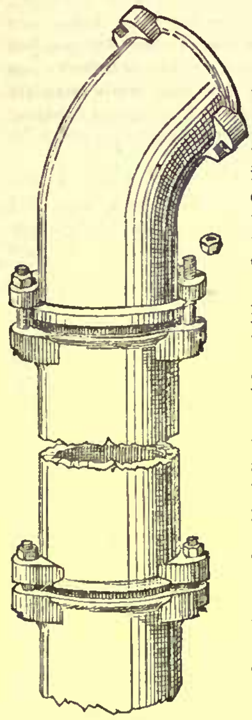


Fig. 203.
The Plain Adjustable Flange-Joint.

OF the various kinds of joints thus far reviewed, we have found the ordinary bell-and-spigot joint the most defective. It is faulty (1) in the manner in which the packing material is applied; and (2) in the position in which it is held; (3) in the absence of any provision for protecting it against the effects of strains in any direction, or of shocks or jars by which the spigot might be loosened from the packing in the socket; (4) in the temptation it presents for carelessness and fraud; (5) in the difficulty of disjointing it for repairs or alterations; and (6) in its costliness.

These defects are inherent in the nature of the joint. The calking may, it is true, be done by hydrostatic pressure or other mechanical means, and some of the difficulties involved by the customary laborious and unsatisfactory process be avoided, but the main defects remain. The use of grooves cast in the bell or spigot to hold the lead may, in a measure, alleviate the evil effect of strains or jars, but cannot remove it.

The sleeve-joint, is in principle, another form of bell-and-spigot joint. It has all the objections of the latter, and adds one of its own in that it doubles the number of calkings and packings required, and complicates the form. Its object appears to be the connection of wrought-iron pipes, upon which bells or caps cannot be formed in a single piece by casting.

The screw-joint is also particularly intended for wrought-iron pipe. It is a great improvement upon the foregoing two classes, removing the first four, but not the last two defects. For a system of cast-iron piping, however, it is not to be recommended.

The flange-joint is suitable for cast-iron, and removes many of the defects enumerated above. It has however, as we have so far illustrated it, the serious defect of being non-adjustable, which renders it for plumbing purposes, unsuitable. Moreover, as heretofore used, the flange-joint cannot be made tight under pressure, without considerable expense in fitting or planing the faces of the flanges, and the means employed for bringing the flanges together have been imperfect and unsatisfactory, requiring considerable working room, and rendering their use in contracted spaces inconvenient, or altogether impossible.

If these defects can be remedied, our ideal joint will have been obtained. Our problem is, therefore, to form a simple and inexpensive flange-joint, which shall be adjustable, tight under pressure, and easy to put together even in the most contracted spaces.

ADJUSTABLE JOINTS.

How shall the joint be made adjustable, without involving difficulties greater than the defect we are seeking to obviate?

We will assume that we have an upright pipe, to which a branch-pipe or bend is to be attached. The branch-pipe is put in to take the waste of some fixture, say a bath-tub, near the upright stack. In order to make the most direct connection with this fixture, and to avoid unnecessary bends or angles, and the cutting of joists, studs, or walls, the direction which the branch must take is subject to variation, and cannot be limited by the bolt holes in the flange of the pipe below. Hence all branch or bend pipes must have one of their flanges so constructed that the pipe can be turned on its axis before screwing up the joint. The natural way to accomplish this is to have a simple annular shoulder formed on the lower end of the branch-pipe, and construct the bolts with hook or hammer-heads as shown in Figure 204.

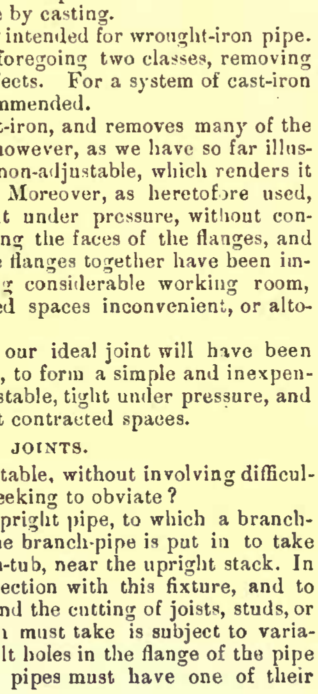


Fig. 204.
Adjustable Flange-Joints with Hook-Headed Bolts.

The upper pipe can now be turned on its axis, and the upper part made to incline in any desired direction before screwing up the bolts. Unfortunately we find two objections to this course. In the first place the pressure comes entirely on one side of the bolt tending to break off the head. All the strain comes on the few fibres nearest the flange. These are immediately ruptured, and the head then easily tears off.

In the second place, the bolt-head tends to slip off of the flange, and to revolve upon it, bending the body of the bolt, which reduces its strength, and gives it a most awkward and unsatisfactory appearance. The necessary draught given to the flanges of the pipe in horizontal casting increases the tendency of the bolt-head to slip off of its bearing.

In order to prevent the bolts from thus slipping off, it would be most natural to slip a ring of iron over the lower flange of the branch-pipe, and rest it on the flange ears of the pipe below, as shown in Figures 205, and 206. But this method would be expensive, and would fail to overcome the principal difficulty which arises from the form and bearing of the bolt-heads. What we want is such a bearing for the bolt-heads that the strain shall be equal all round.

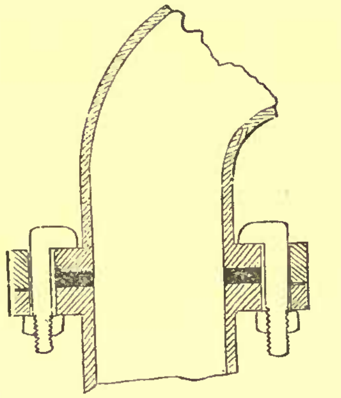


Fig. 205.
Adjustable Flange-Joint, with Ring to secure Bolts.

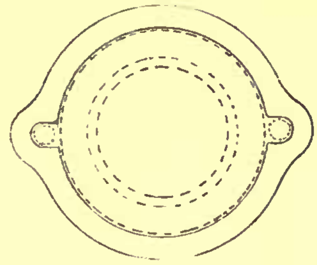


Fig. 206.
Plan of Joint, showing Ring and Bolt-Heads.

A ring bearing on the upper flange, and having ears corresponding with those on the flanges below, through which the bolts can pass cannot be used, advantageously, because it cannot be passed over the flanges of the pipe, unless both ring and flange be slotted, as shown in Figures 186 and 187. This not only weakens them seriously, but limits the amount of play or axial revolution on the part of the branch-pipe.

The difficulty may be overcome, however, by making use of half-rings, formed in the manner shown in Figure 207. The ends of the half-rings are halved together, and perforated for bolts at their junction. The bolts then serve to hold the rings together, while the rings in their turn furnish the required bearing for the bolts, and prevent their slipping away from the flange. Figure 208 shows in perspective the appearance of the joints thus formed. The half-rings must be made of wrought or malleable iron, in order that each shall take part in transferring to the flange the pressure applied by the bolts. They cannot be made of cast-iron, because in this case only one-half would take the entire strain, and the strength of the other be wasted.

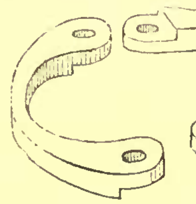


Fig. 207.
Half-Rings halved into each other at the points of Bolt-Heads.

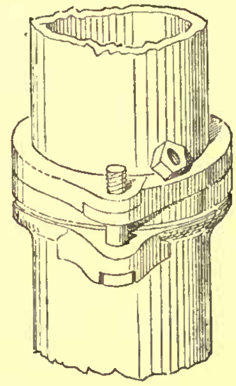


Fig. 208.
Joint with the two Half-Rings.

In order, however, to permit of the use of cast-iron, and yet ensure an equal distribution of the work, and avoid waste of metal, another step is required. A single half-ring of the form shown in Figure 209, is substituted for the double half-ring. This half-ring has a shoulder or projection on its under surface, just around the bolt-holes, as shown in Figure 210, for the purpose of bringing the whole pressure of the bolt directly upon the flange. All parts of the half-ring beyond these projections stand free of the flange. Hence any imperfection of casting, which, without them, might bring all the strain

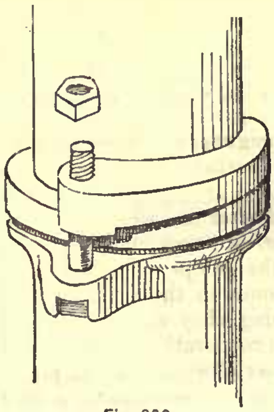


Fig. 209.
Single Half-Ring for holding Bolt.

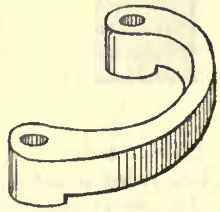


Fig. 210.
View of Half-Ring with Shoulders.

[1] Continued from page 88, No. 452.

to some middle point distant from the bolt-holes, and cause the ring to break under a leverage in tightening up the bolts, can with these projections do no harm, the whole of the bearing being transferred directly to the points where the strains come. In practice it is found that with this form of half-ring a comparatively light casting will bear an enormous strain.

The bolt-heads are prevented from turning, when the nuts are screwed up, by setting in recesses formed in the under side of the ears of the lower flange, as shown in the initial cut. Ordinary bolts and nuts may now be used, and the maximum of strength is thus obtained.

PACKING.

Having obtained a simple and practical method of rendering the pipe adjustable, we have next to find a cheap form of packing which shall render a roughly-cast joint permanently tight under heavy pressure. We have abandoned all forms of soft packing material, such as red lead, cement, putty, sulphur, and similar materials or their combinations, because we have found, after experimenting, that they were incapable of standing the various severe trials they are liable to be subjected to in practice.

The only packing we have found perfectly reliable under all circumstances is pure lead, and the only method of applying it so as to make the joint pressure-tight is to crush it between the flanges of the pipes to be jointed with a power sufficient to completely drive it into the pores and irregularities on the surface of the iron. In

Fig. 211.—Lead Packing-Ring.

order to enable this to be done economically, the lead must before use be cast into rings of a peculiar form of section. It is not necessary that there should be a very broad surface of contact between the two metals, but it is important that the surface of contact should be uniform and connected all around the pipe. A band of contact a quarter of an inch wide is found to be capable of resisting the highest hydraulic pressure which is ever likely to be applied in practice. With a pure lead ring of proper form, such a breadth of contact may be obtained on a four-inch pipe, by using two ordinary half-inch wrought-iron bolts. A man of medium strength can easily compress such a ring with a wrench fourteen inches long.

The form of ring necessary to produce this result is shown in Figures 211 and 212. The ring is, as we see in Figure 212, star-shaped in section. A ring having a double star-shaped section, as shown in

Fig. 212. Full-sized Section of Ring.

Fig. 213. Double Star-shaped Section.

Fig. 214. Diamond Section.

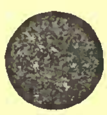


Fig. 215. Round Section.

Figure 213, would require nearly double the power for producing the same effect of calking, for the surfaces of the flanges, as they come from the foundry, are rough and full of indentations. Parts may come as much as an eighth of an inch above or below the general level. We will suppose a case of castings in which there are depressions an eighth of an inch deep in each flange, and that these defects happen to come opposite one another when the pipes are screwed up. Before the lead can come into contact with both the surfaces of these depressions, it is evident that the majority of the ring will have been compressed a quarter of an inch. Hence, a ring having a double star-shaped section would require twice as much strength as a ring of single star-shaped section to produce the same effect in calking.

A ring of diamond-shaped section, Figure 214, would act on the

Fig. 216. Square Section.

Fig. 217. Oblong Section.

same principle as the star-shaped ring, but would obviously be inferior to it. The round section would require many times as much power to compress as the star-shaped. The square and oblong sections would still further increase the difficulty and render the proper degree of compression practically impossible with rough pipes three and four inches in diameter.

Figures 218, 219, and 220, represent our joint with the star-shaped packing-ring in position, before being crushed under the compression of the bolts. Slots instead of holes are here used in the flanges, but holes are to be preferred since they are cast with chaplets and therefore afford a better bearing for the nuts and bolt-heads.

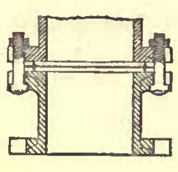


Fig. 218.

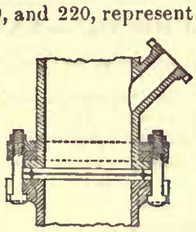


Fig. 219.

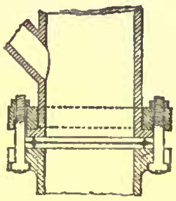


Fig. 220.

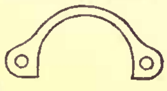


Fig. 222.

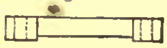


Fig. 223.

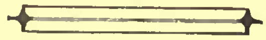


Fig. 221.

Figure 221 shows a section of the lead-ring, and Figures 222, and 223, show the cast-iron half-ring in plan and section.

FLUSH FLANGES.

It will be observed that the outer side of the lead ring has greater horizontal projection than the inner side. The projection extends nearly to the outer edge of the pipe-flanges all round. Its object is to enable the workman to satisfy himself that the ring stands in its proper place on the flange, by feeling it all around before tightening up. This enables us to dispense with a spigot on the pipes, which could have no other object than to serve as a guide. By dispensing with a spigot, and using plain flanges with flush surfaces, we obtain three very important advantages. In the first place it enables the pipes to be disjointed at any time without perpendicular movement, by simply unscrewing the bolts on each section of pipes and sliding out the section to be removed without disturbing the rest. In the second place it leaves more surface on the flanges to receive the packing-ring, and renders the joint correspondingly more compact.

In the third place it is simpler. The spigot is not needed for guiding the pipe-ends to their places, because the outer edges of all the flanges are of equal circumference, and can therefore best be adjusted from without, and adjusted much more accurately than could be done by a spigot, which requires considerable lateral play in its socket, to compensate for the necessary imperfection of casting and ensure its entering the socket at all.

METHOD OF BOLTING THE JOINT.

For ordinary steam-fitting the flanges are pierced with several holes and a corresponding number of bolts are used, the nuts on each bolt being screwed home successively, the pipe being held in place against the pressure of the wrenches by some external power or by its own weight.

This method has several disadvantages of especial weight in plumbing work. In the first place, the bolts which come in the rear of a pipe standing against a wall or ceiling are out of the reach of the workman, and in the second place the external power necessary to resist the pressure of the wrenches cannot always conveniently be applied, and its application must always increase the expense of making the joint.

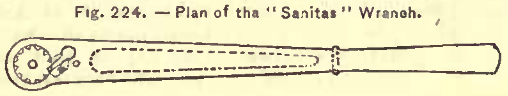
To avoid these difficulties, the flanges should be made with only two bolt-holes directly opposite each other, and the bolts should be of such a size and strength that only two are needed to do the work of compressing the packing. We have found, upon careful experiment, that two half-inch bolts of wrought-iron possessed ample strength for compressing rings of pure lead, star-shaped in section, on pipes of four inches or less in diameter.

In order to avoid the necessity of securing the pipe while the nuts are being screwed up, we have threaded the bolts in opposite directions, using on each joint one right-hand and one left-hand threaded bolt. This enables us to use two wrenches at once, and the pressure exerted by one is resisted by the other. The objection is thus turned to a positive advantage, inasmuch as the amount of pressure which has to be resisted becomes an exact index of the degree of compression exerted on each half of the lead packing. In other words, it causes both sides to be compressed alike, for, as the nuts are turned, that which has received and given the greatest pressure ceases temporarily to turn until the other has caught up to it.

FORM OF WRENCHES.

One of the greatest difficulties attending ordinary hand calking is occasioned by want of space for manipulating the calking-tool. The pipes are often set in slots or corners, or between joists, or in positions such that thorough calking is impossible. With a properly constructed flange-joint and properly formed wrenches, this difficulty can be entirely overcome, and a 4-inch pipe-joint made tight, even at the bottom or back of a slot a foot deep, and no more than one brick, or eight inches, in width. With the usual form of wrench this cannot be done, though even then the joint can be made tight in any place in which the ordinary bell-and-spigot joint can be calked. A special wrench has therefore been devised for this joint, by the use of which it can be firmly screwed together, though set in the most awkward places, in less than a minute's time. Figures 224 and 225 show the wrench used. It is a ratchet-wrench of simple construction and great strength, made to fit the special-sized nut used in this joint. The head is made very small, in order to enable it to pass over the nut without touching the side of the pipe. The handle is bent as shown

Fig. 224. — Plan of tha "Sanitas" Wrench.



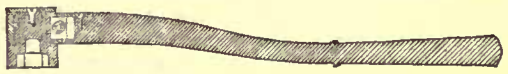


Fig. 225.—Section of the "Sanitas" Wrench.

in Figure 225, and is made detachable from the turning gear, so that each wrench may be used for a right or a left handed bolt, by adjusting the handle accordingly. The bend in the handle enables the hands to pass by each other in screwing up the joint. The whole is made of steel and malleable iron. With such an arrangement the nuts may be screwed home without once taking off the wrenches. This evidently saves a vast amount of time and annoyance, and enables the work to be done in the most contracted spaces. Thus, taking for example an extreme case, as shown in Figure 226, the pipe stands at the back of a slot a foot deep and eight inches wide. The wrenches may be moved through the arc indicated by the dotted lines, a movement which is considerably in excess of what is necessary to do the work.

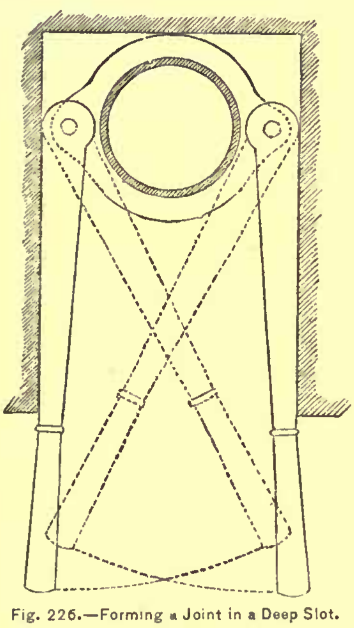


Fig. 226.—Forming a Joint in a Deep Slot.

SAVING IN TIME.

In this manner our joint may be thoroughly calked by a single ordinary workman, after the pipes are once in place, in *less than twenty seconds.* To calk an ordinary bell-and-spigot joint in the usual defective manner is estimated by good authorities as requiring on the average, after the pipes are once in place, *as many minutes.* A very skilful workman, with his helper, could pack the oakum, pour and thoroughly calk the lead in much less time, say five minutes, by making a special effort. But even this is fifteen times as long as is required for calking our improved joint. If we count the time of the helper (considered indispensable by the ordinary hand calker, for melting and transporting the lead, but not required for our flanged pipes), the bell-and-spigot joint takes thirty times as long to calk as the improved flange-joint.

SAVING IN MATERIAL.

In the ordinary four-inch bell-and-spigot joint nearly two inches of the end of each pipe, namely, the spigot-end, is sunk into the bell and wasted. In other words, the pipe is uselessly doubled at this point. The metal in this two inches offsets that in one of the flanges in our flange-joint. The enlarged bell and its strengthening beads offsets the other. The amount of iron in the two joints is equal, or in favor of the flange-joint; in every other respect the flange-joint shows a great saving of material. The quantity of lead used is about one-eighth. Thus, for a four-inch pipe our packing-ring weighs less than a half a pound, and there is no waste. In the same sized bell-and-spigot joint, properly made, four pounds are consumed, as already stated, the rule being a pound for each inch in the diameter of the pipe; for our flange-joint the rule is *one-eighth* of a pound for each inch, though less would probably in most cases suffice. With lead at four cents a pound, this is equivalent to a saving of fourteen cents on every four-inch joint used, and seven cents on every two-inch joint. Another saving in material is in the jute or oakum, which is not required in the flange-joint; the saving in this item amounts to at least two cents for four-inch joints, and one cent for two-inch joints. A third saving is in the fuel for melting the lead. A pound of lead requires on the average, for melting, a half a pound of charcoal as burned in a plumber's stove; hence two pounds of charcoal is required for every four-inch joint, and, allowing for the cost of charcoal one cent a pound, we have a saving of over two cents a joint in fuel.

VARIETY OF FITTINGS.

In bell-and-spigot pipes comparatively few bends and branches are made. Should the angle required to reach a certain fixture in laying the pipe be a different one from that given by the bends furnished, the desired direction must be obtained by canting the spigot slightly in the socket, a movement different from the axial rotation we have already described and provided for. To accomplish the same result with flanged pipes, a greater variety of castings are made, furnishing bends of a larger number of angles, in the same manner as is done in wrought-iron piping when used with screw-joints for plumbing purposes. With the flange-joint a certain play is obtained by screwing-up that side of the pipe upon which the greatest inclination is to be given slightly more than the other. But the variety of castings furnished enables every requirement to be met, without resorting to the method of unequally compressing the packing-ring. We find $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$ and $\frac{1}{64}$ bends, corresponding to angles of 90°, 60°, 45°, $22\frac{1}{2}$°, $11\frac{1}{4}$° and $5\frac{5}{8}$° respectively. By using some one of these bends, or a combination of two or more, any desired direction can be obtained. The half-rings are required only for bends and branches. Straight pipes are screwed together directly, and have ears and bolt-holes at both ends.

METHOD OF CONNECTING WITH LEAD PIPES.

With ordinary bell-and-spigot pipes, the proper connection between lead and iron is both laborious and expensive, requiring the use of brass ferrules. The lead pipe has to be wiped onto the brass ferrule, and the brass must be calked into the iron hub. A double joint is thus required, and this, especially with the larger pipes, involves the use of considerable skill and valuable material. With our flanged joint all of this is done away with. The lead is simply flanged out to correspond with the flanges of the iron pipe to which it is to be connected, and bolted to the pipe by means of a cast-iron ring furnished with the pipe-fittings, and having ears and bolt-holes corresponding with those of the pipe-flanges, as is shown in section in Figure 228, and in perspective in Figure 227. The lead packing-ring is used between the lead and iron flanges exactly as if the flanges were both of iron. In this manner a permanent steam-tight joint is formed between the two metals without hand-calking, brass ferrule or joint-wiping.

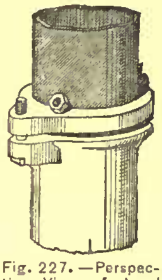


Fig. 227. — Perspective View of Lead Connection with Flanged Pipe.

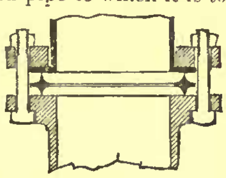


Fig. 228. — Section of Lead Connection with Flanged Pipe.

APPLICATION OF THE HYDRAULIC TEST.

As already explained, the hydraulic test, which should in every house be required before the work can be pronounced safe, is on ordinary bell-and-spigot pipes very difficult of application, because there is no method of temporarily closing the outlets. Here, again, our flanged joint presents an advantage of great importance. In order to close the opening, it is only necessary to screw on caps provided with ears and bolt-holes corresponding with those of the pipe-flanges, as shown in Figure 229. The regular packing-ring is used between the cap and flange, so that the joint is steam-tight, like the rest of the piping. When the test has been made, the caps can be removed and used again and again by the plumber. They are furnished with the rest of the pipe and fittings. The lead rings, after use, can be used for old lead or recast into new rings.

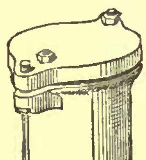


Fig. 229.

TESTING THE PIPES AND FITTINGS AT THE FOUNDRY.

It is sometimes required in practice that each pipe used be tested at the foundry before coating them, in order to ensure soundness. With ordinary bell-and-spigot pipes, the application of a pressure test is difficult, if not impossible. The straight lengths can be tested under pressure, but the branches and bends offer serious difficulties on account of their form. Hence the oil test has to be resorted to, and the strength or thickness of the pipe is not by this method made known; moreover, the oil test is in many other respects obviously inferior to a strong pressure test. A simple machine has been devised to test these flange pipes. It consists of two plates with rubber disks on one side, which are pressed against the flanges of the pipe to be tested, by means of clamps and wedges of peculiar form, designed for rapid application. One of the plates is perforated and connected with a water-pipe and pressure-guage. A simple force-pump is added, so that where the water-pressure is subject to considerable fluctuation, each pipe may be tested under precisely the same pressure. By the use of this device, flanged pipes of any desired size, and all the branches and fittings, may be quickly and accurately tested at the foundry before coating.

EVEN THICKNESS OF THE PIPES.

In the case of ordinary bell-and-spigot pipes, the expense and imperfections of the jointing are so great that the pipes are cast very long, in order to save joints so far as possible. The attempt to cast pipes of small diameter, say two-inch, three-inch and four-inch, in lengths of five feet, is almost certain to result in an inequality in the thickness of the metal. The writer has found bell-and-spigot pipes of five-foot lengths, made by the best firms and sold for extra heavy weight, no thicker than a piece of thick paper on one side and half an inch on the other. Figure 230 is an accurate drawing of a two-inch pipe which he has recently been obliged to reject, among a large number of others from the best makers, upon testing them before they were laid by the plumber. It is much more unusual to find pipes of equal than of unequal thickness throughout. This is a very

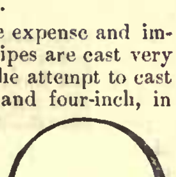


Fig. 230. — Section of a Defective Bell-and-Spigot Pipe.

important consideration. The strength and thickness of a line of piping is equal to its thinnest part, as the strength of a rope is equal to its weakest part. Hence all the metal used in the piping of a house beyond the thickness of its thinnest part is thrown away. Of what use is it to pay for extra heavy pipes, when one side of most of them is *extra light?* It is not for the strength of the piping that we require the thickness, since they are not used like columns to support floors and walls, but for security against leakage and decay. Now since, as is very well known by plumbers and engineers, the majority of long pipes of small sizes are uneven in thickness, the chances of obtaining only the even pipes throughout an *entire stack* are obviously infinitesimally small, and it is not probable that one house in a thousand exists in which one or more of the lengths of pipe are not very seriously uneven. The enormous waste of metal and the great danger of leakage which this condition of things implies renders it of the utmost importance to employ some means of remedying this great defect.

We find a remedy in diminishing the length of our castings. For house-plumbing purposes, pipes (especially the smaller sizes) should never exceed three feet in length. The plumber would find great advantages to offset the inconveniences in using a variety of short lengths of pipes, instead of frequently cutting the usual five-foot lengths to fit the spaces between the floors and fixtures. Cutting cast-iron is an extremely difficult and tedious process. Were these various lengths manufactured from six inches up to three feet, he would find it possible to avoid cutting entirely, and probably add very few joints to the number now required. For it must be borne in mind that each time a pipe is cut a new joint is necessitated, so that the saving in the number of joints in ordinary plumbing practice, by using no other than five-foot castings, is much smaller than is at first supposed. Now, however, that we have found a simple, safe and economical joint to take the place of the clumsy, uncertain and expensive one in vogue, we have no further need of long castings. The saving in pipe-cutting, to say nothing of the other advantages, far more than offsets the labor of making an extra joint or two, and we have a stack of pipes whose thickness can be relied upon as being uniform throughout. The pipes and fittings used with our flange-joint average less than two feet in length, and never exceed three feet. No pipe-cutting is in any case required.

DISJOINTING FOR REPAIRS, ADDITIONS OR ALTERATIONS.

Where it is found necessary for any purpose to remove a piece of pipe from a stack already set up, it is only necessary to place temporary supports under the pipe above the one to be disjointed, unscrew the bolts, remove one of the lead rings by means of a chisel or saw, and slip out the length to be removed.

To replace a pipe or fitting several methods may be employed of which the best is that in which short flanged or threaded brass-pipes are used. To the lower end of the pipe to which the new piece is to be connected is bolted a short piece of flanged brass-pipe, as shown in Figure 231. Another short flanged brass-pipe is then slipped over the first, being made just large enough to do so, and the fitting to be connected is afterwards bolted to its flange, and to the main piping below as shown. The two brass-pipes are finally connected by means of an ordinary wiped solder-joint, or brass-pipes may be screwed to iron flanges as shown in Figure 232, to save the more expensive metal.

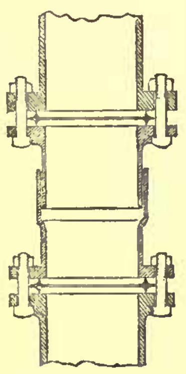


Fig. 231 — Insertion of a Fitting with Flanged Brass-Pipe.

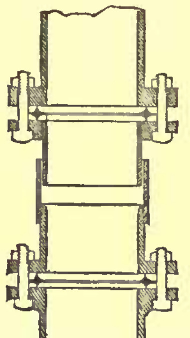


Fig. 232. — Insertion of a Fitting with Threaded Brass-Pipe.

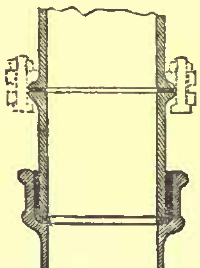


Fig. 233. — Connecting Flange Pipes with Bell-and Spigot Pipes.

Another method is to substitute iron for the brass pieces, and calk the joints by hand in the usual manner, Figure 233. This latter method however, has the objections of all calked joints, and is for this reason not to be recommended when the first can be applied. By this means the flanged pipes may be connected with old work in which bell-and-spigot pipes have been used. Or bell-and-spigot pipes may at any place be inserted in the line of flanged pipes in this manner if desired.

POWER TO RESIST STEAM-PRESSURE AND SUDDEN ALTERNATIONS OF HEAT AND COLD.

As we have already explained the bell-and-spigot joint is incapable of withstanding the effects of sudden and severe variations of temperature. The spigot being nearest the heat expands more than the hub, and compresses the surrounding lead, permanently diminishing its bulk, and forming a passage for the escape of gas. The principle of the construction of our flange-joint is such that this trouble is overcome. The flanges are affected equally by changes of temperature, and the lead packing is never compressed by expansion or contraction. Thus supposing, Figure 232, when the pipes are cool, steam is suddenly allowed to pass through them. Both upper and lower flanges and the lead firmly imbedded between them expand alike outwards under the same degree of heat, and return again unaltered as the pipe re-cools.

The bolts expand and contract with the changes of temperature proportionally with the flanges, and do not affect the packing.

To give these theories a practical test, the writer had some four-inch piping connected and closed up at the ends with our flanged joints, and coupled the whole with the boiler of a steam-engine, the steam-guage indicating about thirty pounds pressure. The steam was left on until the pipe-flanges and bolts had all become thoroughly heated through. The coupling was then immediately transferred to the cold water supply from the city main, and after the steam had been let out the cold water was suddenly turned on until the piping was filled. As the experiment was performed in mid-winter, the test was as severe as possible. The cold water was then poured out, and steam again immediately applied. This alternating application of steam and cold water was repeated successively a dozen times. During the entire process no sign of a leak either of steam or water was obtained. The bolts had been screwed up in the ordinary manner without extra care.

It is well known that no bell-and-spigot joint will stand such a test even after the most careful calking.

The same variations of temperature cause the pipes to expand and contract also longitudinally. But in this direction there is always ample play left in setting the pipes for this action, and the lead is obviously not affected by it. Each packing has upon it the weight of all the pipes above it, as well as the pressure exerted by the bolts. The weight is therefore constant, whatever be the temperature or length of the pipes, provided they are properly set. The expansive force of iron is so great that if free play is not allowed for it in a building, it will make way for itself by tearing away its bonds. Mr. Bayles says: "In setting up a line of soil-pipe, intelligent provision should always be made for expansion and contraction of the metal resulting from changes of temperature. These changes, however, are seldom sudden or extreme; but when the pipe is at any point rigidly fastened to the wall it expands in both directions. The amount of motion at the ends is small, but it must be provided for, or it will provide for itself. The power with which iron expands, as its temperature is raised, is practically irresistible. The end of a pipe may not move more than an eighth or sixteenth of an inch, but the power with which it moves that distance is so great that it can only be resisted by a power great enough to crush the metal. This would be, in ordinary cases equal to about 75,000 pounds per square inch, the strength of cast-iron to resist crushing strains, being from 60,000 to 90,000 pounds per square inch. Consequently, we see that unless the fastenings at the ends of a line of cast-iron pipe are of such a character as to admit of slight movement, something must give way, and it is not likely to be the pipe. This, then, must be provided for in the character and position of the fastenings, which must be so arranged that while allowing for some movement, they shall not develop a tendency to break or loosen the joints. Under ordinary conditions the amount of expansion is seldom great enough to give much trouble, but when steam or a great volume of very hot water washes into an iron-pipe, it is sometimes great enough to loosen joints, and even crack the pipe."

Accordingly if a line of pipe is rigidly fixed at the bottom, the hooks which hold it against the walls should be placed a short distance away from the flanges, so that the line of piping is free to slip up and down slightly under the influence of expansion and contraction. Otherwise these hooks are liable to be loosened from the mortar or woodwork into which they may be driven, since it would be easier for the pipe to loosen the hooks in the mortar or wood than to further compress the packing-rings, or to stretch out the heavy bolts of wrought-iron.

SECURITY AGAINST CARELESSNESS AND FRAUD.

The opportunities furnished by the ordinary bell-and-spigot joint for careless or fraudulent work are avoided in our flanged joints. The entire thickness of the lead is visible from the outside between the flanges. As the lead is the only packing used, and as this is in open view nothing can be fraudulently omitted. The bolts and nuts are also visible and. moreover, must be of the standard size and strength in order to furnish the requisite amount of compression to stand the hydraulic test.

IDEAL JOINT REALIZED.

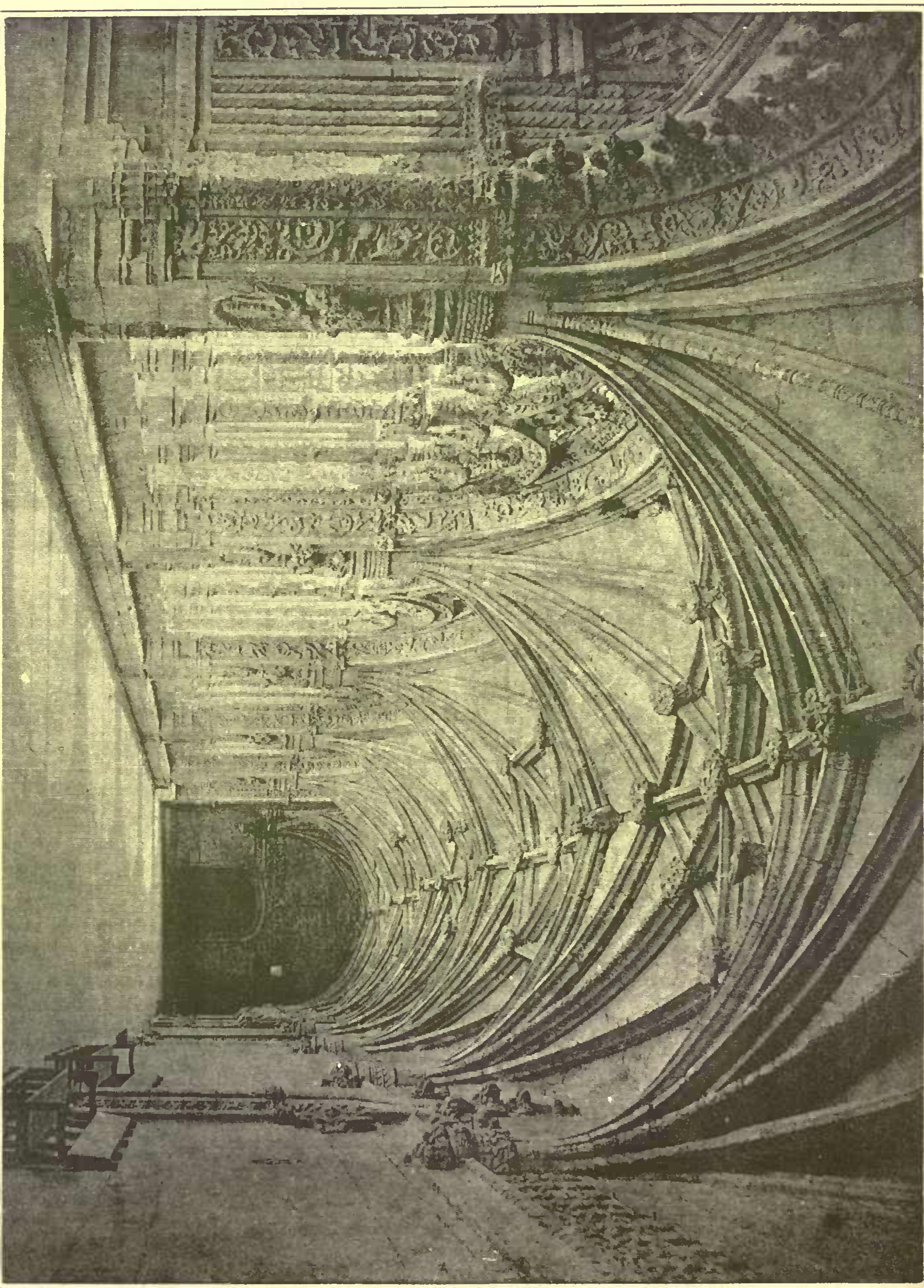
Thus if we turn to our table of requirement for an ideal joint, we shall find in our adjustable flanged joint all the characteristics there demanded.

(1) It is water, gas and steam tight even under heavy pressure.

(2) It is unaffected by the expansion and contraction of the pipes.

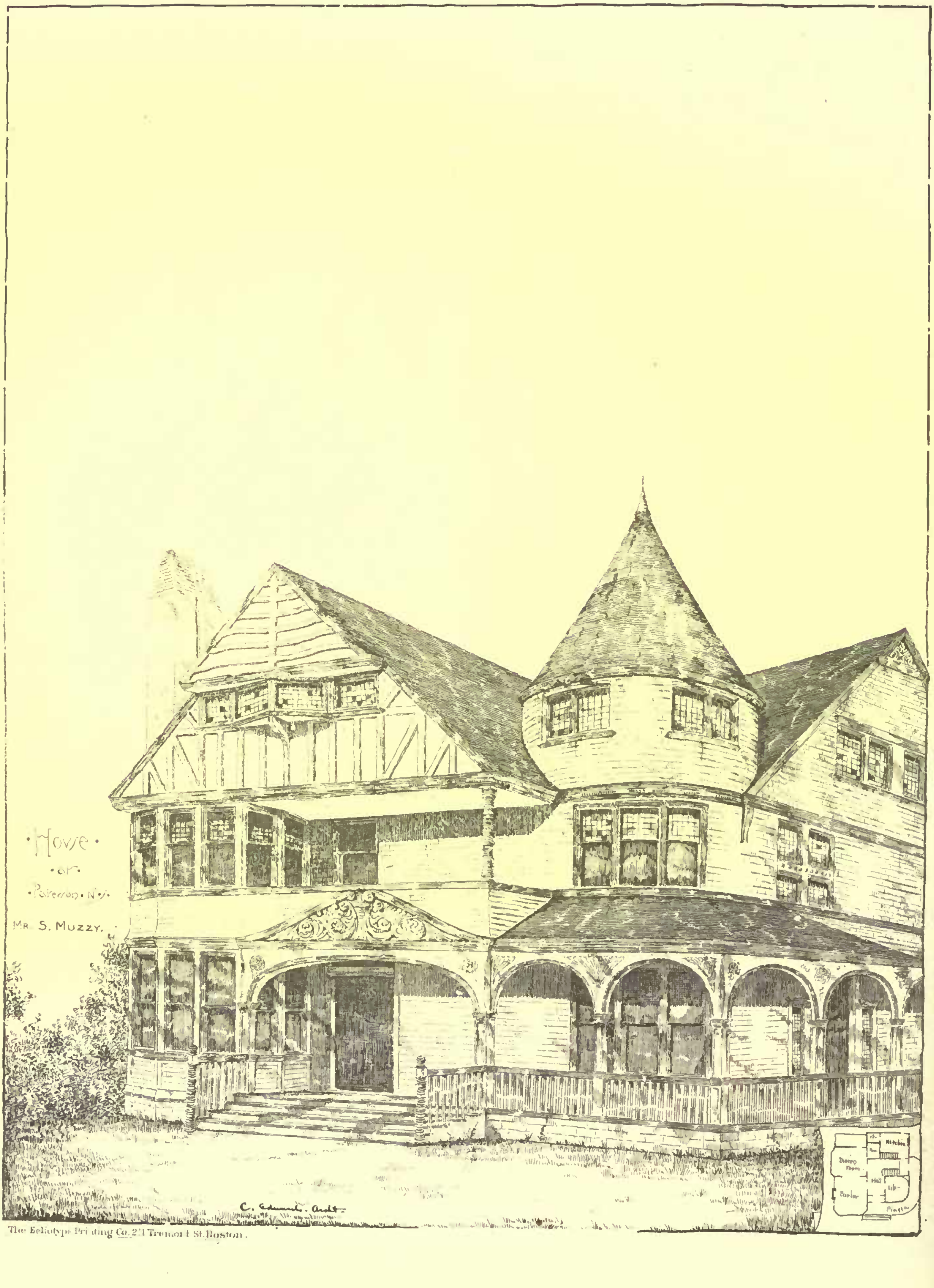
(3) It is capable of resisting severe jars and strains both compressive and tensile, such as are occasioned by the weight of the pipe, or by settlement and movement in the building.

(4) It requires neither skilled labor nor machinery in its manufacture or in its jointing.

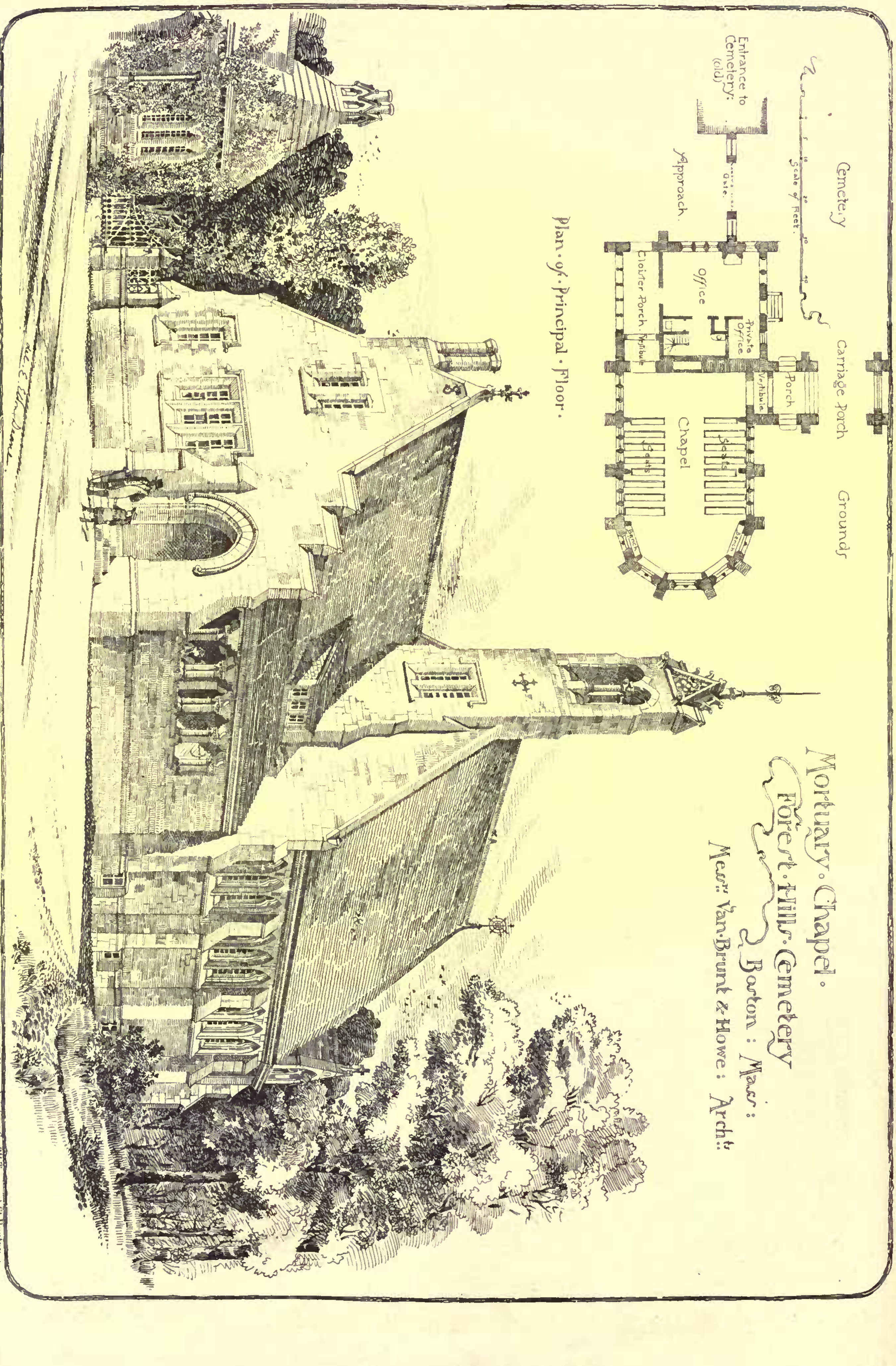


Cloister of the Monastery at Belem, Portugal.

PHOTO CAUSTIC. HELIOTYPE PRINTING CO. BOSTON.



The Heliotype Printing Co. 211 Tremont St. Boston.



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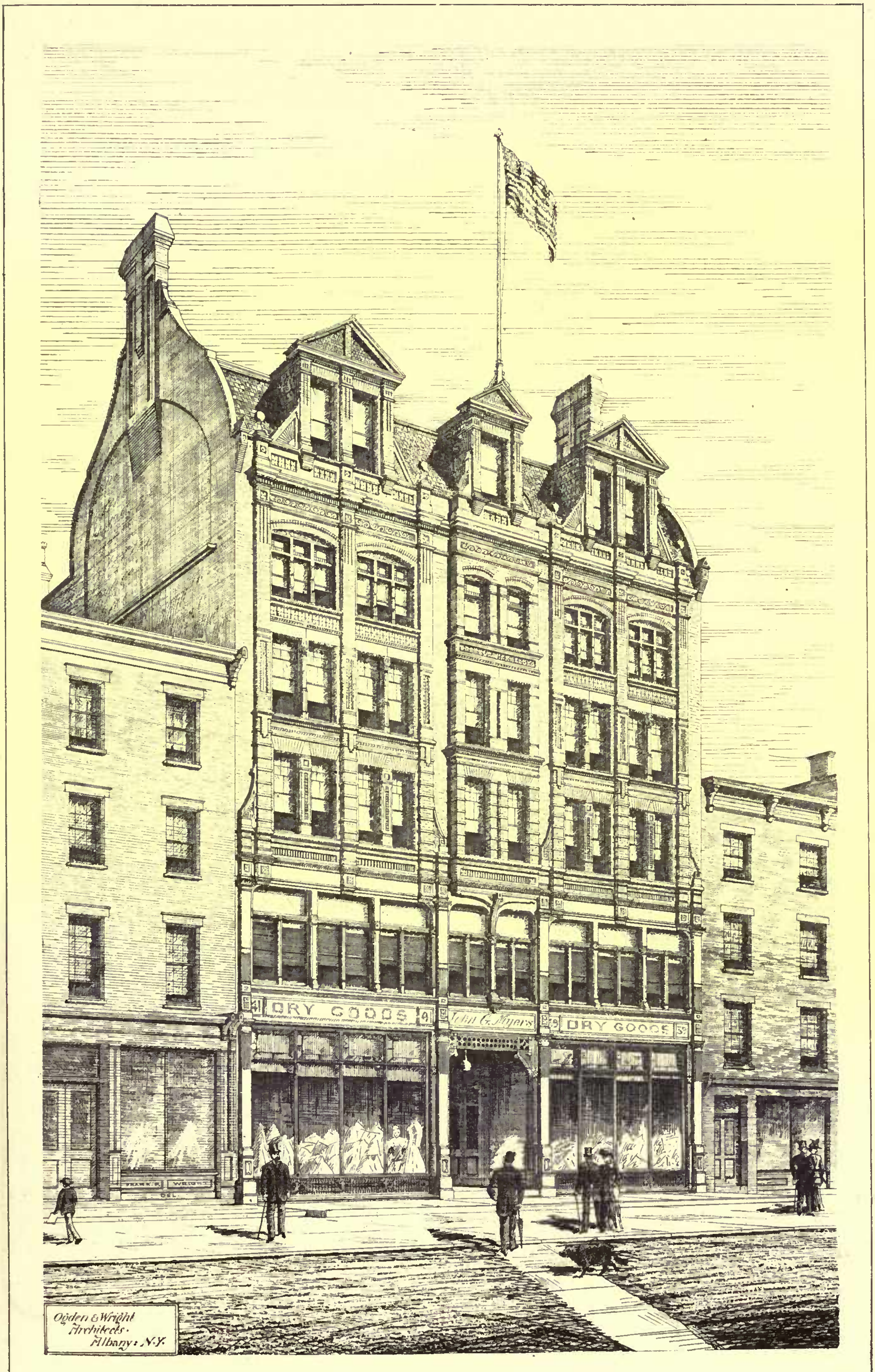
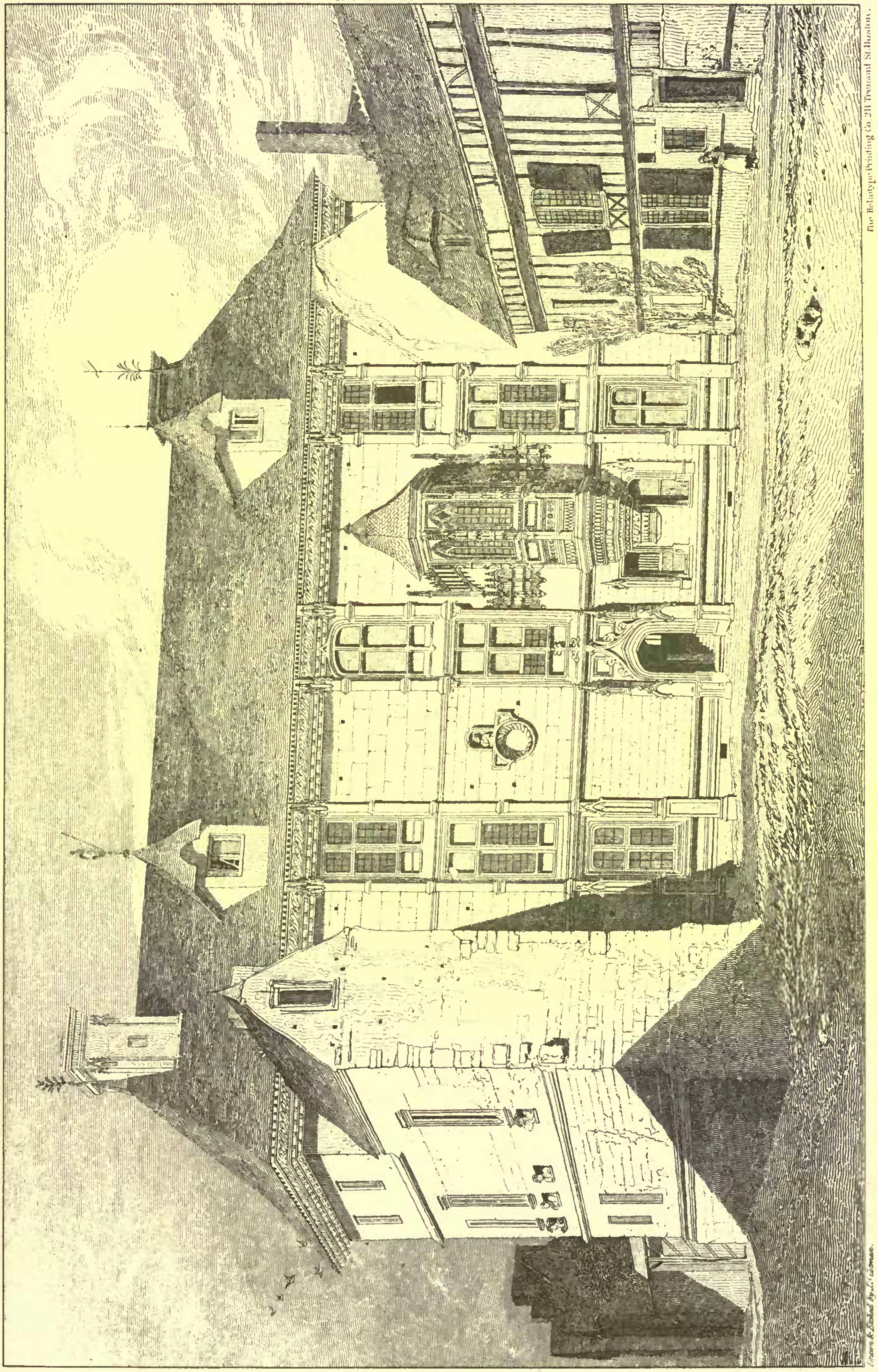


The Heliotype Printing Co. 211 Tremont St. Boston.

·STORE·ALBANY·N·Y· for ·JOHN·C·MYERS·Esq·

House of J. H. McAmmon, Cleveland, O., J. A. Schweinfurth, Arch't.

PHOTO CAUSTIC. HELIOTYPE PRINTING CO. BOSTON.



GREAT HOUSE.

The Heliotype Printing Co. 211 Tremont St. Boston.

(5) It is of such a form and nature as to admit of its being as easily taken apart for repairs or alterations as it is put together, and this without damage to any part.

(6) Its form and construction is such as to allow it to be made and put together rapidly, to follow easily the irregular contour of the construction, and to be used immediately after fixing in place.

(7) It requires no hand calking or hammering, which are liable to fracture the pipe or its lining.

(8) It is so formed that any imperfection, either in the materials used or in the manner of putting them together can be easily detected at a glance from without, without expert aid.

(9) It is compact enough to permit of its use in the most contracted spaces.

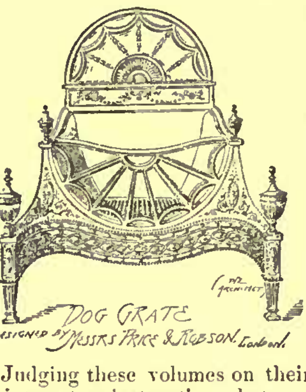
(10) It causes no obstruction to the water-way, and leaves no appreciable space or pocket for deposit.

(11) It is simple, durable, indestructible, economical and un-objectionable in appearance.

It is therefore suitable for water, gas and steam under pressure as well as for drain and soil pipes.

The writer has put these pipes to practical test in house-plumbing with complete success in every particular, as will be fully described in another chapter.

ART IN CHALDEA AND ASSYRIA. — I.[1]



THE first instalment of the great work of Messrs. Perrot and Chipiez on ancient art, dealt with the art of Egypt up to the time when foreign influences materially altered its character, and has already been reviewed in these columns. The second instalment is now before us, and tells the tale of Chaldean and Assyrian developments. Like its predecessor it has been translated into English by Mr. Walter Armstrong, and fills two large octavo volumes, profusely illustrated with wood-cuts, and with steel and colored plates.

Judging these volumes on their own merits only, we find no lack of interest or instruction; but comparing them with those that spoke of Egypt, we are compelled to call them a degree less fascinating. The difference results, not from any deficiency on the author's part, but from the nature of the subject itself. Just because the products of these two different civilizations are described and discussed with equal fulness and clearness, and the same sympathetic insight, do we feel justified in pronouncing the art of Egypt more attractive to the artist than that of Mesopotamia. Historically, it is true, the matter stands otherwise. The influence of Mesopotamia upon Europe was stronger and more direct than that of Egypt; Greece, which must always be the centre of attraction to those who study ancient art, learned far more from its Asiatic than from its African predecessors. But intrinsically the relics of the latter claim a larger share of our sympathy and admiration; and the reason is two-fold. Taken as a whole, the artistic results of Egypt are finer than those of Chaldea and Assyria, and they are also much more varied among themselves. The charge of monotony once brought against Egyptian art has been disproved by fuller knowledge. But it seems improbable — indeed, I may fairly say impossible — that further discovery will ever disprove the similar charge we may bring to-day against the art of Mesopotamia. In both countries, of course, many sites still remain untouched, and it would be rash to predict that our ideas and conclusions may not be modified to some degree by what they may reveal; but our present information is nevertheless sufficiently ample to justify us in saying that in the valleys of the Tigris and Euphrates, ancient civilization and the art it fostered were less rich in possibilities of variety as well as in possibilities of charm, than the ancient civilization and the art of the valley of the Nile. As time passed changes went on in the one land as in the other, and as in all lands that have ever been. Immutability is not possible in anything wrought by men; not even though those men be Asiatics. But the art of western Asia changed less rapidly than even the art of Egypt, and changed in less conspicuous ways. And it also covered a less wide and varied field at any given period of its development.

We may find a proof of its comparative immutability in the arrangement of these volumes. In writing the artistic history of an empire which lasted many centuries and the seat of which was more than once transferred from south to north, and then from north to south again, our authors have not found it wise to attempt to follow any chronological scheme. They have felt themselves justified in treating the different branches of Assyrio-Babylonish art each at first as a whole, noting afterwards those variations which came through lapse of time and change of place. They found no such radical diversities as compelled them in their work on Egypt to describe first the art of the ancient empire, and then the art of later generations. In other respects the two books are similar in arrangement, and the second is as clear and logical as the first. We begin with a masterly *résumé* of the characteristics of local civilization, which is followed by a description of the characteristics of its architecture in general. Then come chapters on funerary, religious, civil, and military building, and then those that deal with sculpture, painting, and the industrial arts, while a comparison between Egypt and Chaldea closes the work. As was the case with its predecessor, the illustrations often reveal unfamiliar objects, and always are chosen with a keen eye to their strictly illustrative, explanatory qualities.

It is not very long since the accepted history of the Mesopotamian empires was a mere issue of legends and fables, the most trustworthy items of which were the scattered and unscientific references found in books of the Old Testament; but since the discoveries of Layard and the deciphering of the cuneiform records, our knowledge has been placed on a firmer basis. The history of the people who dwelt in the valleys of the Tigris and Euphrates is now known to us, not indeed in a fulness at all approaching to detail, but at least in its general divisions and main outlines. In the earliest days of which we have any knowledge we see east of the Tigris in its southern course a country which the Greeks called Susiana and the Jews Elam. West of the Tigris in southern Mesopotamia, the first Chaldean Empire is arising. The two countries were perpetually at war, and the earliest date that can be fixed marks the Susian conquest of Chaldea, in B.C., 2295. But the balance of power was soon reversed. Susiana became subject to Chaldea, and is of little interest to the student of art for its few existent relics show it to have been, artistically speaking, a mere offshoot of the western kingdom. This First Chaldean Empire had its earliest capital at Ur (now Mugheir) near the ancient mouth of the Euphrates. The date of one of its kings, Ismi-Dagan, has been fixed at about B.C., 1800, and at this time it was probably at the height of its power, embracing under its dominion the whole of Mesopotamia. About two centuries later (B.C., 1600), occurred the Egyptian conquest under Thotmes and Rameses. While their deputies ruled the land the various tribes of Upper Mesopotamia revolted, and after a period of petty sovereignties coalesced into a united Assyria, with Nineveh as its capital. This new empire in its turn gradually absorbed the whole of Mesopotamia. By the end of the fourteenth century the Egyptians had retired, and though Chaldea still had her own kings (now seated at Babylon) they were but vassals of the Assyrian monarch. Constant attempts were made to throw off his yoke, and for about fifty years — between 1060 and 1020 B.C., — Babylon seems to have held the sceptre. This was the end of what is known as the First Assyrian Empire; but a new family soon mounted the northern throne, and after severe conflicts succeeded in founding the Second Assyrian Empire. To it belong those great monarchs whose names are familiar to modern ears, who extended the borders of their empire to the Mediterranean, and who built the vast monuments, from the ruins of which we have gathered almost everything we know of themselves and of the land they ruled. But their empire, so wide in extent, was not consolidated; the countries they subdued were never amalgamated with Assyria, were hardly annexed thereto in the true sense of the word. Revolts were of yearly occurrence, and a consequence of the unceasing wars they necessitated was the gradual destruction of the governing and fighting classes in Assyria herself. The empire was already almost in a state of disintegration when the Scythians fell upon it about the year 632; they are said to have left it with but half its population surviving, and the way was thus prepared for its eventual conquerors — the Medes — who appear to have been assisted by rebellious Babylon. Nineveh was wiped out, and the Assyrian land was possessed by the Medes, while in the southern half of Mesopotamia arose the Second Chaldean Empire, having its capital at Babylon. Nebuchadnezzar is the most conspicuous figure of the time. Almost everything we now find on the site of Babylon bears traces of his hand, and at his death it was the largest and finest city in Asia. But the Persian monarchy was arising in the east, and after it had conquered and absorbed the Medes, Babylon, too, fell before the arms of Cyrus. With its fall (B.C., 536), ends the period with which Messrs. Perrot and Chipiez have concerned themselves. I have retraced these historical outlines, because unless they are borne in mind we can get no clear idea of the progress of art in Mesopotamia. Dates are few and description can but refer to the different empires which succeeded each other as the centuries passed. I must however, refrain from summarizing the authors' interesting analysis of local civilization and pass at once to the art in which it found expression.

The controlling influence of geography upon architecture could not be more forcibly shown than by the contrast Chaldean work presents to other ancient styles. Egypt was bordered by mountains of soft stone, and Greece was rich in quarries of marble, and each country developed a Lithic style that accorded with and clearly explained the qualities of its native material: but the Chaldeans dwelt on a vast level plain, much of it a deltic formation, where stone was the rarest of commodities. So, here we find an architecture in which clay, crude or burnt, or enamelled brick, is the sole material. Indeed, we may almost say, as will be shown farther on, that Mesopotamian builders heaped masses of earth together to form their works, instead of employing separate units of construction; but we find also that custom and tradition may be factors almost as potent in architecture as geographical conditions. The Assyrians received their art from Chaldea, and they clung to Chaldean ideals, and persisted in Chaldean habits, although their opportunities were very different. Stone lay in unlimited qualities within easy reach of Nineveh, but its buildings, too, have clay as their chief, almost as their sole, material. The main fabric of their huge palaces, temples, and observatories was of brick. They

[1] *A History of Art in Chaldea and Assyria*, from the French of Georges Perrot and Charles Chipiez. Illustrated, translated, and edited by Walter Armstrong, B.A. London: Chapman & Hall, New York: A. C. Armstrong & Son, 1884.

merely revetted some of their exterior walls with stone, employed it inside their apartments for paving, and for lining the lower parts of the walls, and used a columnar style occasionally in small and subordinate structures. Wood, too, was denied the early Chaldean; and so when the Assyrian found it within his reach, and when the vast commerce of Babylon might have brought it to the hand of the Chaldean of the Second Empire, it was still employed only for such accessory things as ceilings and doors. Metal, easier of transportation than either wood or stone, was used in profusion by the Chaldean decorator and by his later imitators.

In Chaldean as in Egyptian brick-making, the clay was always mixed with chopped straw. The moulds in which it was cast measured about fifteen-and-a-half inches square, and in thickness varied from two to four inches. For general use they were burned only in the scorching southern sun. In Assyria these crude bricks were used while damp, so that units and courses adhered, and the resultant mass scarcely differed from *pisé*. It was revetted with slabs of alabaster or limestone, or covered in its upper portions with a coating of stucco. Comparatively minor use was here made of burned bricks; but in Chaldea excellent burned bricks, a little more than a foot square were alone used for the outer covering of the crude brick core, and the crude bricks themselves seem to have been put in place when more thoroughly dry, as they preserve their individuality to the eye, and sometimes to the touch. Neither in Chaldea, nor in Assyria are the lofty foundation mounds, upon which all important structures were erected, always composed of brick. Sometimes there is merely a brick shell filled in with earth and the débris of earlier constructions. In Assyria, mortar was not used, clay, mixed with water and a little straw being the only cement. This we sometimes find to be the case in Chaldea too, but at other times mortar made of lime, or of lime and ashes, or of bitumen was employed. In Assyria, bitumen seems only to have been employed in the formation of pavements. Mighty buttresses sometimes strengthened the walls, but there were no foundations in our sense of the word. The structure proper merely rested on the summit of its artificial hill. Notwithstanding, the Chaldean was a very careful builder, having, for example, pierced his gigantic walls with a system of tiny tunnels or ventilating-pipes, that the interior of the mass might become thoroughly dried. In Assyria such pipes are absent; they could not have been preserved in the softer bricks that there were used. Adequate provision was everywhere made for carrying off the rain-water.

Assyrian stone construction was careful and skilful, and the architect was evidently able to make a more extensive use of lithic materials than he cared to attempt. The most interesting known example dates from the Second Assyrian Empire, from the palace of Sargon at Khorsabad. Stone was here employed to case the entire foundation mound. A system of "headers" and "stretchers" was used, and the stretchers of the lower courses are no less than six feet eight inches in height and thickness, and nine feet in length. On the outside face the stones were carefully dressed, and they were perfectly smoothed where they touched one another and the joints formed with the utmost niceness, no mortar being used; but the inside face which met the crude brick was wisely left in a rough state. The entire height of this wall was sixty feet, including the parapet which rose five feet above the platform, and was formed of battlements finished with open crenellations of brick. In the wall that surrounded the town stone was also used, but only to form a plinth four feet high, above which rose crude brick to the height of forty feet, and being *eighty feet* in thickness.

It will be readily seen even from this brief description why it is that the ruins of Mesopotamia are ruins indeed; wrecks beside which the monuments of Egypt seem in perfect preservation. Her gigantic structures were mere masses of unburnt clay, protected only by a thin outer covering of stone or burned brick. Rain was frequent, and often fell with torrent-like force, so we find no sloping walls as in Egypt, since these would have given too great a chance to its activity; but even the perpendicular wall and the well-drained roof and terrace must have been in constant danger of taking in water through the rifts in their revetment; water which once admitted into the core of crude clay, did speedy and almost hopeless damage. If argus-eyed care was once relaxed, disintegration and destruction inevitably followed. So when we read how the great cities of Chaldea and Assyria were one after the other conquered, desolated, and abandoned, we do not wonder that each has in the course of time become, as the prophets of Judea proclaimed "a heap," and nothing more; a natural-seeming hill, weather-worn and seamed by the flow of temporary torrents, a hill which only the spade of the explorer proves to be of human workmanship.

M. G. van Rensselaer.

THE ILLUSTRATIONS.

THE GREAT HOUSE, AT ANDELYS, FRANCE.[1]

The subject of this plate existed in 1818, as it is here represented, shorn, indeed, of much of its ancient splendor, reduced from the residence of a nobleman to a granary, and most probably curtailed of full two-thirds of its size, as retaining apparently little more than that portion of the square which fronted the court-yard, together with a small part of one of its wings. It can now (in 1821), only be spoken of as a building that did exist: last year saw it levelled with the ground. The following description of it is transcribed from Mr. Turner's "*Tour in Normandy*." "Andelys possesses a valuable specimen of ancient domestic architecture. The Great House is a most sumptuous mansion, evidently of the age of Francis First, but I could gain no account of its former occupants or history. I must again borrow from my friend's vocabulary, and say that it is built in the 'Burgundian style.' In its general outline and character, it resembles the house in the Place de la Pucelle, at Rouen. Its walls, indeed, are not covered with the same profusion of sculpture; yet, perhaps, its simplicity is accompanied by greater elegance: — The windows are disposed in three divisions, formed by slender buttresses, which run up to the roof. They are square-headed, and divided by a mullion and transom. The portal is in the centre; it is formed by a Tudor arch, enriched with deep mouldings, and surmounted by a lofty ogee, ending with a crocketted pinacle, which transfixes the cornice immediately above, as well as in the sill of the window, and then unites with the mullion of the latter. The roof takes a very high pitch; a figured cornice upon which it rests, is boldly sculptured with foliage. The chimneys are ornamented by angular buttresses; all these portions of the building assimilate more or less to our Gothic architecture of the sixteenth century; but a most magnificent oriel window, which fills the whole of the space between the centre and the left-hand divisions, is a specimen of pointed architecture in its best and purest style. The arches are lofty and acute. Each angle is formed by a double buttress, and the tabernacles attached to these are filled with statues; the basement of the oriel, which projects from the flat wall of the house, after the fashion of a bartizan, is divided into compartments, studded with medallions, and intermixed with tracery of great variety and beauty. On either side of the bay, there are flying-buttresses of elaborate sculpture spreading along the wall. As, comparatively speaking, good examples of domestic architecture are very rare, I would particularly recommend this at Andelys to the notice of every architect whom chance may conduct to Normandy. This building, like too many others of the same class in our own counties of Norfolk and Suffolk, is degraded from its station. The Great House is used merely as a granary, though, by a very small expense, it might be put into habitable repair. The stone retains its clear and polished surface; and the massy timbers are undecayed. The inside corresponds with the exterior in decorations and grandeur; the chimney-pieces are large and elaborate, and there is abundance of sculpture on the ceilings and other parts which admit of ornament."

[1] From Cotman's "*Antiquities of Normandy*."

HOUSE FOR S. MUZZY, ESQ., PATERSON, N. J. MR. CHARLES EDWARDS, ARCHITECT, PATERSON, N. J.

MORTUARY CHAPEL FOR FOREST HILLS CEMETERY, BOSTON, MASS. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, BOSTON, MASS.

CLOISTER OF THE MONASTERY, AT BELEM, PORTUGAL.

HOUSE OF J. A. AMMON, ESQ., CLEVELAND, O. MR. J. A. SCHWEINFURTH, ARCHITECT, CLEVELAND, O.

A sketch of the other front of this house was published in our issue for August 20, 1881.

STORE FOR MR. JOHN C. MYERS, ALBANY, N. Y. MESSRS. OGDEN & WRIGHT, ARCHITECTS, ALBANY, N. Y.

The material used in this building is iron for lower story, pressed-brick and terra-cotta for the upper stories and the roof is covered with red tiles.

THE WARMING AND VENTILATION OF FRENCH SCHOOLS.

The 'Statue of Liberty' one thousand years later. 'Waiting.'

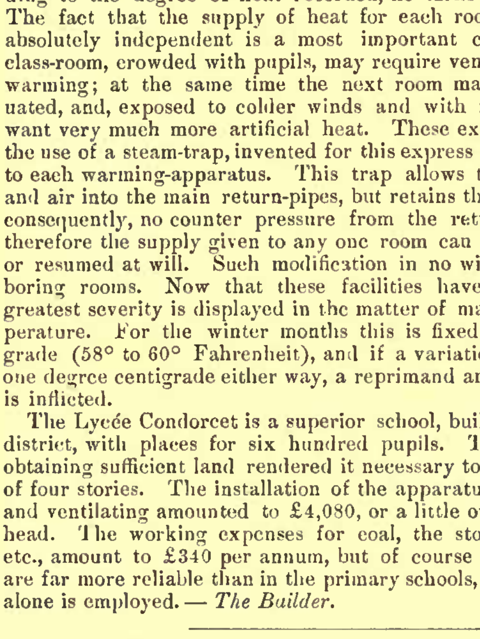
The warming and ventilation of the Lycée Condorcet is a good illustration of the modern system and of the newest improvements. The class-rooms, so far as light and ventilation are concerned, are disposed in the same manner; but they are warmed by steam under slight pressure. The steam is generated within a multitubular boiler of the Naeyer de Willebrœck type, so as to avoid all risk of explosion. From the basement, where the boiler stands, the steam goes straight up to the attic, where it passes through a reducing valve. This apparatus is round in shape, and divided by a copper disc or plate, which becomes either convex or concave as the pressure or expansion pushes one way or the other. By the movement of this plate the steam supply is so regulated as to be always at a very low pressure. This has the advantage of insuring an even distribution; otherwise the steam, if at high pressure, would rush into the first opening instead of travelling slowly but surely over the whole building.

In the place of the chimney from the stove we have two steam coils passing along the wall of the class-room. The upper and larger coil gives off a considerable quantity of heat. It is placed as near as possible to the bottom of the window, to counteract the chilling influence of the large surface of glass. The fresh air from the outside is admitted at a height of only a few inches from the floor, and here it is only slightly warmed by passing over the second and much smaller steam coil. The air is really not warmed; the chill only is taken off. The side walls are also warmed by a steam coil; thus no down-draught can occur, and the pupils are enveloped all round with heat that radiates upon them, and that is distributed in proportion with the causes of cold. Thus the same temperature is noted in every part of the room. The fresh air, entering almost on a level with the floor, is warmed and vitiated as it rises and comes in contact with the pupils; but then it continues to travel upwards till it reaches the ceiling, where it is drawn off by shafts communicating with lanterns in the roof containing gas-burners or other contrivances to accelerate the up-current.

Further it should be noted that the whole of this system is regulated from the outside, without in any way disturbing the pupils during their studies. An attendant goes the round periodically of each class. A small opening in the wall, protected by glass, enables him to see a thermometer placed within the class-room, and, according to the degree of heat recorded, he turns the steam on or off. The fact that the supply of heat for each room is in this manner absolutely independent is a most important consideration. One class-room, crowded with pupils, may require ventilating rather than warming; at the same time the next room may be differently situated, and, exposed to colder winds and with fewer pupils, would want very much more artificial heat. These exigencies are met by the use of a steam-trap, invented for this express purpose and applied to each warming-apparatus. This trap allows the escape of water and air into the main return-pipes, but retains the steam. There is, consequently, no counter pressure from the return main pipe, and therefore the supply given to any one room can be entirely stopped or resumed at will. Such modification in no wise affects the neighboring rooms. Now that these facilities have been created, the greatest severity is displayed in the matter of maintaining even temperature. For the winter months this is fixed at 15° to 16° centigrade (58° to 60° Fahrenheit), and if a variation occurs exceeding one degree centigrade either way, a reprimand and even punishment is inflicted.

The Lycée Condorcet is a superior school, built in a very crowded district, with places for six hundred pupils. The impossibility of obtaining sufficient land rendered it necessary to build to the height of four stories. The installation of the apparatus, etc., for warming and ventilating amounted to £4,080, or a little over six guineas per head. The working expenses for coal, the stoker, the attendant, etc., amount to £340 per annum, but of course the results attained are far more reliable than in the primary schools, where a mere stove alone is employed. — *The Builder.*

THE SUBSTITUTION OF IRON AND STEEL FOR WOOD IN RAILWAY SLEEPERS.



A PAPER on the above subject to which we alluded a short time ago, was recently read before the Institute of Iron and Steel, by Walter R. Browne. After a few prefatory remarks the author said: — Every engineer who is conversant with the technical literature of Germany must be aware that the superiority of metal over timber sleepers, and their eventual substitution for them, is there no longer a matter of doubt. The fact is practically admitted on all hands; the miles of line laid with metal are counted by thousands, and the weight of iron and steel employed by hundreds of thousands, if not millions of tons. The points which do remain in doubt, and on which controversy still rages, concern merely the precise form which the permanent way of the future is to take; whether the metal is to be iron or steel, whether the sleepers are to run lengthwise or crosswise, and what is the particular mode of fastening to be adopted for uniting them with the flat-footed rail which is the general type on the Continent.

With these questions the writer will not here concern himself. His object is to discuss solely the introduction of iron or steel sleepers in England. Now to any one acquainted with English railway engineers it will be tolerably clear that no system is likely to meet with any favor unless the new sleeper is able at once, and without inconvenience, to replace the old one. With one marked exception, the main lines in England may now be said to be laid with double-headed rails in cast-iron chairs resting upon a transverse sleeper; and if an iron sleeper is to be speedily adopted, it must be one which can go at once into the place from which an old wooden sleeper has been withdrawn, utilizing the same rails, and if possible, the same chairs as before. This being so, the whole subject of longitudinal sleepers (which have met with much favor in Germany), may here be left out of discussion. In the single exception alluded to above, namely, that of the Great Western Railway, such sleepers, should indeed be of special utility in replacing the very expensive oak longitudinals which are in use on that line; and probably the subject has already attracted the attention of the engineers of that company. But, for the present, attention may be directed to cross sleepers only. For the same reason, the bowl sleepers so largely used by Mr. Livesey, Mr. Batho, and others, and the bowl-shaped cross sleepers now being introduced in India by Mr. A. M. Rendel for flat-bottomed rails, will not here be discussed.

Now the experience in Germany, which by this time is very large, enables us to lay down with confidence the following statements.

First, the corrosion of the sleepers, as to which fears were once expressed, is found to be insignificant. Like the rails, they do not rust so long as the traffic is frequent and regular; and no shortening of their life is to be feared from this cause.

Secondly, the elasticity of the road, as to which doubts have also been expressed, is perfectly satisfactory, no complaints having been heard as to hard running. This will be a matter of little surprise to any one who reflects that iron or steel is in itself a far more elastic material than soft wood, and retains that elasticity immeasurably better under the conditions of daily use.

Thirdly, the connection of the rails to the sleepers has proved a matter of some difficulty, and many ingenious, and more or less complicated devices have been brought into use. Satisfactory results have been attained; but this does not concern us at present, because we have to do, not with flat-bottomed, but with double-headed rails. Such rails can only be secured in chairs, and these chairs rest, of course, on the flat top of the sleeper, and can be bolted or riveted to it as desired.

Fourthly, the point which in Germany has been found to give most trouble is the tendency of the sleepers to shift endways when laid upon sharp curves. This question is ably discussed in a recent paper by Herr Meyer, of Berlin (*Railway Organ*, 1884, p. 9). He observes that wooden sleepers offer greater resistance than iron ones to such endway motions, for three reasons. In the first place, their weight is greater, and they are therefore, less disturbed by sudden shocks. Secondly, their ends have a much larger area to bear against the ballast, in which they are in general deeply embedded. Thirdly, their co-efficient of friction with the ballast is very much higher, not merely because timber is rougher than iron, but because the sharp gravel actually bites into the soft wood, as it cannot do into the hard metal. The iron sleeper bears upon the ballast only at a few points, and is thus easily movable. In addition the vibration and the churning of water below the sleepers frequently turn the bed into a layer of greasy mud, over which sliding is easy.

In Germany, this difficulty has been overcome in two ways; either by bending down the ends of the sleeper, or by riveting angle-irons or other dividing plates to its bottom. The first is not very efficient; and the second, though successful, adds materially to the weight and cost. Herr Meyer's own suggestion is to put the sleepers in pairs crossing each other in the form of a St. Andrew's cross. One of them is of course cranked up in the middle, so as to pass over the other, and is riveted to it. This, though it would no doubt be efficient involves a decided complication; and in point of fact nothing of the kind seems necessary on English railways. In the discussion above mentioned before the Institution of Civil Engineers, Mr. Wood called attention to the greater length of English as compared with Continental sleepers (nine feet and seven feet) respectively, and showed two diagrams. Assuming, as is no doubt the case, that there is always a certain shrinking of the ballast under the rails, an inspection of these diagrams showed at once how much more liable the short sleeper is than the long to such endway shifting. If we investigate what the tendency to such shifting is, we find that, supposing a train to pass at a speed so high as sixty miles an hour round a curve of only ten-chain radius, the so-called centrifugal force or outward pressure will not exceed one-third of the weight in motion. When we consider the resistances to be overcome before a sleeper nine feet long can move endways through the ballast, and also take into account the elevation of the outer rail, it is clear that the co-efficient of resistance will in all ordinary cases be much greater than this. Moreover English railways have a great advantage in this respect from the much coarser and drier nature of their ballast. No such greasy surface of mud as Herr Meyer describes can be formed in the clean gravel, burnt clay, or broken stone, which form the ballast of English railways.

The writer has dwelt particularly upon this point because it is the only one which appears at present to present even a semblance of difficulty; but here, as in all similar cases, experience is the safest guide, and as a matter of fact, a number of Mr. Webb's wrought-iron sleepers, which are laid in South Wales on a curve having a radius of only ten chains (660 feet), and on a gradient of one in forty, are reported to show no signs whatever of endway shifting.

The sleepers just mentioned may now be described, as forming the most successful instance, and on by far the largest scale of the application of metal sleepers in this country. These sleepers are rolled from Bessemer steel ingots, ten-and-one-half inches square in a three-high mill, and come out as bars sixty to seventy feet long, which are afterwards cut into length. They are then punched with six holes for the chairs, the holes being punched from both sides so as to make them slightly tapered in the middle, and so ensure the firmness of the rivets. The chairs are of steel, made from crop-ends of rails and other scrap. This scrap is heated in a mill furnace, and rolled into bars; the bars are cut up, whilst hot, into lengths, and each length is placed still hot in a die beneath a steam hammer, and stamped at one blow into the shape of a half-chair. This half-chair is then punched still hot, is put back into the die, and receives a second blow, which removes all burrs, etc., and finishes the manufacture. The lining-plate between the chair and the sleeper is also rolled out of crop-ends, and sawn up hot to the proper length. It is set in the middle in such a way as to give a firm base to the foot of the rail. Between the chair and lining-plate, and between the latter and the sleeper, are inserted liners of brown paper soaked in tar; these fill up any little interstices, so that no water or dirt can get in between the surfaces, and prevent any possibility of shaking loose or clattering, and bind the whole into one coherent mass. All the parts — chairs, lining-plate, liners, and sleeper — are now fitted together and riveted up by a Tweddell hydraulic riveter. The moment this is completed, the distance between the rails is absolutely fixed, and so long as the keys are in place any spreading of the gauge (the source of so many accidents) is rendered impossible.

The keys themselves are of the ordinary kind and shape, and are never found to work loose under any circumstances. This is due partly to the elasticity of the steel chair, which follows the wood in case of any contraction, and continues to grip it tightly; partly to the recess which is formed at the centre of its length, as shown in the section. The wood swells out into this recess, where it is not exposed to pressure, and this swelling acts like a feather on the key to prevent any endway motion.

The weight of the whole arrangement is 174 lbs., made up as follows: —

	Lbs.
Sleeper 9 feet long	124
2 chairs	28
Rivets	5
2 lining-plates	15
2 oak keys	2
Total	174

The weight of a creosoted wooden sleeper of the kind used on the London and North-Western Railway, complete with chair, spikes and screwed spikes, and felt liners, is 242 lbs.

This difference in weight and bulk might be of considerable importance in the case of shipping sleepers to distant countries.

With regard to cost, Mr. Webb's figures show that a creosoted timber sleeper, complete with chairs, etc., as described, is rather cheaper than the steel sleeper. It is to be observed, however, that while the price of steel is ever tending downwards, the timber is gradually getting scarcer and dearer, and a very slight change in this respect would bring the two to an equality. Again, it may well be found that a somewhat thinner, and therefore cheaper sleeper will answer all requirements. Still it will be better to accept the fact of the excess in cost, and to consider whether there are not certain advantages on the side of the steel sleeper which may make this slightly increased cost a good investment. Some of these advantages may be enumerated as follows: —

1. The life of a timber sleeper, as shown by the extensive researches made in Germany, is a very uncertain quantity, depending on the kind of wood, its seasoning, its pickling, and the conditions of ballast, traffic, climate, etc., to which it is exposed. Probably the extreme limits may be taken at one and twenty years, and fifteen years will be a very favorable estimate as an average. On the other hand, the iron sleepers laid down on the Bristol and Exeter Railway thirty-one years ago are still in use; and it does not seem possible to lay down any definite limit to the life of such a system as Mr. Webb's. There are absolutely no parts exposed to wear, and corrosion, as has been already pointed out, does not occur so long as the traffic is frequent; whilst. if necessary, it can be prevented altogether by dipping the sleeper in any tarry solution, as, in fact, is done at present.

2. There is no possibility of the guage spreading, as it often does when the fastenings can eut into the timber sleeper. Moreover, the keys, as already mentioned, do not work loose. Hence the labor and cost of maintenance will be very greatly diminished, and with them the risk of accident from the causes just mentioned.

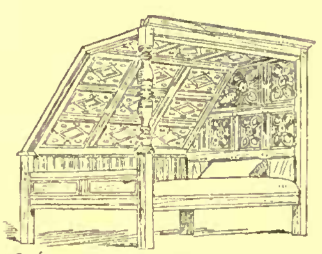
3. In the case of derailment the permanent way is far less likely to be injured than where the sleepers are of timber, and therefore liable to be cut and crushed by the wheel flanges. In an actual case (mentioned by the writer on a previous occasion) a derailed train ran some distance over a line which was laid at one part with wood and at another with iron sleepers. The result was that all damage done to the latter was repaired, and the line ready for traffic, long before the *débris* of the wooden sleepers had even been cleared away.

4. In severe weather the moisture which has soaked into wooden sleepers freezes, and the road thus becomes hard and inelastic. This is probably the main cause of the well-known fact that breakages of rails, tires, etc., are much higher in winter than in summer. In the steel sleeper this cannot occur; and although the ballast may freeze beneath it; yet owing to the thinness and conductivity of the metal a very slight rise in the temperature above freezing point will suffice to thaw it again.

5. A last advantage, but as the writer hopes not the least from the point of view of his present audience, is that the use of steel sleepers would give employment to the capital and labor of our own country, now suffering under so severe a depression. On the other hand there is not a single sleeper upon an English railway which has not been imported from abroad, and of which almost the whole cost has not gone to swell the resources of other and competing nations.

In conclusion, the writer feels it needful to apologize for the necessarily incomplete character of this paper, which has been prepared at very short notice in response to a suggestion kindly made by the President of the Institute. He desires that it should merely be regarded as the starting-valve, so to speak, for a discussion. But, in fact, the case appears to him so strong as to need little advocacy. The problem of metallic sleepers has been thoroughly mastered in Germany, and worked out with all the exhaustive care and skill for which the engineers of that country are celebrated; while its solution, in the particular form demanded by English conditions, appears to the writer to have been satisfactorily achieved by Mr. Webb. Nor can it be said that this solution is a theoretical one merely. Some 40,000 of these sleepers are now in use, and some of them have been down for a period of three years. They may fairly claim, therefore to have answered the test of practical work. It remains to ask why their introduction is still so slow and so doubtful. Is the answer to be found in the remark made by an eminent engineer during a former discussion, in which he congratulated English railway companies on the caution and slowness of their advisers, whereby they had avoided the failures which in many cases had been experienced on the Continent? If English engineers have thus begun to take pride and to assume credit for being in the rear of progress, instead of in the van, it is not to be wondered at if the manufactures of England are threatened with ruin, and our industrial supremacy with defeat. Mr. Webb, has, however, already falsified the prophecy then made, that no engineer of sound judgment would ever entrust to iron sleepers the carrying of such a traffic as that of the London and North-Western Railway; and the writer has been glad to learn within the last few days that the engineers of other lines are beginning to follow in the same track. He hopes, therefore, to see the time, before many years are over, when the importation of timber into England for the making of sleepers will be looked back upon as a curious delusion of the past, and useful works be found for our steel works at home.

BUILDING IN DUBLIN.



CANTED ROOF BEDSTEAD AT TABLEY OLD HALL, CHESHIRE, ENG. (BLDG. NEWS.)

THE following extraordinary statement by a workman has appeared in one of the Dublin papers as an illustration of the causes which have increased the price of building in that city. If it be true, it is no wonder that the estimates for the proposed museum have exceeded the contemplated amount: —

A contractor has a building in course of erection, and he for such orders a hundred thousand of bricks from some of the brickmasters in the locality where such are made. The price of the materials ordered, at a rough summing up, amounts to £300. Through the dishonesty of the contractor's men in charge of the works, two-thirds alone of the whole amount are delivered to the buyer, thus leaving the contractor at £100 loss on that transaction. Here is how the fraudulent schemes are worked. The brickmasters give their carters, when leaving their brick-yards, dockets or invoices of their loading, stating what amount of bricks each driver has in charge. The signing of the invoices by the builder's foreman or clerk-of-works stands, when returned to the brickmaster, as a receipt of the goods delivered. Now the signing of the invoices is managed thus: the foreman writes his name on all the invoices presented to him for such, whilst he is fully aware there is one of every three horse-loads, to use the trade term for such, "hobbed," that is, sold and delivered to some roguish purchaser at half-price or less. Half of the money procured by this scheme of robbery must find its way into the foreman's hands; if not, the fraud must cease.

The foreman then, and his dishonest accomplices, lavish their ill-gotten coin on the procuring for themselves and others drink and the foul sources of immoral pleasures. The plunder is not retained exclusively by the foreman and carters, but generally all hands engaged at the building have their share of the booty. So far is such carried that all sober and well-inclined workmen are almost completely "boycotted" by their fellow-workmen. To express yourself averse to the robbery practised is to solicit dismissal on the Saturday evening following from the hands of the man in charge. This is how our mechanics can spend more than their honest income in the fetid backways of our city. All engaged at a building must, with the rarest exception, be supplied with beer-money by traders in lime, stones and sand, etc; if not, the trader's goods, be they ever so free of defect, will be objected to by the hod-men and their fellow-conspirators. This raising of blackmail is one reason why building is costlier in Dublin than elsewhere. The robbing of building-contractors by their employés, and carters of brickmasters, etc., of thirty-three per cent on the principal materials used, namely, bricks, stones, sand and lime, must undoubtedly make building more expensive in Dublin than elsewhere, as the building-contractors learn from bitter experience that materials are in the total very costly affairs; so to clear themselves of destructive loss they must raise their charges to intending employers to figures which will cover all expenses and leave a margin suitable to live on. They must so be thirty-three per cent higher than legally required if honestly dealt by at the hands of their employés. Take the builders of anywhere else into comparison with them, and the great difference of prices is seen immediately. Not to give too much credit to the workmen and foremen of other places for honesty, we can plainly see twenty per cent for robbery would even leave builders a good profit on the same amount of work. A fact I will now allude to will suffice to prove the evil effects of the fraudulent schemes spoken of to native industry. In one locality within four miles of Dublin, where a few years ago a dozen of brick-yards were in full swing, there are now but two. The builders found the County Dublin bricks ran very short in work (from reasons the reader is already acquainted with), and so they now send their orders across the Channel. Irish workingmen, and Dublin artisans in particular, should think of that.

METROPOLITAN SEWAGE DISPOSAL.[1]

OF all the many fearful muddles and failures of systems with which we have become so familiar within the last few years, that of the Thames drainage stands out in gigantic prominence, and it is hard to say whether the Lower or the Upper Thames has come the worst off, although from different causes. Below bridges, we have expended millions in constructing what appeared to be the most perfect drainage system in the world; and after the experience of a few years' working, we find that we have succeeded in paving the bed of the Thames with a new and fictitious bed of excremental matter; that, instead of getting rid of our sewage far out at sea, as was hoped and intended, it is, like the poor, always with us, churned backwards and forwards with the tide, and each day presenting a more threatening aspect to the public health. Above bridges, millions have certainly not been spent, but thousands have, not in perfecting a system of drainage, but in most ingeniously contriving to prevent any system at all being made.

The London area of drainage north of the Thames is fifty-three square miles, the sewage of which is collected in reservoirs of nine-and-one-half acres at Barking, the capacity of these being 35,000,000 gallons, or 5,600,000 cubic feet. The drainage south of the Thames is sixty-six square miles, the sewage being collected at Crossness in reservoirs of six-and-one-half acres, and in capacity of 25,000,000 gallons, or 4,000,000 cubic feet. The average daily discharge of sewage into the Thames is 164,000,000 gallons, the Lower Thames receiving about 60,000,000,000 gallons in the course of a year, the amount of suspended matter being estimated by Professor Frankland, as long ago as 1879, at 1,354,000 tons. Of course, it is a matter of gigantic difficulty to deal with this mass of filth, and up to the point at which it is received at the outfalls, no fault can be found with the system. But here the mistakes appear to begin. At the time of high water, all that is done is to open the sluice-gates of the reservoirs for four hours during the ebb, and let the sewage pass into the tideway. As a matter of course, some will go out to sea, but the bulk only travels a short distance down the river, to be brought up by the next tide, while a certain proportion is deposited, and, in point of fact, the volume of the river is physically unable to carry it away.

Two questions naturally strike one here. 1. Why is not the public health better protected? 2. Why are no endeavors made to utilize the sewage and reduce the expenses? Here we are met with the old bugbear of expense, as if the health of the people was a matter to be regulated by pounds, shillings, and pence, and was not paramount over all such faulty considerations. If we are too poor to devote a few millions to this end, let us do away with the luxury of an annual war in our foreign possessions for a few years; let us cut down some of the extravagant expenses of the School Board; anything, indeed, to insure the primary duties of a government towards the population. To begin with, at any cost this mass of pestilence-breeding sewage should be deodorized or rendered innocuous, if nothing else is done; but that is not enough, it should also be taken out of sight and out of smell of London city, and not be let go until it is cast fairly into the sea. We are told that to extend the outfall works to Tilbury, fifteen miles lower down the river, would cost nearly three millions sterling, and that the pumping would represent another million. Very good, so far. But why stop at Tilbury? It is only partially lessening the evil, besides ruining the navigation of the river below Gravesend.

I say that the only plan, and the cheapest in the end, is to convey the sewage of London straight across the Essex marshes to Foulness Island, a little to the north of Shoeburyness, and there, if possible, cast it into the German Ocean, from whence there is not much chance of its returning. And why I say emphatically that this plan will be the cheapest in the end is because you will have here all the elements of a successful locality to deal with the sewage from a manufacturing point of view. Surely, unless our boasted scientific knowledge is all a sham and a delusion, some one of the many projects for converting sewage into a practical manure, and therefore of financial value, may be, after due consideration and further experiments, adopted with success. Space is of no object in Foulness or Wallasca Islands, and I see no reason why a busy manufacturing district should not arise, and a brisk trade in artificial manure be carried on from a harbor on the River Crouch, to which ships from all parts might resort; inland also, by means of railway extension. Even in the case of failure we should, at all events, secure a fair amount of immunity from epidemics and pestilence, which, even at a money computation, would be invaluable.

My belief is (whatever it may be worth), that an automatic power is needed to deal with the whole subject *ab initio*, so that the drainage of the Thames, from Windsor to Gravesend, should be under one strong hand, and should be made part and parcel of one scheme. I believe also that that one scheme should be the transportation of all this sewage to some place like Foulness Island, there to be dealt with commercially by the most approved form of treatment, and that at the same time, while not interfering unduly with the vested rights of the existing water-companies, I believe that an additional and independent supply of the very best water possible should be procured and brought to London.

[1] From a paper by G. Phillips Bevan, read before the Balloon Society.

THE FEE FOR A PURCHASING AGENT.

BOSTON, MASS., October 2, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you please inform a reader of your *Architect*, in your next issue, what are proper charges for an architect, when he undertakes to build in Boston, for a party in affluent circumstances a block of brick buildings, and makes all plans, details, specifications, contracts, etc., buys all materials, and sub-lets each part of the work separately, and gives almost daily superintendence; and whether there should not be a separate commission on the amount of materials purchased, and what it ought to be when no outside commissions are taken? Yours respectfully, A SUBSCRIBER.

[THIS is an unusual case, and there is no custom which would regulate the amount to be paid for work of this kind, outside the ordinary professional service. Perhaps the best way would be to keep, as nearly as possible, an account of the time occupied in extra duties, and charge for it at a reasonable rate by the hour. — EDS. AMERICAN ARCHITECT.]

THE KNOX COUNTY, TENN., COURT-HOUSE.

KNOXVILLE, TENN., October 13, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — My attention has been called to an article in your number of September 13, in reference to the Knoxville (Tenn.) Court-House, which does great injustice to the successful architect, and gross violence to the truth. Of course this is the fault of your informant, and not of yourselves.

It is true, as you state, that a committee composed of members of the county court selected the plan submitted by Mr. Tinsley. Whether the action of that committee was tentative or final, and their functions advisory or potential, are vexed questions upon which an opinion is unnecessary. Suffice it to say, Mr. Stephenson accepted the committee's award as final. But the members of the Knoxville bar, who must spend the greater part of their lives in the contemplated structure, were unwilling that Mr. Tinsley's errors and incongruities should be perpetuated in marble and mortar, at the cost of the county and their comfort. A meeting of the bar was held, at which practical unanimity prevailed that the plan of Mr. Tinsley was in no wise suited to the wants and demands of the county. A committee, composed of the oldest and most eminent lawyers of Knoxville, was appointed to present the views of the meeting to the county court. At the instance of this committee a petition was prepared, specifying the objections to Mr. Tinsley's plan, and the advantages and superiorities of Mr. Stephenson's. This petition was signed by every member of the Knoxville bar, save three, only one of whom preferred the plan of Mr. Tinsley.

This petition was presented to the county court, and, by a vote of thirteen to three, Mr. Tinsley's plan was rejected and Mr. Stephenson's adopted. Do you think there could have been such practical unanimity in the bar and the court unless there had been decided objections to Mr. Tinsley's plan, and decided superiorities in Mr. Stephenson's?

The reopening of the question and the adoption of Mr. Stephenson's plan was wholly the result of the labor of the members of the bar, in which Mr. Stephenson had no part. Of the five members of the bar committee, only one had any acquaintance with Mr. Stephenson. I prepared and presented the petition, and had never met Mr. Stephenson until after the entire matter was concluded.

Your statement that "the question was renewed at the instance of defeated competitors, and of attorneys acting in their interest," is unfounded and unjust. Very truly, WAT. M. COCKE.

A QUESTION OF FRICTION.

TOPEKA, KANSAS.

To the Editors of the American Architect: —

Dear Sirs,—I wish to take exceptions to the statement of Col. Ludlow, Superintendent of Philadelphia Water Supply — referred to in your editorial of September 13 — that "the pressure in the main of seventeen pounds to the square inch was reduced in the house, at nearly the same level to seven pounds, by obstructions in the pipe." Leaving out of the question the element of friction the *pressure* in the house (at the same level) would be the same in spite of the obstruction, and in substantiation of this would refer to the experiment of Pascal in 1647, at Rouen, p. 155, "*Silliman's Physics.*"

Truly yours, L. M. Wood.

[Of course Mr. Wood is right "if the element of friction," as he says, "is left out of the question," but in Colonel Ludlow's experiments it was not left out of the question. If the owner of the house referred to, tried to sprinkle his lawn with water drawn from the kitchen faucet through a hose, and found that the water would not run out of the nozzle, although the guaranteed pressure in the main was sufficient to throw a stream fifteen feet above his head, it would be hard to persuade him that the tension in the main and in the hose were the same. Undoubtedly they would become the same if the hose were shut up tight and allowed to fill, but that is a different matter. — Eds. American Architect.]

SEIZING DRAWINGS TO SECURE PAYMENT.

New York, October 3, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Has a draughtsman any right under the lien law of the State of New York?

A, an architect, employed B to make certain designs and drawings for which he stipulated to pay a certain sum per week, B worked for a number of weeks till the drawings were completed, when there was still a considerable sum unpaid. A had not been in the office for a long time, and had paid no attention to demands for salary, so B seized the drawings and still holds them. A has not made any demand on B for the plans, nor has he been heard from in any other way.

In the meantime, the owner of the property secured a "blue print" copy, and is proceeding with the work, and when spoken to by B about the matter, refused to have anything to say to him.

Is there any remedy for B? Yours respectfully, B.

[We do not think that B can help himself much under the circumstances, and the lien law, which in New York has been expressly decided to be inapplicable to the designer of a building, will do him no good whatever. He made a great mistake in carrying off his drawings, and has probably forfeited by that unwarrantable act his prospect of being paid for them. As the case stood before that, he had a simple contract with A to render a certain service, in consideration of certain payment. If he had carried out his part of the agreement in good faith, it would be a trifling matter to compel A, if he were responsible, to fulfil his promise to pay for them; but as B chose to take the law into his own hands, and deprive A of the use of his drawings, his service to A is incomplete, and as A's contract with B was not for half-finished work, but for full service, he can claim, with considerable reason, that B has not done what he agreed to, and he therefore owes him nothing. As against the owner, his claim is even weaker than against A. As we suppose, A was to have the privilege of doing what he liked with the drawings made for him by B, and if he chose to give the owner blue prints of them he had a right to do so, and the owner is not accountable to any one, unless perhaps to A, for the use he makes of them. Whether A has paid for them or not does not concern the owner in the least, nor can he in any way be made responsible for the cost of making them. We repeat, that if B had carried out his agreement to the end, he could easily have obliged A to pay the promised compensation, provided A had property enough to cover it, and if A was indigent and irresponsible, B worked for him at his own risk, and has no right to try to make any one else pay his bill. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Cremation at Paris.—Cremation is making great strides in France. The Prefect of the Seine means to establish Siemens furnaces in several of the cemeteries of Paris, and proposes to cremate all persons whose bodies are not claimed by their friends. If this experiment proves successful, the Government will probably introduce a general bill on cremation.—*Exchange.*

Paper Houses. — Paper houses are coming into use in England, where for some purposes they are found greatly superior to tents. Shooting boxes 12 feet square were found convenient both to use and transport, and, the material being impervious to moisture, the little cottages are satisfactory from a sanitary point of view. It is said that they will be used at the seaside during the coming season, not only for bathing houses but as "residences" for quiet bachelors of contemplative habits. — *Exchange.*

A Key to Aztec Writings. — A Mexican archæologist, Señor Don Damaso Sotomayer, who has devoted years to the study of Aztec monuments and temples, professes to have made important discoveries in the hieratic writings of the Aztecs. He feels confident that the discoveries he has made will enable him to decipher the Chaldean writings and other mysteries of the far Orient, from which he traces the emigration of the early races who settled this country, writes a correspondent from Mexico. When Dr. Le Plongeon of New York was here, some three years ago, he felt equally confident he had found a key to the hieroglyphs on the temples and palaces of Palenque and Uxinal. Dr. Le Plongeon and his energetic wife, to whose courage and industry the Metropolitan Museum of New York is indebted for copies of the mural designs of the palaces of those ruined cities, spent nine years in Yucatan making researches. We would be glad to hear how far they agree with Sotomayer as to the mysteries to be solved and revelations made by the key to the Aztec hieroglyphs, which they believe is theirs. — *Boston Herald.*

English Knowledge of Objects de Virtu. — In an article on the Fountaine collection, the London *Times* says: "It is the fact that most of the very finest works of decorative art that have been sold within the past ten years have gone out of the country; and in the Fountaine sale, had it not been for Messrs. Franks and Robinson and their syndicate, nearly everything best worth having would have gone to M. Lowengard, or M. Settiner, or M. Egger, or M. Clément, or if not to them, then to some London dealer buying for a French or German or American amateur. The truth is that we are being distanced, not only in taste but in knowledge, by our foreign rivals. As far as pictures and prints go, we have a fair number of good judges among us; but in the matter of *la haute curiosité* we must yield. For one Englishman who knows a rare book when he sees it, or who can tell a fine piece of majolica or ivory from a piece of the second order, there are twenty Frenchmen and Germans; and while this state of things remains, our choice possessions will undoubtedly tend to flow out of the country."

Cape Cod Canal. — The report of the minority of the Committee on Harbors and Public Lands, regarding the Cape Cod Ship Canal Company, contains some very important facts, among which are the following: —

1. No corporator named in the charter and no director or officer of the Canal Company has ever subscribed to any of its stock or pay anything whatever to the business of the company.
2. That the company has contracted with F. A. Lockwood to build the canal at $1.000,000 per mile, that Lockwood shall receive all the stock which is to be issued to him as the work advances, and that when he shall have received $5,000,000 of the stock, the company shall issue its bonds to that amount to the contractor to complete the rest of the work, so that the canal will represent $10,000,000 of money regardless of the cost of construction.
3. That the construction of the canal depends upon the success of the "dredger," in which the contractor is interested.
4. That it is contrary to public policy for one man to constitute a company which has authority to take more land than was ever before taken by a single corporation in Massachusetts.
5. That the company estimating the cost of the canal has made no provisions for the construction of the bridge, ferries, etc., which will be necessary, and no security has been furnished by the contractor for their construction.
6. That the conditions of last year's act have not been complied with and that nobody is now interested in the scheme except Mr. Lockwood, the contractor.
7. That the construction of the canal would interfere with the railroad, which is the only communication with the outside world.
8. That the contractor has not given the land owners any security for damages, but can enter upon the lands of private persons without permission. — *Engineering News.*

Greely's Arctic Observations.— At Montreal, Canada, on the 2d ult., Lieutenant Greely read a paper descriptive of his observations in the Arctic Regions, before the Geographical Section of the British Association for the Advancement of Science. The following is an abstract of the paper: Following but disagreeing with Lieutenant Ray, who expressed his disbelief in an open Polar Sea, Lieutenant Greely said he did not believe there was a navigable sea at the pole, but he was of the opinion that there was open water somewhere about. The geographical work of the Lady Franklin Bay expedition covers nearly 3° of latitude, and over 40° of longitude. Starting from latitude 81° 44′, and longitude 84° 45′, Lieutenant Lockwood reached, May 10, 1882, on the north coast of Greenland, latitude 83° 24′, and longitude 40° 46′. From the same starting point he reached to the southwest in May, 1883, Greely Fiord, an inlet of the Western Polar Ocean, latitude 80° 48′, and longitude 78° 26′. This journey to the northward resulted in the addition to our charts of a new coast line nearly one hundred miles beyond the farthest point seen by Lieutenant Beaumont, R. N. It also carried Greenland over 400 miles northward, giving that continent a much greater extension in that direction than it had generally been credited with. The vegetation resembled closely that of Grinnell Land. Among the specimens brought back, the Arctic poppy and several saxifrages were identified. About the 83d parallel, traces of the polar bear, lemming and Arctic fox were seen, and a hare and ptarmigan were killed. Lieutenant Lockwood and himself journeyed across Grinnell Land and examined into its physical condition, discovering, what may have been hitherto unsuspected, that between the heads of Archer and Greely Fiords, a distance of some 70 miles, stretches the perpendicular front of an immense ice cap, which follows closely from east to west the 81st parallel. The average height was not less than 150 feet. This ice cap, extending southward, covers Grinnell Land almost entirely from the 81st parallel to Hayes's Sound, and from Kennedy Channel westward to Greely Fiord in the polar ocean. In connection with the line of perpetual snow he said that on Mount Arthur it was not far from 3500 feet above the sea. From barometical measurements it appeared that the crest of Grinnell Land was of about 2500 feet elevation in front of the southern ice cap and 3000 feet near Mount Arthur. He took occasion to mention a fact that had surprised him. It was the discovery that when the tide was flowing from the North Pole it was found by his observations that the water was warmer than when flowing in the opposite direction. He took the trouble to have prepared an elaborate set of observations showing this wonderful phenomenon, which would evetually be published. To him these peculiarities were unexplainable, and he hoped that the observations would be studied by his hearers, and some explanation found in regard to the thermometric observations of the expedition. He remarked that the mean temparature of the year of the hourly observations was 5° below zero, which justified him in saying his station was the coldest point of earth ever reached.

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CONTENTS.

THE finishing touch is at last to be put to the painful caricature which makes the lower part of the dome in the Capitol at Washington ridiculous, by the addition of a new jumble of what are supposed to be historical subjects. Many of our readers will remember that the late Signor Brumidi, after completing the clever decoration in the upper part of the dome, was seized with the unfortunate idea of painting a fictitious bas-relief around the bare white walls of the Rotunda, and, as there was no one in Washington with energy enough to prevent him, he actually spent many years of his life in carrying out this dreary joke. When he died, about a third of it still remained to be done, and the work has been continued by Signor Costigini. Whether the deceased artist had any definite scheme of subjects in mind we do not know, but if so, the design for the portion yet incomplete seems to have been lost, and its place has been supplied by the selection of three important events, which are to be illustrated in due sequence. The first of these is the "Capitulation of the City of Mexico," which is to be represented by a figure of General Scott, receiving the keys of that unfortunate town. This, if the keys, the city, and the generals on both sides are all properly labelled, may perhaps, be intelligible to those who, years from now, shall conquer their disgust at the infantile "sell" involved in the whole scheme of the decoration sufficiently to inquire what it represents; but even labelling will, we are afraid, hardly make the last two subjects, the "Discovery of Gold in California," and the "Driving of the Last Spike in the Pacific Railroad," either comprehensible or artistic. The latter, especially, surpasses in unsuitableness for any form of artistic representation all the other themes upon which the decorators of the Capitol have lavished their skill, and we hardly know how anything more than that could be said; while the former presents exactly as much inspiration as the discovery of a turnip by a hungry tramp, and a good deal less opportunity for picturesque treatment.

THE clever "architect of the beasts" writes to *La Semaine des Constructeurs* concerning the proper way of building shelters for sheep, and those of our readers who are likely to be called upon to design farm-buildings might do well to remember his instructions. The first criticism that he makes upon the ordinary close sheds used for the purpose is that they are not sufficiently ventilated for the health of the sheep. In Norway, it is said, as well as in Holland, which has a much colder climate than France or England, sheep live out of doors the year round without inconvenience; but where merino or other sheep of delicate constitution are kept, they should be provided with a cover to protect them from the heat of the sun in summer, and in winter from rain and wet snow, which soak their fleeces, and often chill them fatally. The sheds for this purpose may with advantage be closed with a wall on the north side, but left either entirely open, or sheltered with louvre-boards, on the south. If built thus, they can be kept dry and wholesome throughout the year. The doors of such buildings, especially, should be very wide, and ought to open by sliding. Sheep, in going in or coming out of their houses, crowd upon each other, all trying to get out at once; and in the crush the lambs are sometimes killed, while the sheep nearest the sides of the doorway are pushed against the timbers or stones, and often leave tufts of their wool on the sharp edges, or suffer bruises. To prevent this in part, the "architect of the beasts" recommends that the jambs should be provided with vertical rollers to prevent friction, and facilitate the movements of the sheep nearest the side. With the same idea, of preventing the crushing of the animals against the jambs, a platform, of the same width as the door, may be placed in on each side of it, slightly ascending to the threshold, which is raised. With these the crowding in the opening cannot take place, as the sheep at the edges of the platform are pushed off before they reach the door. In alloting space for housing a flock, it may be useful to remember that the shorter diameter of a sheep. or the space he occupies when eating, side by side with others, is about twenty inches, while the average length is about five feet. The rack generally used for feeding measures about nineteen inches in width, so that twenty inches by six feet seven inches will be the space required for each animal while standing and eating.

AN explosion of dynamite took place recently in France, resulting in the instant death of nineteen persons, and the destruction of the building in which they were at work. The building was a small one, of wood, occupied as a work-room for filling cartridges, and to prevent the shock of a possible explosion in it from communicating itself to neighboring structures it was surrounded by heaps of earth. The cause of the catastrophe is unknown, all the witnesses having been killed; but any one of many slight accidents, the dropping of a cartridge, or of the scissors used to trim its paper envelope, the presence of a gravel stone in the dynamite sand, or the slamming of a door, would have been sufficient. It is certain, however, that only forty pounds of dynamite, containing thirty pounds of nitro-glycerine, exploded, but this quantity was sufficient to blow most of the operators, all but two of whom were girls or women, into small fragments, which were found scattered over a space of considerable extent. The only object found among the débris which presented the slightest sign of life was a bird, which had probably been flying over the spot, and was stunned by the shock. It was found paralyzed, and incapable of movement, although there were no signs of actual injury. The sound of the explosion, although the weight of the detonating material was less than that of an ordinary charge of powder for a heavy gun, was heard six or seven miles away. No doubt the enclosing of the building with banks of earth, by confining the force of the expanding gases, rendered their effect more violent within the building itself, but there would have been little advantage for the occupants in mitigating the power of the explosion, which, as it was, deprived them of life with merciful swiftness; and it is quite possible that this precaution may have saved scores of their fellows from sharing their fate.

AT the recent reunion of the graduates of the Ecole Centrale, M. Pasteur gave a little account of his researches into the causes of hydrophobia, which, as reproduced in the stenographic report of *Le Génie Civil*, has a remarkable interest. Almost nothing is known by physicians of this dreadful disease, and its very existence is denied by some, but the obscurity of the subject seems to have given it an additional charm for M. Pasteur, and his investigations have been made with a thoroughness which will give the results a character of certainty. One of his first and most important discoveries is that the disease acts through the brain upon the nerves. It has long been known as almost purely a nervous affection, post-mortem examinations of the victims showing no serious changes in the organs of the body; but M. Pasteur has proved that the brain and spinal marrow are engaged, by inoculations upon the membranes of the head with the saliva from a mad dog, reproducing the disease in this way with absolute certainty, and great rapidity, while the virus introduced into the circulation, as by a bite, developes the characteristic symptoms in only about one-tenth of the subjects, and after a long period of incubation. It is found, moreover, that collections of virus, of the same sort as that contained in the saliva, but unmixed with extraneous matters, form in certain portions of the brain and spinal marrow, the number of deposits increasing with the progress of the malady, until death takes place. In order to propagate the disease, a small portion of brain-matter or marrow is taken from a rabid subject, rubbed with water or sterilized *bouillon*, and applied to the brain of the animal to be infected, a piece of the skull being removed for the purpose by trepanning. The operation occupies only about five minutes, and the animal is made insensible by chloroform, so that when the small wound is dressed, and he returns to consciousness, he shows no sign of suffering. Between the eighth and the fourteenth day afterwards, however, he is invariably attacked with hydrophobia, and if the virus was administered in its normal condition, he always dies.

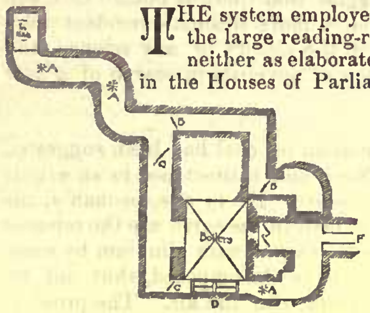
WHEN the contagion takes place through the circulation, as by a bite, or by injection of virus into the veins, the period of incubation is, with human beings, very much more protracted, months, and sometimes years elapsing before the fearful symptoms declare themselves. Among animals the rapidity with which the disease develops varies. So far as M. Pasteur's observation goes, it invariably originates in the dog, although there is an idea in this country that foxes are quite as liable to it as dogs, and sometimes communicate it to other animals. However that may be, the bite of a mad dog induces hydrophobia in many other creatures: cattle, horses, and pigs are readily infected, as well as monkeys and rabbits, the latter, particularly, being seized with the disease very quickly after being bitten. According to M. Pasteur, there is reason to suppose that by successive inoculations, conducted with precautions which experience has taught, the virus of hydrophobia may be so attenuated as to be used like vaccine virus, for protecting dogs and men against the unmodified disease, but this must be done through the medium of animals, since, so far as is known, the virus of rabies cannot, like that of carbuncle, be cultivated artificially, and attenuated by exposure to the air. In the hope of finding the means for accomplishing this result, M. Pasteur keeps a great number of animals under treatment. Hundreds of dogs, rabbits, and other creatures have been, as gently as possible, subjected to the disease, in order that from their death might be derived the knowledge necessary to save other beings of greater capacity for suffering, from a similar fate.

HITHERTO, no experiments have been made upon human beings. M. Pasteur, in hisanxiety to gain the knowledge, so indispensable to his object, of the effect of the virus in different forms upon men, has often thought of asking for subjects among criminals condemned to death, but, with humane reluctance, has refrained. Meanwhile, however, he has had repeated offers from persons interested in the subject in one way or another, to submit themselves to inoculation for the benefit of science. The story of one of these cases, as told by M. Pasteur, is an extraordinary one. Not long ago, he received a letter from a certain professor, in these touching words. "Sir," said the letter, "I have been bitten by a mad dog. I begin to experience the symptoms of that frightful malady. I wish to spare my beloved family the sight of my torments and death from hydrophobia, and have therefore arranged my affairs, and am about to leave the town where I live for another, where you may reply to me. I place myself entirely at your disposition, happy in the thought that I may be useful before I die. If you will designate a hospital in Paris, I will go there, and you shall do with me what you like." M. Pasteur said that he dared not at that time ask his unfortunate correspondent to come to Paris, not having carried his experiments with dogs far enough to show him the possibility of preventing hydrophobia after infection had taken place, but with the humanity that comes of knowledge, he inquired further, and found that the incipient hydrophobia whose convulsions he was asked to utilize for the benefit of mankind had declared itself eleven days after the patient had been bitten. Knowing that this was far too short a time for the development of the poison by means of the circulation, he suspected that some other affection might have been mistaken for the disease, and ascertained that the professor, who had been bitten in the hand, had had the wound immediately cauterized, but before this was done, in the pain of the bite, had instinctively carried his hands to his lips. There was probably an excoriation on the lips, and by means of this some poisonous germ, differing from that of hydrophobia, was conveyed into the blood, giving rise afterwards to an inflammation in the mouth and throat, which had been mistaken for the commencement of the spasmodic affection of hydrophobia. All this was explained by the great chemist to his terrified correspondent, and the latter finally returned to his home, where the trouble in his throat subsided, and he was soon perfectly and permanently cured. We imagine that there is not often much romance about vivisection, but a more dramatic incident than this it would be hard to find in the history of any science, and we commend it to the attention of novelists in search of a new theme.

A NEW theory of the formation of coal has been suggested in France by M. Paul Noel, and is described in an article in the *Journal de l'Agriculture.* Every one, probably, has some loose notion that the coal beds in the earth are the remains of vast forests, which have been covered with alluvium by some subsidence of the ground, and have decomposed, shut out by the mass above them from contact with the air. The proof of this is generally supposed to consist in the fact that most coal mines show traces of vegetation; leaves of fern, of immense size, trunks and branches of trees, and other vegetable products, being often found in them, converted into a black, shining substance, but retaining their original form. This theory certainly seems reasonable, but there are difficulties about it which have not yet been explained. The most serious of these lies in the fact that the chemical composition of coal does not agree sufficiently well with that of wood to show a similar origin. Of course, coal, like charcoal, differs from wood in containing no hydrogen, which would naturally be driven off in the process of decomposition; but the partial decomposition which is supposed to have taken place would affect only the volatile constituents of the mass, and if this had been composed of leaves or trunks of trees, the residue or ash, left after burning coal, should be the same as that left by wood or charcoal, which is far from being the case. Again, the evidence afforded by the finding of carbonized vegetable forms in the mines is rendered less convincing by the fact that these objects do not exist in the mass of coal itself, but are always discovered at the edges of the bed, or directly above or below it, and generally embedded in the rock which forms its boundary. Another curious circumstance is that the fern-fronds and trunks at the edges of the coal always lie in parallel lines, presenting an appearance which differs entirely from that of an ancient forest, and suggests rather the effect of an inundation of soft material, bending the vegetation over which it passed in the direction of its course, and carrying long lines of floating leaves and drift-wood. There is much further evidence that all coal was once in a plastic or liquid condition, both in the fact of its being found in situations and under circumstances which cannot be otherwise accounted for, and in another, to which M. Noel calls attention, that the coal varies in character with the rock on which it lies, the beds upon hard rock being usually bituminous, while those overlying soft, porous strata have been, as it were, filtered, the more liquid constituents of the mixture, such as petroleum and bitumen, soaking downward into the stone, and leaving only the hard anthracite.

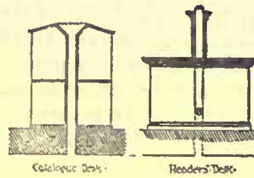
IT is generally admitted by geologists that all coal beds once formed the bottom of lakes, of fresh or salt water, and M. Noel believes that this fact indicates an explanation of the production of coal which will remove the difficulties of the old theory. It is hardly conceivable that wood, especially through the loss of its hydrogen, should ever become converted into a substance plastic enough to flow like a river, taking the impression of objects along its banks; but it is not difficult or unreasonable to suppose, instead of this, that the stagnant lakes of the coal districts were, ages ago, when the temperature of the earth was higher, and vegetation more luxuriant than now, filled with the little plants which even now discolor our drinking water, and that these, dying and settling to the bottom, may in time have so accumulated as to form a layer of carbonaceous mud of considerable depth. Something of the kind still goes on in such ponds, the bottom of which are usually covered with a light, black mud, while the bubbles of carburetted or phosphuretted hydrogen which rise when this mud is stirred, show that it is in process of conversion into something at least very similar to coal. Such mud, if it could be suppcsed to accumulate undisturbed, would present perhaps all the qualities necessary to fit it for conversion by decomposition into coal. The presence of certain salts and mineral substances, which are often found in coal ashes, but never in wood, might be due, on this theory, to impurities dissolved or suspended in the water of the carboniferous lake, and even the formation of petroleum, naphtha, and bitumen, in connection with coal, is at least as easily explained by this hypothesis as by the old one.

HEATING AND VENTILATION OF THE BRITISH MUSEUM.

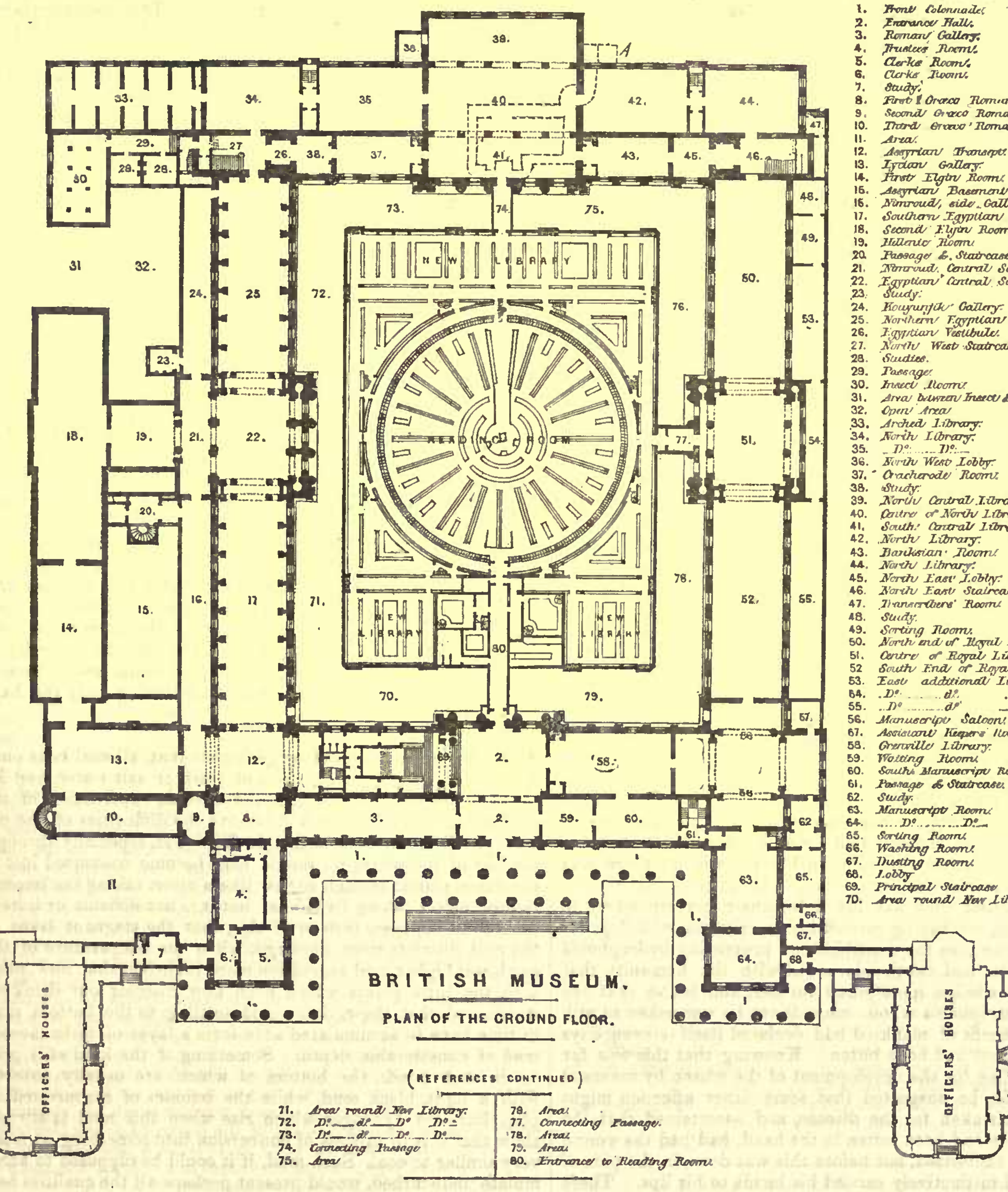


THE system employed for heating and ventilating the large reading-room of the British Museum is neither as elaborate, nor as successful as that used in the Houses of Parliament; still it has many interesting features, and is well worth study. The system is the result of many years of experiments and failures, and is doubtless but little like what was put in when the room was first opened, twenty-seven years ago; though the building seems to have been planned with reference to something like the existing arrangements. It will be noticed that the reading-room and the adjoining apartments for the storage of the books stand alone in what was the central court-yard, being connected to the main building only by the narrow passages at front and rear. The heating and ventilation of this department is quite distinct from that of the other portions of the Museum; though properly speaking the reading-room is the only part which has any systematic scheme for ventilating in connection with the heating.

Fresh air is taken in at the top of a tower on the north side of the building, through openings fifty to sixty feet above the ground, and protected only by large louvres. No screen is used, but as this side of the Museum is in the centre of the block, and protected by buildings on all sides, very little dust ever finds its way into the openings. Inside the tower is a spray of water to cool and purify the incoming air, though the actual advantage of this is practically not very obvious. The air passes down the shaft into cellar passages, where it is moistened by additional sprays of water, and is led to a fan sixteen feet in diameter, which forces the air into the passage beyond, and from thence into the cellar under the reading-room, the whole of which is utilized as an air-chamber, though the space is so much cut up by the radial walls supporting the brick arching that the air does not circulate as freely as might be desired. To obviate this difficulty air is taken into separate sub-ducts from just inside the fan, and led directly to corners of the air-chamber, which are too much enclosed by the radial walls to feel the general circulation. In this way the entire chamber is kept moderately well filled with fresh air in motion, and a nearly constant current ascends from all the openings into the room above.



As will be seen by the general plan of the building, the readers' desks radiate from the centre, the inner circular lines being the catalogue-desks. These desks are built back to back with a narrow open



BRITISH MUSEUM.

PLAN OF THE GROUND FLOOR.

TABLE OF REFERENCES.

1. Front Colonnade.
2. Entrance Hall.
3. Roman Gallery.
4. Trustees' Room.
5. Clerks' Room.
6. Clerks' Room.
7. Study.
8. First Græco Roman Saloon.
9. Second Græco Roman Saloon.
10. Third Græco Roman Saloon.
11. Area.
12. Assyrian Transept.
13. Lydian Gallery.
14. First Elgin Room.
15. Assyrian Basement Room.
16. Nimroud side Gallery.
17. Southern Egyptian Gallery.
18. Second Elgin Room.
19. Hellenic Room.
20. Passage & Staircase.
21. Nimroud Central Saloon.
22. Egyptian Central Saloon.
23. Study.
24. Kouyunjik Gallery.
25. Northern Egyptian Gallery.
26. Egyptian Vestibule.
27. North West Staircase.
28. Studies.
29. Passage.
30. Insect Room.
31. Area between Insect & Elgin Rooms.
32. Open Area.
33. Arched Library.
34. North Library.
35. Do. Do.
36. North West Lobby.
37. Cracherode Room.
38. Study.
39. North Central Library.
40. Centre of North Library.
41. South Central Library.
42. North Library.
43. Banksian Room.
44. North Library.
45. North East Lobby.
46. North East Staircase.
47. Transcribers' Room.
48. Study.
49. Sorting Room.
50. North end of Royal Library.
51. Centre of Royal Library.
52. South End of Royal Library.
53. East additional Library.
54. Do. do. Do.
55. Do. do. Do.
56. Manuscript Saloon.
67. Assistant Keepers' Room.
58. Grenville Library.
59. Waiting Room.
60. South Manuscript Room.
61. Passage & Staircase.
62. Study.
63. Manuscript Room.
64. Do. Do.
65. Sorting Room.
66. Washing Room.
67. Dusting Room.
68. Lobby.
69. Principal Staircase.
70. Area round New Library.

(REFERENCES CONTINUED)

71. Area round New Library.
72. Do. do. Do.
73. Do. do. Do. Do.
74. Connecting Passage.
75. Area.
76. Area.
77. Connecting Passage.
78. Area.
79. Area.
80. Entrance to Reading Room.

space between, as shown by the sketch. Under each line of desks are continuous openings in the floor, from which the air rises between the partitions, and escapes into the room above the readers' heads. Air also escapes lower down at the ends of each row of desks. If draughts are felt these lower openings can be closed, but the upper ones always remain open.

In warm weather the course of the incoming air is as above described. The air is never cooled any further than by the sprays of water. The engineers claims they will reduce the temperature by ten degrees, but this seems doubtful, as under similar conditions four degrees reduction is all that is counted on at the House of Commons. If the weather is moderate the fan is not used, the fresh air being led around it by side passages and directly to the air-chamber.

During cold weather no provision is made for adding moisture to the air. The sprays of course are useless at such times. The air is led directly to the passage beyond the fan, and heated by hot-water pipes before passing to the air-chamber under the reading-room. Should the weather be unusually cold, the air is further heated by being passed over the boilers, which are enclosed in tight shells and set up free from the masonry, giving passage for the air above and below. The boilers and fire-boxes are said to be sufficiently air-tight to prevent any coal-gas from leaking into the air-supply. From in front of the boilers air is led to the corners of the air-chamber by sub-ducts, as previously described.

The initial sketch-plan shows the arrangement of the cellar passages. The jets of water are at A. At B and C are gates by which the passages can be closed and the air sent in either direction as desired. The fan is at D. The passage F leads to the air-chamber under the reading-room. It will be seen that the doors C and B afford a means of regulating the amount of heat supplied to the reading-room independently of the amount generated by the boilers.

The reading-room is one hundred and forty feet in diameter, the dome being one hundred and six feet high. Just at the spring of the dome is a row of wide windows, which are fitted with double sashes, and cut up into the curve of the dome. At the bottom of the outer sash is a movable shutter, swinging out. The seat of the inside finish swings down, thus giving an opportunity to introduce additional fresh air into the reading-room. A large steam-pipe runs across the bottom of each window between the sashes. In winter the outer flap is closed, and the steam-pipe heats the air in the space between the sashes, thus preventing any down draughts of cold air from these windows.

A portion of the vitiated air escapes through the openings in the soffits over the windows before mentioned. The remainder escapes through the eye of the dome into the lantern, which is made with double sashes, and provided with steam-pipes both in the air-space between the sashes, and inside over the glass ceiling of the reading-room, so that there is very little chance for any down draught in winter.

The book alcoves are heated by direct-indirect coils of hot-water pipes, drawing air from the central court. There is consequently hardly any draught in summer time. The exhaust is through flues in the brickwork, which are carried up into the space immediately over the windows of the dome. These book-rooms appear to be quite insufficiently ventilated.

The Museum guides say the ventilation of the reading-room is often complained of; but judging from personal experience it operates far better than would be expected in most public reading-halls of the same size. When the fan is in operation, the air is changed about three times an hour, on the average. In the moderate weather such as London has so much of in the early fall, the fan is not used, and as the provisions for extracting the air are so inadequate, the room often seems close and musty. The scheme of ventilation can hardly be called a success, though more might be done by a better use of the existing arrangement. When the fan is in operation closeness of the air is seldom felt. The reading-room often receives as many as four hundred persons at one time, including the attendants. The temperature is kept at 63° in the winter — a trifle low perhaps for American ideas.

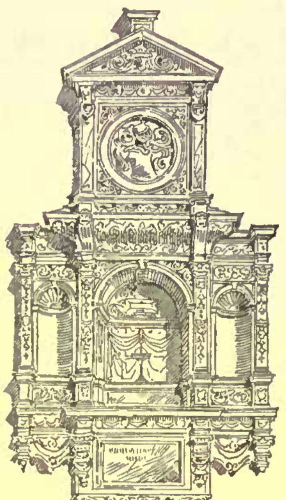
The Museum proper has very little heating, and almost no ventilation. The halls and stairways have no heat at all. The rooms are mostly provided with direct-indirect coils of steam or hot-water pipes, laid in the floor, and having fresh-air supply from out of doors, and a few rooms are heated by indirect radiation from coils in the cellar. The skylights over the upper rooms are provided with small ventilating openings at the ends, and some of the rooms are connected with mushroom ventilators on the roof; but the engineer informed me that these were all carefully closed in winter. Still the stories are so high, and the rooms are connected by such wide openings that the lack of ventilation would not often be noticed.

In heating the entire Museum and reading-room, the engineer says he rarely uses over twelve tons of coal per day.

C. H. BLACKALL.

THE RATHHAUS AT AUGSBURG.—The most famous of the buildings which Elias Hole raised at Augsburg is at present threatened. The city authorities are preparing to erect a huge block of public offices against the Rathhaus, which would quite overshadow and destroy its proportions. Fortunately an influential opposition has been roused among the Augsburgers themselves, which should be reinforced by protests from foreign sympathizers. — *Exchange.*

NEWPORT.[1]



MURAL MONUMENT. BREDA CATHEDRAL HOLLAND.

IT must be confessed that American cities are uninteresting; that they are pervaded by an air of careless haste in construction and design, that there are few impressive or characteristic features, that picturesqueness — *real* picturesqueness, either accidental or contrived — is conspicuous by its absence; that the architecture is too often distinguished in the richer quarters by vulgar pretension, and in the poorer quarters by squalid commonplaceness. The "march of civilization" is here too rapid, too frenzied, we might almost say, to allow of much consideration for what does not appeal to the general appreciation. It follows that the interest of travel in the United States, if we except what attaches to natural scenery, is confined in the main to the statistician, to the politician, or the student of social or political economy.

Among the crowd of modern American cities there are, however, a half-dozen sleepy old towns lying all along the Atlantic seaboard, upon which the smart genius of our marching civilization has forgotten or scorned to set his shining seal. These towns make but a poor showing in the census reports; they have no boasts to make of a population doubling once in ten years or so; no ten-story buildings of ambitious design attract the wondering gaze of the stranger; a little grass here and there in the quiet streets, a little moss on walls or roofs, tell the story of commercial and social decay.

For this absence of the prosperity which has come to be regarded as the birthright of American cities, there are yet compensations to the residents of these old towns, in a certain softness and poetry which invests them: the unforced picturesqueness of the old time, the quaint flavor of historical association, "the tender grace of a day that is dead," the atmosphere of refinement and repose, all the more alluring from its extreme rarity, and the sharp contrast which it offers to the general life of American towns.

Among these cities of the past, few are more marked by the characteristics of which we have spoken than Newport, a hundred years ago a centre of commercial activity and enterprise, and of social distinction, but now stranded on the shore of the great stream of American progress, and condemned to see its honored name represent a newer Newport at its gate — the chosen seat of the most frivolous, the vainest, the most pretentious and flamboyant *nouveaux riches* of the Western world.

Mr. Mason's "*Reminiscences*" are the pleasant gossip of an old resident who has spent his life among the scenes and people of whom he speaks, and who is glad to be, by every association of birth and personal experience, identified with the history and life of his native town. His fondness is justified by many lively and interesting accounts of the notable personages who have figured at one time or another in the placid annals of the old town — of Commodore Perry, whose fame is dear to Newport, which has set up his statue in the public park; of Malbone, the painter of miniatures, of whose origin and history little is known, but whose first triumph in art is said to have been the painting of a scene for the little Newport theatre, and who pursued his studies here with Washington Allston, and travelled with him to Charleston and to England; of Abraham Redwood, the good Quaker, a lover of books, who came early in the last century from Antigua to Newport, where he pursued his honorable career as a successful merchant and also as a prominent member of the philosophical society of which Berkeley was the head during his stay on the island, and where he founded the library which has continued to this day one of the most cherished among the institutions of Newport; of Talleyrand, who stepped ashore one spring morning in 1794, from a New York packet, took a quiet lodging, and went out and in among the people of the place for three months or so, with the inquisitive enterprise of his race, and departed as quietly as he came, without the sharpest quidnunc having discovered that one of the most conspicuous figures of the eighteenth century had been amongst them — an account which the active reporter of to-day will read with unutterable feelings; of the good Bishop Berkeley, who landed at Newport in 1728, and lived there for three years, building himself a house some little way out of town, where he could enjoy, with his young wife, the quiet and freedom which his position at home doubtless made impossible; of the Reverend James Honyman, sent over to these western wilds in 1704, as a missionary, by the Society for the Propagation of the Gospel in Foreign Parts, and who presided over Trinity Church from that time till his death, near half a century later; of whom it is told how, when Dean Berkeley arrived in the harbor on a holy-day, when divine service was being held in the little church, the Dean wrote a letter to Mr. Honyman, which was speedily handed up to him in the pulpit. "He opened it and read it to the congregation, from which it appeared the Dean might

[1] "*Reminiscences of Newport*," by Geo. Champlin Mason. Illustrated. Newport, R. I. Published by Chas. E. Hammett, Jr. 1884.

be expected to land in Newport every moment. The church was dismissed with a blessing, and Mr. Honyman, with the wardens, vestry, and congregation, male and female, repaired immediately to the Ferry Wharf, where they arrived a little before the Dean, his family and friends."

There is an interesting chapter on the Jews of Newport. Nothing in the history of the old town is more characteristic than the prominence, not only in trade, but in all the enlightened public enterprises of the community, attained by the representatives of this much insulted and proscribed race. Moses Lopez and Jacob Joseph were among the founders of the Redwood Library; Mrs. Pollok fed the hungry poor in a winter of unusual severity, until the citizens came to her aid and organized a relief committee; the memory of the Touros is held among all classes as among the most precious legacies which have come down to them from the past. And these are but the conspicuous examples of a long line of industrious, simple-minded, self-respecting citizens, who for more than a century contributed to the prosperity and reputation of Newport.

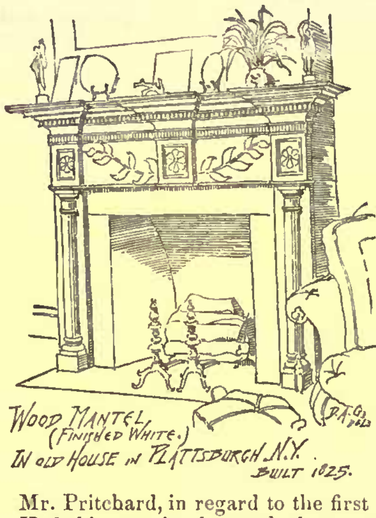
We find here the first account we have seen of Michele Felice Cornè, an Italian painter who came to this country in 1799 and found his place as the earliest decorative painter on this side the ocean. He landed in Salem, where he found so little employment that he shortly "removed to Boston, where he was occasionally called upon to decorate interiors in his best manner. The walls of the Hancock House were painted by him, and he had probably other like orders. . . . His custom was not to paint directly on the wall, but to cover the whole surface with wide strips of white paper, joining the edges neatly and putting it on like ordinary wall-papers. On this he first sketched his subject in charcoal and lead-pencil, and then washed it in with water-colors, using on the foreground opaque colors laid on with size, which gave his work more body than he could secure in any other way." Cornè had great facility in the drawing of ships, and this facility finally made his fortune. The war of 1812, with Great Britain, of which so many of the events were sea fights just off our own coast, created an excitement in the seaboard cities, which Cornè availed himself of by painting large pictures representing the various naval combats, as they followed each other in quick succession: the fight between the Constitution and the Guerrière, the Hornet sinking the Peacock, the Battle of Lake Erie, and others of similar character. These pictures were placed on exhibition, and the painter was able at last to gather the harvest for which he had been long waiting. "Cornè's pictures were exhibited as long as they would hold together. They were all painted in distemper and with but indifferent materials. By the time they were worn out the public interest in them had abated, and finding that a further attempt in the same line would not be likely to succeed, he had the good sense to give over and withdraw from the field. Having settled his affairs in Boston, he left that city for a more quiet and retired residence and found his way to Newport, arriving there in 1822, where he lived at ease during the remainder of his days."

A curious chapter is that on the small-pox hospitals of the last century, established by private enterprise for the reception and treatment of persons willing to undergo inoculation for that disease. Some island in convenient proximity to the great lines of travel was usually selected, and advertisements set forth in attractive colors the advantages and inducements of the place. At Fisher's Island, for instance, Jonathan Loomis proclaimed that he "had travelled to Philadelphia for the express purpose of learning the business of inoculation." At Duck Island, John Elisha Ely "declared that during a period of twenty-seven years several hundred persons had been inoculated, without the loss of a single patient, and that they continued to furnish, with their unsurpassed treatment, every luxury that could be looked for in such an establishment, at a cost not exceeding £1 lawful money. . . . Of out-door sport there was no lack, and when night closed in, one could sing and dance at Duck Island till bed-time. An old negro, white-haired and with whiter teeth, who had the 'Rakes of Mallow' and the 'Miller of Mansfield' at his fingers' ends, scraped the fiddle and called the figures." Samuel Lee, in 1795, "made it known that there was a good chance for eighteen or twenty young gentlemen and ladies at a time to have the small-pox in a mild and safe form, and at the same time to enjoy the best of fishing, hunting and boating. Application was to be made at the Old Hospital at New London, near the light-house. The season opened in May and closed with frosty weather." Some of these enterprises were, however, under official supervision. "In 1792 the town of Newport set apart Coaster's Island as a place where persons so disposed could go and be inoculated. . . . Dr.'s Jonathan Easton, Jr., Isaac Senter, and Benjamin Mason, all leading physicians, agreed to divide the labor, with the understanding that those persons who were able to do so should pay a fair consideration, while the poor should be treated gratis."

Mr. Mason's book is published in very attractive style, and is embellished with half a dozen beautiful heliotypes, and with numerous wood-cuts, which are a little more hasty than one could wish.

A Legend of the Eucalyptus. — The eucalyptus tree has hitherto been in favor for its anti-malarial properties, which are especially familiar in Australia, where it is one of the loftiest of timber trees. It has, however, lately lost favor in the province of San Pedro, Brazil, from the belief that it stimulates the generation of a poisonous dragon-fly, which attacks all living creatures, to whom its sting is fatal in a few minutes. The destruction of all eucalyptus trees has, therefore, been ordered in San Pedro.—*Philadelphia Press.*

THE DISPOSAL OF TOWN SEWAGE AND OTHER REFUSE.



In the Health Department of the Social Science Congress at Birmingham, the first question was:—"What is the best method of dealing with (*a*) Town sewage? (*b*) The products of home and street scavenging? and (*c*) The products of combustion?" papers being read on these three subjects respectively by Mr. E. Pritchard, Mr. Lawson Tait, and Captain Douglas Galton. The latter we have already published. As the discussion appears to have turned chiefly on the sewage question we give extracts from two papers which dealt with the sections *a* and *b*.

Mr. Pritchard, in regard to the first part of the question, said: —

Had this question been asked me some fifteen or twenty years ago, I, like many others, would have suggested irrigation; but experience of the last few years has caused a modification of my views, and the answer now would be to the effect that local circumstances must of necessity govern the particular method of treatment; and what might possibly be considered the best system for one place would prove to be an undesirable one for adoption in another.

The methods generally adopted in this country for the disposal of town sewage, and to which I propose to briefly refer, I have classified as follows: —

1. Land purification.
2. Chemical precipitation.
3. Discharge of sewage into the sea.

Under the first head may be considered two methods for the purification of sewage: — (*a*) sewage irrigation; (*b*) intermittent filtration.

(*a*) *Sewage Irrigation.* — Broad irrigation is the application of the minimum quantity of sewage to the maximum area of land, whereby the sewage is allowed to flow over the land, the greatest return being obtained from this process of sewage utilization. With suitable land and proper management good results are obtainable without the creation of nuisances; but as the true value appears now to be more generally known, sewage treated by broad irrigation, unless under exceptional circumstances, does not at the present time find much favor. It is estimated that one acre of land will purify the sewage from fifty to one hundred persons; this is on the assumption that such land is not continuously treated. Heavy crops are obtainable from land so treated; large quantities of rye grass, mangel wurzel, and various green crops being readily grown. On the Earl of Warwick's farm at Leamington, a few years since, over eighty tons of mangels per acre were grown. It will, however, be perceived that in broad irrigation the first consideration would generally appear to be "how to make it pay," leaving the purification of the sewage as the lesser factor.

(*b*) *Intermittent Filtration.* — In 1868, Dr. Frankland, one of the Rivers Pollution Commissioners, determined, by experiments, that by deep drainage of land of a suitable description, sewage could be purified in large quantities upon a small area. This system was termed "intermittent downward filtration," and requires that the land shall be laid out in level beds, and properly drained at a sufficient depth, the surface of the land being prepared in a ridge and furrow, and upon the ridges green crops can be successfully grown. As the name implies, the sewage is applied in an intermittent manner. This process of sewage treatment is a costly one in the first instance for the preparation of the ground, the outlay in some instances reaching a sum in excess of £200 per acre, whilst the cost of preparation of ground for broad irrigation might not exceed, under favorable circumstances, £10 to £15 per acre. The cost of works, however, whether for irrigation or filtration, must be governed by local conditions, my own experience proving that sums from £7, 10*s.* to nearly £700 per acre have been expended in the preparation of land for sewage treatment.

The treatment of town sewage by chemicals has now occupied the attention of engineers and others for many years. I do not propose in this paper to refer to the numerous processes that have been brought before the public during the past twenty years; and although not prepared to support a scheme of chemical precipitation *per se* for the purification of sewage, assuming the effluent has to be discharged into a stream of ordinary purity, still I am strongly of opinion that great improvements have been made, and it is somewhat satisfactory to find that lime, the first precipitant used, still holds its own as being able to produce fair results in sewage purification. The great difficulty for many years was how to dispose of the considerable volume of sludge, which is the natural result of precipitation. This difficulty has, however, been successfully overcome by means of the improved system of sludge presses in operation at various works. The sewage effluent from any scheme of chemical precipitation should pass through a properly-constructed artificial filter, or through land deeply drained on the principle of intermittent filtration.

The sewage from towns situate upon the sea coast is generally cast into the sea, at a point below low-water mark. In some instances this is done without in any way separating the heavier matters held in suspension; in other instances, — notably Brighton, Torquay, and other places, — intercepting-sewers have been constructed at considerable cost, by which means the sewage has been diverted to a point some distance from the town, where the influence of the tides has not exerted any disagreeable effect upon the towns so sewered, by causing any return to the beach of the sewage discharged. In other instances sewage from large cities and towns, such as London, Liverpool, Glasgow, Newcastle, and Bristol, is discharged into tidal rivers. This emptying of sewage into rivers is, however, in some instance, productive of great nuisance to the public, and injury to the river. At the present time a Royal Commission is sitting to consider remedial measures for the metropolitan sewage. I had the honor of appearing before such Commission as a witness, and advised what, in my opinion, was the most desirable course to adopt, viz.: the extension of the existing outfall sewers of the metropolis, so that the sewage may be discharged into the sea beyond the range of tidal influence, even assuming that such works would entail great outlay.

Mr. Lawson Tait, in treating of "The Utilization of Town Refuse," gave some account of his practical experience in dealing with the sewage of Birmingham. He said that Birmingham, from its situation on the highest part of the Midland district, was obliged to adopt in its early history the system of surface household wells, and until recently these had an almost universal prevalence throughout the town; indeed, they exist now in very large numbers. Closely associated, the midden privy was constructed, and in 1871 there were nearly 20,000 of these centres of disease existing in the borough, their aggregate area exceeding thirteen acres. As by far the greater part of the town is built upon hills of loose sand and gravel, it is perfectly needless for me to say that soakage from the privies into the wells was of constant occurrence, and is still far too frequent. Of these privies about 14,000 drained at that time into the sewers. There were about 7,000 water-closets, the contents of which, together with all the road-sweepings, manufacturers' refuse, and countless other impurities, were turned, and had been ever since the town existed, into the small river traversing its area. Up to 1871, the government of the town was conducted upon lines which it is no part of my business here to discuss or condemn, but no one who knows the town at all but will be able to substantiate my statement that, the new *régime* inaugurated by the distinguished statesman who at the present moment presides over the Board of Trade has, as it were, reconstructed every aspect of our municipal life. The town has improved in every possible way; its death-rate has fallen nearly five in the thousand, and the average age at death has been raised six years, and the whole of these beneficial changes are due to the inauguration of Mr. Chamberlain's sanitary policy.

The problems we had to solve were two, — how we could treat the fluid impurities which ran into the river, and how we could dispose of the solid household refuse; but they were extremely complicated, from the enormous bulk of the material to which they had to be applied, and it is from this chiefly that our progress in their solution was so slow. We found, in fact, that theoretical chemistry was of but little help, and that laboratory experiments were absolutely futile. We sent out inquiries, and we visited by deputation all the large towns in Great Britain which were in any way comparable to our own, and these inquiries and investigations, concurrently with our experiments, occupied a period of nearly seven years. As they advanced, and as the results of our experiments became more accurate and more extended, the more certain did we become that the original conclusions established by the report of the Birmingham Sewage Inquiry Committee were those alone which were applicable to our town. The recommendations were as follows: "The exclusion of animal excreta from the sewers is, in the opinion of the Committee, essential both to the effectual treatment of sewage, and to the health and comfort of the population, and they have arrived at the conclusion that this object may be attained by a reform of the system of exposed privies and open middens now prevailing in the town, and which defile the air, poison the water, and, by means of connecting drains, pollute the sewage."

The first principle we established, and we arrived at it chiefly from the disastrous experience of other towns, where it had not been adopted, was that it was absolutely essential to keep the two elements with which we had to deal, — the household refuse and the excreta, — entirely separate, and for this purpose we established a system of dual and joint collection, which has proved perfectly satisfactory. In the reconstruction of closet accommodation, we filled up the old middens, and replaced them by simple closets, under the seats of which we placed large galvanized pans. These pans are coated inside from time to time with boiling tar, an operation which very much diminishes the smell and enables them to be easily cleaned. Somewhere near the closets ash-tubs, either of wood or iron, are placed, into which the tenants are requested to place their household refuse, and they are strictly forbidden to empty slops into the pans. It took a long time to educate the population to the fulfilment of even these simple directions, and much trouble was encountered for several years in establishing the fresh arrangement. We found that many people objected to it, and clung with a mistaken but most affectionate pertinacity to the foul middens to which they had been accustomed. The arrangements for the collection of the pans and ashes were at first defective, and a good deal of outcry was raised from time to time against the objectionable smells which they emitted as they passed through the streets; but as the details became perfected one after another these objections ceased, and we were not troubled with any complaints. Indeed, the complaints now are all against the old system, for when the remaining middens are to be emptied, the overwhelming stench which prevails all over the neighborhood for some hours after the process is a never-failing theme of complaint from exactly the same people who, when they were accustomed to its nightly recurrence, thought it hardly worth mention.

The collecting-vans are arranged to carry eighteen pans and about one ton of ashes, and the collection is made from each house on the average once a week. When the pan is removed it is covered by a lid, made to fit perfectly tight by means of a strong string and a band of India-rubber, so that any smelling is avoided. The ash-tubs are emptied into a special receptacle at the hinder part of the van. These vans are taken to our central depôt, and there are subjected to processes of which I shall shortly speak.

The continually increasing cost of collection, and the continuously diminishing value of the material gave indications that the continuation of that policy would have been ruinous. At this point it may probably be convenient to anticipate a criticism which is sure to be raised upon the general system of our policy for the disposal of refuse which has been adopted in Birmingham. Towns will be pointed to, of great importance and large size, in which no such costs as these are incurred, and instances of towns where the water-carriage system is in use will doubtless be specially indicated. We may, and probably will, be asked the question, Why has not the water-carriage system been adopted in Birmingham? And there are some amongst us still, I am sorry to say, who are disposed to take such a retrograde step. I need not answer the objection in detail, because the answer to it will be found in the volume I have already quoted, the Report of the Birmingham Sewage Inquiry Committee. Suffice it to say generally, that as Birmingham has a very elevated position we cannot obtain a water supply by gravitation. Every ounce of water used in the town, unless obtained from a soft-water cistern placed on the roof of a house, has to be pumped, and the public supply has to be raised from 200 feet to 600 feet, and I need not say that not only is this an extremely costly process, but that the quantity we can obtain, and from reservoirs, is such as is calculated only for the maximum requirements of a constantly growing population for all purposes exclusive of a water-carriage system of sewage. It is extremely doubtful if we could obtain in any way the additional quantity of water required for this purpose, and even if we could obtain it our difficulties would be increased instead of diminished by every gallon of water-closet liquid which was added to our already enormous bulk of sewage. The conclusion is, therefore, that the true economy is to preserve from waste these materials which having been taken from the land should be restored to it, and that it is a mistake to waste them by such dilution as renders them practically valueless.

Acting upon these principles, the plan we adopted was to act upon the one kind of refuse by means of the other. Immensely to our surprise, and to our no small satisfaction, we found that the solid ash-tub refuse, which amounts to 72,000 tons per annum, would burn in properly-constructed furnaces without the addition of any other kind of fuel, and in this burning it is reduced to one-fourth of its original bulk, and the result is a peculiarly useful siliciôus clinker, which we turn to all kinds of useful purposes. It has been used to erect buildings with, to make roads and paving blocks, staircases, horse-troughs, tables, and ornamental fireplaces, samples of all of which may be seen at our works. Of this kind of household rubbish there has been about eleven boats per week sent out into the country, the mere cost of transit being £500. If we burned the same amount, the cost would be £270; and if we used all the clinkers, as we hope to do, we should save £230. The burning of this amount would occupy three furnaces of the kind we have erected for the purpose, and of the total bulk of the rubbish thus burned, seventy-five per cent would be dissipated in the form of heat.

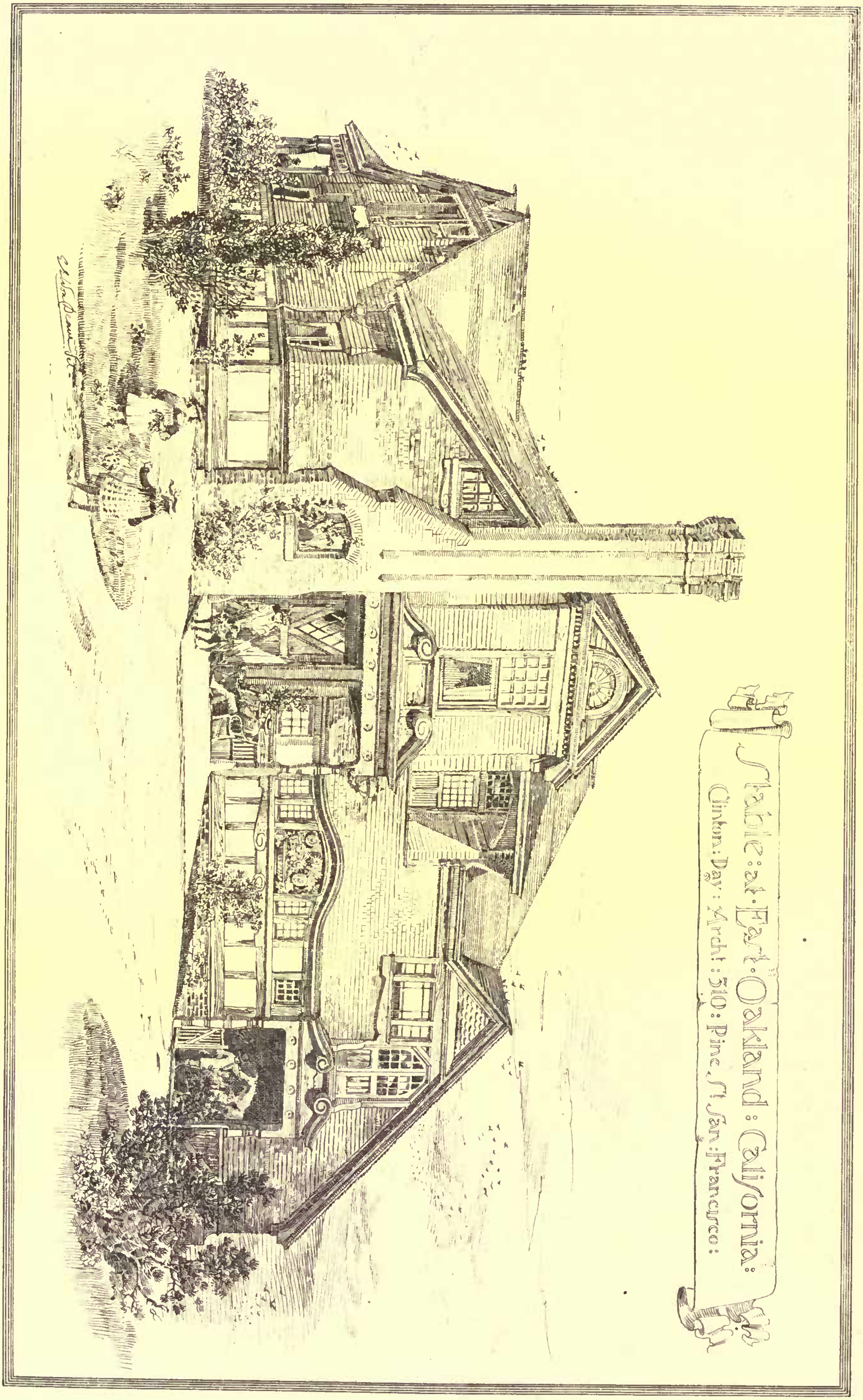
In order to utilize this waste heat, the plan adopted by the Health Committee was to apply it for the removal of moisture from the contents of the pans. The means by which this is done is extremely simple. Boilers are placed in the furnaces, and the heat is transferred by means of steam to large machines, of which a working model is here exhibited, into which about sixteen tons of pail-stuff are put as a charge with sufficient sulphuric acid to fix the ammonia. A hot-air blast from the furnace flue is drawn through the machines by means of a blower. The steam is applied by means of a steam-jacket and hollow rotating spindles, and in from sixteen to twenty hours the sixteen tons are reduced to one ton of solid *poudrette* containing from seven to nine per cent of ammonia, according to the time of the year, and from two to three per cent of phosphates. Without any further treatment or addition this forms an admirable manure for top-dressings, and for all kinds of rapidly-growing roots, particularly the beet-root, and in the growth of those vegetables for the purpose of sugar manufacture this kind of manure has been found extremely valuable, and doubtless it will also have a ready sale for sugar-cane and cotton.

Concerning its commercial value no absolutely certain statements can be made. So long as we were making ten or fifteen tons per week, and until we were satisfied we could make a much larger

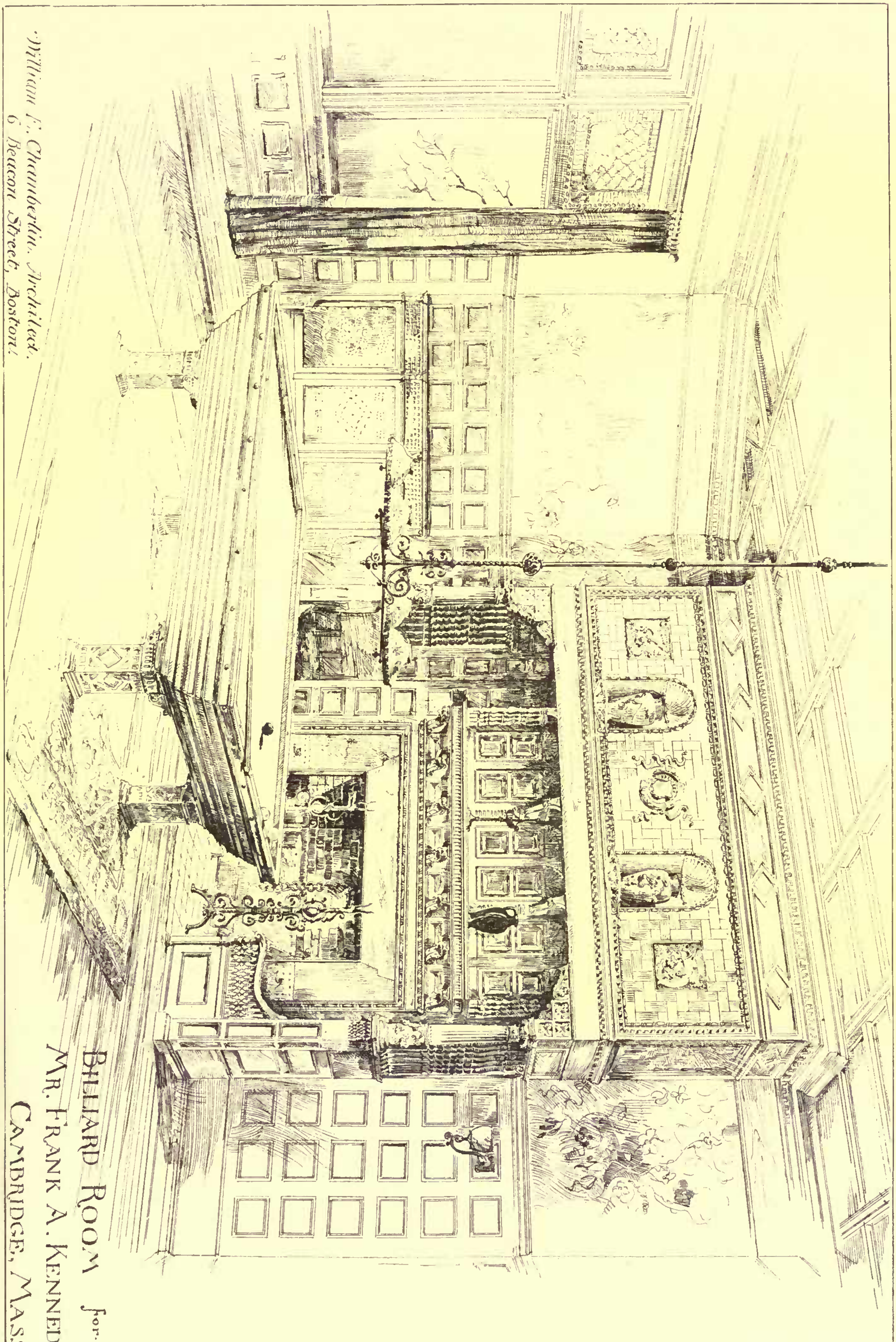
PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON

Mayence Cathedral, Germany.

The Heliotype Printing Co. Tremont St. Boston.



The Heliotype Printing Co. Tremont St. Boston.

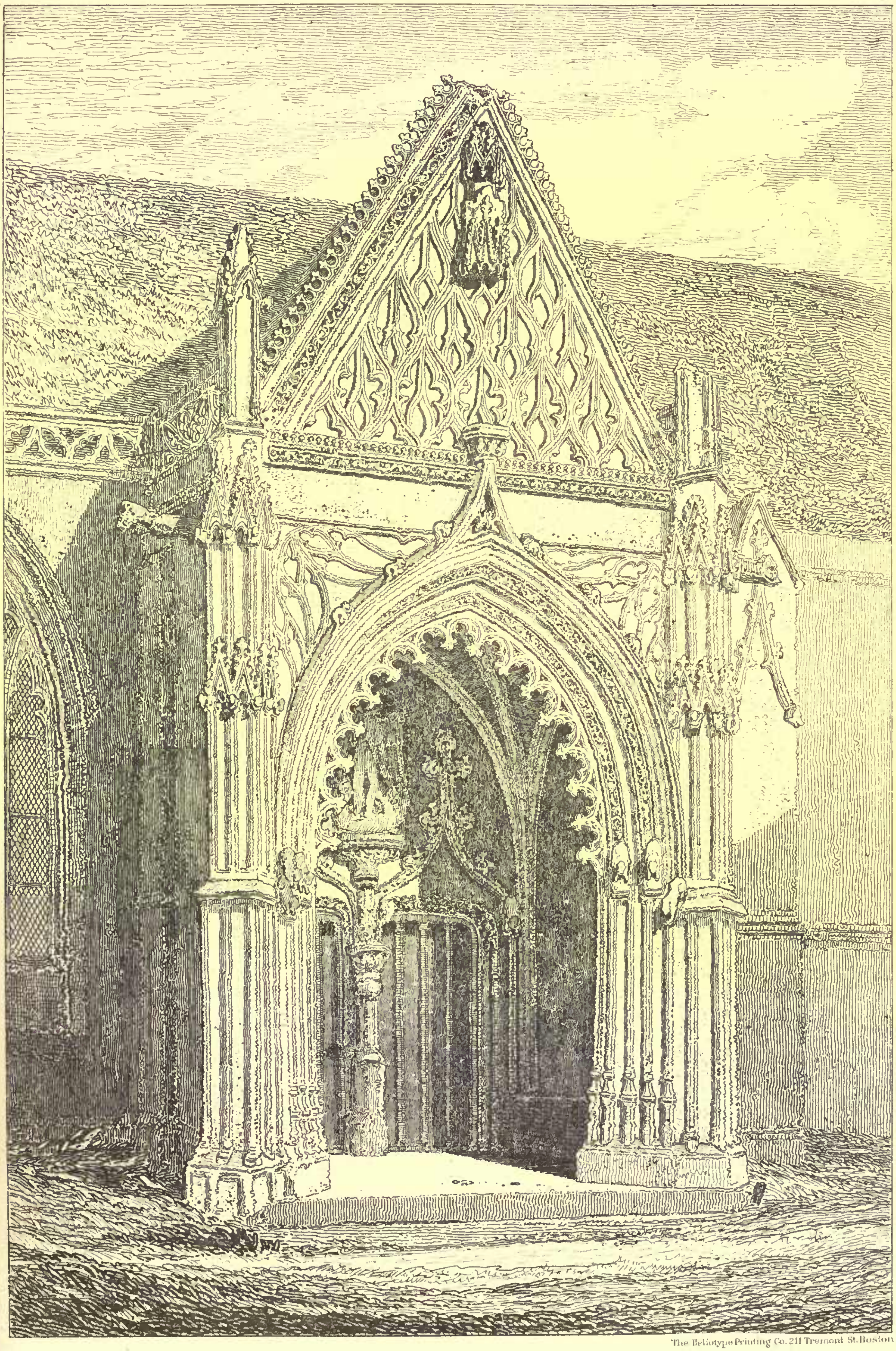


William E. Chamberlin. Architect.
6 Beacon Street, Boston.

Billiard Room for
Mr. Frank A. Kennedy.
Cambridge, Mass.

The Heliotype Printing Co. 211 Tremont St. Boston

American Architect and Building News, Oct. 18 1884 No. 460



The Heliotype Printing Co. 211 Tremont St. Boston.

CHURCH OF ST MICHEL DE VAUCELLES, CAEN.

North Porch.

Bay of Amalfi, Italy.
from the Monastery of the Capucins.

amount, we did not very energetically enter into the question of the price we could obtain for it. We were quite satisfied to hand it over to a large firm of artificial-manure manufacturers, who took all we made at £5 per ton without any reduction for carriage. When our output rose to twenty and twenty-five tons per week, this firm found the quantity larger than they could deal with, and we accepted a temporary reduction of price to £4 a ton. During the last two months, however, we have been making efforts to obtain other markets and a better price, and we found no difficulty in getting £5 a ton; in fact, we have been able to get as much as £7 10*s*. We also find that the Corporation of Warrington can command a steady price of £6 10*s*. per ton for exactly the same material.

THE ILLUSTRATIONS.

CHURCH OF ST. MICHEL DE VAUCELLES AT CAEN,[1] (CENTRAL TOWER AND NORTH PORCH).

THE Abbé De la Rue, in his excellent publication upon the town of Caen, does not furnish the satisfactory information which might have been hoped, relative to the date of the erection of the Church of St. Michel, in the suburbs of Vaucelles. He contents himself with observing, that it is a work of different eras; that the tower and its supporting pillars belong to a primitive church, of which no account remains; that a part of the nave may be seen, from the circular form of the arches having been obviously altered into pointed, to have belonged to the same church; that the choir was raised and increased during the sixteenth century; that the aisles are partly of the same century, and partly of the preceding; and that the other portion of the nave and the new tower are productions of our own days.

In all this there is nothing definite; and, unfortunately our knowledge of Norman architecture is not such as will justify us in attempting to fix precise eras to the different specimens which are left us of it. As far, however, as it may be allowed to judge from corresponding edifices, Mr. Turner seems correct in his opinion, that "the circular-headed arches in the short, square tower, and in a small, round turret which is attached to it are early Norman." He subjoins the observation, that "they are remarkable for their proportions, being as long and as narrow as the lancet-windows of the following era." The conical stone-roofed pyramid is, with the exception of its lucarne windows, most probably of the same date. With regard to the porch, its general resemblance in style to the southern porch of the Church of St. Ouen, and its having, like that, its inner archivolt fringed with pendent trefoils, are circumstances that have likewise been pointed out in the work just referred to. Both porches may probably be of nearly the same date, the latter part of the fourteenth, or beginning of the fifteenth century. Caen, but a short time before the Revolution, contained another very similar architectural specimen in the western portal of the Church of St. Sauveur du Marché, now replaced by an entrance altogether modern. The nave of the Church of St. Sauveur was built, according to De la Rue, in the fourteenth century; and it may fairly be inferred, that the portal was also of the same date; but this porch wanted the pendent trefoils, and was altogether less ornamental than that of St. Michel, as the latter was then at Rouen. Both those at Caen, however, agreed in the wall above the arch rising into a triangular gable, covered with waving tracery, a very peculiar, and a very beautiful style of decoration.

A DESIGN FOR A BATTLE-FIELD MEMORIAL, LEXINGTON, MASS. MR. GEO. R. TOLMAN, ARCHITECT, BOSTON, MASS.

AT a town meeting held in Lexington, November 6, 1883, a committee was appointed to consider and report at the March meeting, on the subject of marking the principal sites of historic interest in the town. March 3, 1884, the town heard and accepted the committee's report, and referred the subject back to them, with full powers to carry out the recommendations suggested; also granting an appropriation to cover the expense. One of the sites to be marked is the slope, near the present High-School, where Earl Percy planted one of his field-pieces early in the afternoon of April 19, 1775.

The committee in consultation with the architect decided upon a design by him of a stone cannon, roughly suggested.

The accompanying print is from a pen-and-ink drawing made by him from his submitted design, which was in water-color. In the design the motive was to suggest only, without attempting a reproduction of a field-piece. The weight of the memorial is about five-and-one-half tons, the gun being about six feet long.

It was acceptably executed in Concord granite, by Mr. R. K. Carpenter, at his yard in West Medford, Mass.

It will be placed in position about the middle of October.

BILLIARD-ROOM FOR F. A. KENNEDY, ESQ., CAMBRIDGE, MASS. MR. W. E. CHAMBERLIN, ARCHITECT, BOSTON, MASS.

STABLE AT EAST OAKLAND, CAL. MR. CLINTON DAY, ARCHITECT, BERKELEY, CAL.

THE BAY OF AMALFI, ITALY, FROM THE MONASTERY OF THE CAPUCINS.

[1] From Cotman's "*Antiquities of Normandy*."

THE CATHEDRAL, MAYENCE, GERMANY.

A DESCRIPTION of this building may be found in the *American Architect* for December 6, 1879, page 180.

HELPS.[1]

SEVERAL years ago, we passed an exceedingly pleasant evening at the house of an English architect, who,— apart from his disdain for America, its scenery, its architecture, and its inhabitants, a disdain so intense that he then avowed his intention never to visit this country, though he is a constant traveller in the older world — was a most entertaining and agreeable host, and with the simplicity of a man who is confident of his powers exhibited to us and the other guests of the evening his collection of sketches,— a vast array, for he is a most industrious and rapid worker, and, moreover, an adept in the use of the camera lucida, which he does not hesitate to use both for the sake of saving time, and of securing perfect accuracy in sketches which are likely to be of professional value to him.

But what struck us more than the amount of work or the excellence of it was the perfection with which the collection was arranged and classified. A lawyer's docket was nothing to the methodical system here exhibited before us. A guest while examining a sketch had but to raise a question whether there was or was not a similarity between its subject and some other building, when the host would pull open one of his neat little drawers, and in a moment produce the proof wanted; if it was n't a sketch, it was a photograph or an engraving. This evening visit gave us a new idea as to what an architect's working-library should be, and showed us how little practically useful are the shelves full of handsomely bound volumes, which, we confess, had up to that time been the ideal library which we dreamed of and hoped for. Observation has since shown that this sort of library is gaining in favor with the profession, and topical scrap-books and portfolios in many offices take the place of the attractive red morocco and gilt bindings. The true way to form an architectural library would be, of course, to buy all illustrated books in duplicate, one volume to be kept for reference with all its glory of red and gold intact, and the other to be ruthlessly disembowelled and its viscera distributed under their appropriate classes; but, alas! who can afford such a library as this?

We dare say our readers have wondered what induced us to adopt the seemingly erratic custom of prefixing to each printed article an initial-cut, which, as often as not, has no association with the article it introduces. But we hope they have felt that they added interest to the page, and made it "easier reading"— if in no other way, then by making it shorter — and that they have found in these miscellaneous cuts the same sort of profit and interest that comes from turning over a fellow-worker's pocket sketch-book. And we hope, too, that not a few may have repined that so much good material so many useful hints and *motifs* were buried up and lost in a mass of printed matter where it was not easy to find them, as the text with which they were allied would afterwards afford no clue to their whereabouts.

It was always our intention that all this good material should not fail of its full usefulness, but should sooner or later see the light again in more convenient form; and at length we have looked over our accumulation and have selected enough from it to make, both in quantity and quality, an architectural miscellany which we believe many designers will be glad to have, and which we hope will meet with such acceptance that this issue will prove to be simply the first of a series of similar ones; for herein lies the real value of the undertaking.

The cuts we have selected have been arranged by subjects, printed on extra heavy and strong paper, and enclosed, loose, in a paper envelope, so that they may not only be most convenient for immediate office use, but so that a future re-classification may be possible, as other issues are put forth which may contain sheets treating the same subjects as are included in the first issue: so in this instance, at least, an architect need not hesitate to arrange his plates according to his own idea of greatest utility through his unwillingness to do violence to a "fine binding."

Looked at as we would look at a publication with whose being we had had nothing to do, we cannot but say that we are surprised at what has been accomplished. We have here a work of no mean artistic pretension, for in the couple of dozen or so sheets containing, perhaps, one hundred and seventy-five cuts, we have specimens of the handiwork of many skilful sketchers, a fact which lends a sparkle to the page, and creates a sustained interest, which one does not feel on turning over page after page of one man's work, however cunning a worker he may be. Some of the sheets taken as a whole are exceedingly "taking" at first sight, and closer inspection of the individual cuts declares the reason: for instance Plate 10, which in spite of its lugubrious title, "Tombs and Funeral Monuments," has altogether the most jocund air of any in the collection. Others evidently await the advent of future issues to acquire their full value.

[1] *Picturesque Sketches:* comprising Architectural Sculpture, Statues, Monuments, Tombs, Fountains, Capitals, Cathedrals, Iron-work, Details of Ornament, etc. Boston: James R. Osgood & Co., 1885. Price, $1.50.

SUBTERRANEAN RAILWAYS IN PARIS AND IN LONDON.

The Great Bed from Ware, Eng.

The pressure of population on the channels of communication, of which we have so much experience in London, is becoming intolerable in Paris. In 1881 a population of 2,243,000 persons was contained in 77,000 houses, over an area of thirty square miles, in that city. In the same year the "Greater London" of the Registrar-General contained 4,764,312 inhabitants, occupying 645,818 houses, built over an area of 697 square miles. The total passenger traffic of Paris is returned at 340,000,000 persons in the year, or about 932,000 per day, of whom about thirty-four per cent were carried by tramways, thirty-one per cent by omnibuses, thirty per cent by cabs and other vehicles, and five per cent by steamboats. In London the total amount of traffic is not accessible; but 384,000 pedestrians and 75,000 vehicles pass daily over the metropolitan bridges; and the traffic on three of the metropolitan railways — viz., the Metropolitan, the Metropolitan District, and the North London — amounted in 1881 to 373,000 passengers per diem. This total takes no account of the daily influx of passengers by railway at Victoria, Paddington, Euston, St. Pancras, King's Cross, Ludgate Hill, and the Eastern Counties Termini, or of those who, arriving at the London Bridge or the Waterloo Stations, do not cross the river; or, again, of the dense traffic on the high-level line from Charing Cross to Cannon Street. The rate of travelling in Paris, according to the previous statement, is rather more than 150 journeys per inhabitant per annum. Going and returning, then, without counting pedestrians, each Parisian will only take an enumerated trip by vehicle three times in a fortnight. At the same rate the London journeys by railway or other vehicle would amount to upwards of 711,000,000 passenger trips per annum, or nearly 2,000,000 per diem, without counting pedestrians.

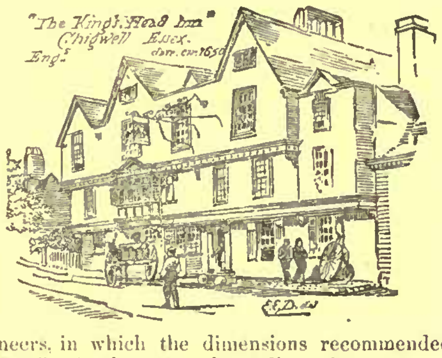
Whether we regard London, Paris, or any other great centre of population, it becomes apparent that an enormous amount of inconvenience and loss of time is due to the abandonment of the ancient Roman method, borrowed from the camp, of building cities on the plan of straight thoroughfares, crossing each other at right-angles; a return to which excellent method has been accomplished by the builders of the rapidly-growing cities of the United States. The actual loss of that time which has a direct money value that is incurred by the want of a direct thoroughfare, either for locomotives or for common road vehicles, from the northern to the southern railway stations in London, must be something very serious indeed. In Paris there exists a similar inconvenience, although, of course, on a smaller scale, which it is now proposed to remedy. Three lines of subterranean railway are projected for this purpose. One will connect the Chemin de Fer de l'Ouest with the Lyons Station, with a branch to the Arc de Triomphe, and another, by the Trocadéro, the Mount Parnasse, and the Orleans Stations to the Sceaux Station. Lastly a line is to run north and south, inside the existing Ceinture Railway, passing the Nord and Est Stations, the Bourse, and the Halles Centrales, to the Sceaux Station.

The total length of the line which it is thus proposed to construct is 23.25 miles, for which the estimate is £5,720,000, or about £246,450 per mile. The average gross revenue of the tramways along the boulevards and from the Place de l'Etoile to La Villette, together with that of the three-horse omnibus service along the Boulevards de la Madeleine and le Bastide, is £26,833 per mile per annum. If the new line provide for the traffic *à grande vitesse* only, as will probably be the case, and if the traffic secured by the new line yields an equal revenue per mile to that above cited, there can be little doubt that the undertaking would pay six and one-half per cent on the capital; while, if the amount of the omnibus traffic cited be taken as a measure of revenue, the return would be between nine and ten per cent on the capital, assuming the estimate not to be exceeded.

It may be instructive to compare this outcome with that of the railways through London. Unfortunately, the accounts of the Charing Cross and Cannon Street line, like those of the Ceinture Railway in Paris, as involving operations on the part of more than one company, are not distinguished in the annual returns. But we can take the average of the statistical features of the North London, the Metropolitan, and the Metropolitan District railways, which form an aggregate length of fifty-two miles. Of these, the cost per mile, at the end of 1883, averaged £416,538. The gross revenue was £30,047 per mile per annum, and the working expenses came to £14,400 per mile per annum. The resulting earning on capital is only at the rate of 3.52 per cent per annum; but this net return on traffic is reduced by the omnibus character of the North London traffic, which, following the usual law in such cases, costs fifty-one per cent income to work, while the two passenger lines are worked at forty-two per cent of gross income. On the North London line, each servant of the company only earns £227 per annum, while on the Metropolitan District the mean earning per servant is £348, and on the Metropolitan £395. On the Ceinture line (*Rive-droite*), the earning of each servant of the companies engaged averages £358 per annum; while the average earning per servant on the Metropolitan and Metropolitan District lines, taken together, is £375. It thus appears that it is safe to estimate the working costs of the new Parisian lines as not likely to exceed forty per cent of the gross income, while the capital cost is only about five-eighths of that of the three London lines.

It may be hoped that a consideration of these figures may tend to stimulate the attention of the metropolitan authorities to the construction of a better line of communication from north to south in London. The enormous cost of a line through London itself is very formidable, and can hardly be encountered by the promoters of any new line, taken *per se*. In 1878, the cost of the Metropolitan Railway stood at £639,000 per mile, and that of the Metropolitan District Railway at £680,000 per mile. The distances then open were fourteen miles and nine miles respectively, and the extension of the lines to cover distances of twenty-two miles and eighteen miles has reduced the enormous mileage cost, while at the same time it has fed the traffic. At present, however, while regarding the possible development of electric traction, it perhaps is hardly the moment for asking the public to find two-thirds of a million per mile in order to link Euston and Charing Cross by railway. As to a well laid out and practical street, however, a hint may be taken from the returns of the traffic of the Paris omnibuses. Let us give one pair of facts alone. The earning of each passenger-carriage on the Metropolitan District Railway in 1879 was £2,028. The earnings of each three-horse omnibus running along the Boulevards de la Madeleine and le Bastide since 1883 amounts to £2,272 per annum. It is true that it costs nearly three and a half times as much to move an equal weight for a mile over the road as it does over the railway; but, on the other hand, the interest of money required is eight times as much in the latter case as in the former. Without expressing an opinion as to what is best, there can be no doubt that a wide, straight, well-paved street, served by a thoroughly well-ordered horse service, would, at the same time, be a great benefit to London and a highly-remunerative enterprise to the purveyors of this mode of communication. In fact, the figures above cited, which are the result of a long series of observations, explains how it is that the dividend of the London General Omnibus Company is something more than twice the net earning on capital of the Metropolitan Railways.— *The Builder.*

THE SIZE OF BRICKS.



The best method of developing the art of building in brick has occupied the attention of architects and engineers in Switzerland for some years, and with this view it has been determined to attempt to fix a certain standard size of brick, and a report was presented to the Swiss Society of Architects and Engineers, in which the dimensions recommended were 9.84″ x 4.72″ x 2.36″ As, however, these dimensions were not agreed to by all sections of the Society, a special Federal commission was appointed to inquire into the subject. A report was presented to the General Assembly of Cantonal Delegates at Berne, by M. Favod. The author, first of all, gives a brief account of the bricks that were used by the Assyrians, Egyptians and other ancient peoples. He then gives tables of the dimensions of the bricks that were used from remote periods up to the seventeenth century, and of those in use at the present day in Italy, France, England, Belgium, Austria, Germany and Switzerland. From these tables he shows that the standard size should be between the limits 4.45″ long, 4.43″ broad, and 1.97″ or 2.56″ or 2.76″ thick, and 11.63″ long, 5.12″ wide, and 1.97″ or 2.56″ or 2.76″ thick; or, taking a mean, the size should be 9.84″ x 4.72″ x 2.36″. This size is made at the present time, as is also that of 9.84″ x 4.72″ x 2.76″.

The author is greatly in favor of the thicker brick, and a great deal of the paper is taken up with a discussion of the possibility of properly burning it, many of the Swiss brick-makers having stated that they cannot burn bricks having a greater thickness than 2.36″. In reference to the thicker bricks, he remarks: —

1. That, the other dimensions remaining the same, the resistance increases with the thickness.

2. There is, perhaps, rather more difficulty in drying a thick brick, but care in mixing the beds of clay, the addition of sand, gradual drying, etc., will readily get over it.

3. In burning the bricks must be carefully placed in the kilns, as the gas will follow the shortest route to the outlet. The bricks must be arranged so as to oppose obstacles to its escape in this direction, while facilitating its passage by the longer route. The bricks, after being dried in the sheds, should be further dried by hot air from the kilns before being burnt. All apertures by which the air could pass into the kilns must be carefully closed, and the cooling of the bricks must be gradual.

4. When color is of importance, attention must be paid to the fuel.

Coals of inferior quality frequently contain extraneous matter which is deleterious to good color, and also the weathering qualities of the bricks, and is sometimes the cause of efflorescence.

5. With the same material there will be a better output of first-class bricks with a 2.76″ than a 2.36″ thickness, because vitrification does not begin so soon. Of course the best quality can not be obtained from clays which are very chalky, earthy or sandy, but, with careful manipulation, very fair bricks may be made from very moderately good earth.

The author conducted some experiments at the Horn brick-fields of M. Bourry, where the bricks are made by machinery and burnt in Hoffman kilns. These experiments were performed with eight varieties of earth: three blue, three yellow, one sandy and one earthy. Bricks were made from each variety separately, and also from mixtures of different kinds. Their dimensions were 9.45″ x 4.53″ x 2.76″. They were dried under different conditions, according to their kind, and burnt carefully in kilns with other bricks. The result was that each different clay and each mixture produced bricks of different colors, but all well burnt and sound. With regard to the question of price, of course, if the manufacturer sells his bricks by the thousand without reference to size, the smaller they are the better for him. The contractor, too, is apt to prefer small bricks, because with them he uses more mortar, which costs him less: but, on the other hand, he requires more bricks per cubic yard (the number of bricks of different sizes in a cubic metre of work are given), and there is more labor in setting them, so that what he gains in one way he loses in another.

In regard to the quantity of mortar, Dr. Boehme's experiments at Berlin in 1875 proved that no more mortar than was actually necessary to keep the course horizontal and effect the cohesion of the bricks (for which purpose joints of .4″ thick are ample) should be used, as, whether the mortar becomes more or less hard than the bricks, the result is in either case to reduce the strength of the work. Experiments made with blocks of twenty sound bricks, one set of blocks cemented with various kinds of mortar and cement (the joints .4″ thick), another set consisting of bricks laid dry, and surrounded with cement simply to keep them together, gave as mean resistences to compression: for the first set, 1,618 pounds per square inch to cause splitting, 1,934 pounds for the destruction of the bricks; and for the second set, 2,202 pounds per square inch to cause splitting, and 2,291 pounds per square inch for destruction, showing that the dry bricks gave a mean resistance of one-third more than those set with mortar before splitting, and one-fifth more before destruction. The author therefore concludes that, to secure the greatest strength, thick bricks with a minimum of mortar should be used. The author suggests that the price of bricks per thousand should vary according to the number required per cubic metre of work, so that the manufacturer may be paid according to the size of the bricks. Finally, he recommends that the standard brick should have the dimensions 9.84″ x 4.72″ x 2.36″. — *Exchange.*

THE PLUMBERS AND DEALERS.

New York, September 19, 1884.

To the Editors of the American Architect: —

Gentlemen, — We enclose our circular to the Master Plumbers, addressed to them on the question of "Protection" now agitating their trade. As the circular contains some points that may be interesting to architects, and as we are old advertisers in your paper, we take the liberty of asking you to publish it in your next issue.

Very truly yours, Myers Sanitary Depot.

New York, September 15, 1884.

To the Master Plumbers: —

We have been requested from several sources to express our views upon the matters now under discussion between the plumbers and the manufacturers of plumbing supplies. It seems to be chiefly due to there being two sets of resolutions one of them National, and the other Local. At the combination meeting of dealers and plumbers, after the reading of the National resolutions by Mr. Andrew Young, all of the dealers present expressed their views, and Mr. Young, with the plumbers present, could not but have thought from remarks made by the dealers that their fondest hopes were about to be realized. Later on at this meeting, the local resolutions emenating from the New York and Brooklyn Associations were submitted, and shortly after the meeting adjourned with the understanding that the dealers would hold a separate meeting. A few days later at the dealers meeting, the local resolutions which were supposed to compel all plumbers to become members of an association before dealers could sell to them were presented. The framers of the letter addressed to Mr. A. Young, President of the National Association of Master Plumbers, had these local resolutions appended to the reply which they had prepared, we, in common with others, supposing these resolutions to be the National resolutions, signed the reply that was addressed to the President of the National Association. We have since discovered our error, and having read the National resolutions we find that we can heartily approve of them, and believe that if they should be accepted by the dealers, the consumers of our goods, and all concerned would alike be benefited.

Some years since, we sold a large bill of goods to a builder, who hired a master-plumber to put the material into the building; after the completion of the work, and a comparison was made of prices with former estimates, the builder found he had lost money, and he can never again be induced to buy his own plumbing material: this is the experience of the large builder as well as the individual house owner. It is our opinion that builders, as well as individuals, will find it to their own interest to always select a competent plumber, and allow him to buy the goods for them, then the responsibility for the proper working of the material rests with the plumber, but if the individual buys the goods, and hires the plumber to put them in, and if there is anything unsatisfactory in the working of them, a contention is apt to arise as to the responsibility, and the individual if he has been so lucky as to have obtained a discount on his purchases, finds that his extras have cost him more than the discount he thought he had saved.

We very much deprecate the spirit of the communication dated September 3d, addressed to Architects by the Chairman and Secretary of the Dealers meeting, we had no knowledge of this letter until it appeared in public print, we are not in sympathy with those who believe that this move is "an apparent effort to combine for the purpose of extorting from the public." It is the manufacturer who fixes the prices, and we are not aware that the plumber has asked us to raise our prices.

And we further deprecate the terms "communistic" and "trades-unionism," which the architects are asked to help stamp out. In all our dealings with the plumbers, we fail to discover anything of the kind. Very truly yours, Myers Sanitary Depot.

A. G. Myers, *President.*

[We publish this document as we are requested, but we think that the final scene of this comedy of errors will be brought on the stage more speedily if both parties will let printer's ink alone. The quarrel is obviously one which should be settled by a reference to a joint committee. — Eds. American Architect.]

THE BROOKLYN HALL-OF-RECORDS COMPETITION.

New York, September 17, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I enclose the circular sent out by the Kings County Board of Supervisors, concerning the competition which closes to-morrow, for the designing of the new Hall of Records for that County. It is in certain respects a model, I think, of what ought not to be done in arranging such a competition. I also enclose a copy of a letter I mail to that Board to-day, regretting the lateness both of that letter and of this; though I could not in any case have really hoped that such a letter would effect a change in the published regulations of the competition. Is it not strange and sad that for so important a building, so near the very metropolis and centre both of wealth and of architectural affairs in this country, such an extraordinary programme should be officially promulgated.

You are at liberty to do anything you please with these enclosures except to consign them to the waste-basket. If they are of no use to you will you kindly return them by mail to me? I enclose the necessary stamps, and sign myself,

Yours very truly, Subscriber.

New York, September 16, 1884.

To the Special Committee on Hall of Records, Brooklyn, Kings County, N. Y.: —

Gentlemen, — Early last August, in response to an advertisement sent me by a friend, I applied to the Clerk of the Board of Supervisors of Kings County, for a copy of the conditions regulating the proposed competition for the design of the new Hall of Records of that County. In due time these were forwarded me by mail, and I at once examined them to see what inducements they held out to intending competitors. I take the liberty at this late date, on the eve of the closing of your competition, and presumably on the eve of your decision thereon, to lay before you the reasons which led me, and I doubt not many others to decide against engaging in this competition; and I greatly regret that a press of other duties has prevented my addressing you earlier.

Few will deny that the object of an architectural competition is, or should be, to secure the best possible design, by inviting to friendly rivalry through the stimulus of prizes, the largest number of competitors possible, thus making possible a choice from the greatest variety of designs. To this end, few will venture to deny the following conditions to be essential: —

1st. Prizes to be sufficiently large to attract the efforts of even distinguished and prosperous architects.

2d. The drawings and labor required should be reduced to a minimum; for evidently, the smaller the amount required to be risked, the greater will be the number of competent architects willing to take that risk.

3d. The requirements of the new building, whether as to form, size, material, or character, should be given in the clearest manner, either by letter-press, figures, or diagrams, or all three.

4th. The competitors should know who is to judge their work, and the jury selected for this important task, especially in the case of a building of public importance should be of conspicuous ability, both architectural and practical, and of unchallenged fair-mindedness.

5th. There should be some guaranty that every competitor will receive back either his drawings, or a fair equivalent therefor.

The "Rules and Regulations" of the present competition, whatever may be said of the value of the prizes, fail utterly to satisfy the last four conditions.

Besides the eight or nine drawings called for, your circular requires detailed specifications and estimates, and a study of points which should never be obtruded into a competition like the present, and the preparation of which involves labor and expense, which not many architects of high standing, nor many unblessed with extensive leisure, would be willing to bestow for the mere chance of a prize. But supposing the architect to assume this risk, he is then confronted with the necessity of measuring the present offices of County Clerk, Surrogate, etc., or procuring, as best he may, plans of the same as the basis of his work. This is impossible for architects at a distance, inconvenient for those near by, and wholly needless, since a simple statement in your circular of the areas required would have been all that was necessary.

But fourthly, your circular says nothing about the jury of award; and even presuming it to be your own honorable Board, it is no derogation to your honor and fair-mindedness to inquire what special qualifications your committee possesses for the decision of so delicate and important a question of purely architectural merit.

And finally, at the close of your circular, the competitor learns to his amazement, that if successful in winning a prize, his carefully wrought design (worth two-and-one-half per cent of $250,000, or $6,250, if adopted integrally, and of proportionate value if used in part) is to *remain the property of the County:* — and that the Board of Supervisors reserve the right to use any and all of the prize-designs, wholly, or in part, in erecting the building, without further compensation to, or consultation with, the designers! They thus thriftily secure for one thousand dollars five designs, to procure any one of which at the regular rates of compensation adopted by reputable practice, alike in France, England, and the United States, would cost them over $6,000. And this, with no guaranty that the architects' ideas shall be carried out as he conceived them, or in a manner creditable to him, and in the face of countless legal decisions, affirming as a principle the architect's ownership in his drawings, whether used in the erection of a building or not, *unless expressly stipulated to the contrary,* which stipulation truly "to the contrary" of all good practice every competitor for these prizes is compelled to agree to.

I am convinced, gentlemen of the committee, that these regulations were drawn up without realization of their unfortunate bearing upon the profession, and good architectural practice; and I venture to express the hope that the erection of so important a building as this Hall of Records shall not be awarded upon such unsatisfactory conditions of competition. The importance and dignity of Kings County should call to the task of such a design, the very highest order of ability. This, I am afraid — knowing not a single one of the present competitors, and in the hope that my fears are groundless — the terms of the just closing competition will hardly have secured; and lest by this statement I seem to egotistically refer to my own refraining from the competition, I beg to add: that whatever might have been the conditions, I should in any case have soon found myself too busy to engage in it, owing to the same press of work which has delayed this letter. I have therefore written with no personal feeling, but from devotion to the interests and honor of a profession, of which I am one of the humblest and least known members; and beg to remain ever, Yours respectfully, Alfred D. F. Hamlin.

THE AREA OF HEATING-SURFACE.

Winnipeg, September 25, 1884.

To the Editors of the American Architect: —

Dear Sirs, — In a number of your journal dated June 2d, 1883, page 257, it is stated, that "the usual rule for estimating the heating surface of the boiler must be one-tenth that of the radiating surfaces." By this rule a building containing 30,000 cubic feet of air would only require 40 square feet of heating surface in the boiler, this I find far too small; would you be kind enough to throw a little more light on the subject, and say what you consider the right amount of heating surface required in a boiler to heat the air space mentioned.

Yours respectfully, J. Greenfield.

[The rule of one square foot heating surface to ten of radiating surface is the common one in the Northern States for direct radiation in ordinary buildings. Where a fresh-air supply is admitted, to be heated by the steam and afterwards wasted by ventilation, of course both radiating and heating surface must be increased. Much also depends upon the character of the boiler and the care given it, and much, of course, on the proper arrangements of pipes to give sufficient circulation. If our correspondent has any specific case in mind, we would be glad to have further details, and will give a careful opinion. — Eds. American Architect.]

NOTES AND CLIPPINGS.

A New Diving-Bell. — MM. Imbert freres, of St. Chamond, have produced a very original diving-bell, which they have named "*Neptune.*" It reminds one of Jules Verne's "*Nautilus,*" and is admirably adapted to its purpose, scientific observations at sea. In form the apparatus resembles a huge bottle. It is seven metres 80 inches in height, and three metres in diameter. Its sides and neck consist of two steel plates, twelve metres thick, firmly riveted and bolted together. The neck contains a spiral staircase leading to the three superimposed chambers below, and is closed on the top by a steel cover through which the tubing of a pump used within for sinking or raising the diving-bell passes to the surface of the water. The cover itself is bordered with India-rubber, to render the bell perfectly water-tight. The compartments are separated from each other by steel sheets twenty-five centimetres in thickness, and supported by diminutive columns and angles. The upper chamber is furnished with reservoirs for compressed air, telegraphic and telephonic apparatus, electrical piles, etc. Five eye-holes, filled with strong glass, enable the engineers to look about on all sides. The middle chamber is furnished with fourteen eye-holes, with lenses for taking observations, and in the centre is a large lens, eighty centimetres in diameter, to inspect the sea bottom. The lower chamber contains the lighting and ballasting apparatus. The electrical machinery for projecting a light in all directions fulfils a two-fold purpose, for the electrical rays will undoubtedly attract the fish. The bell may be let down to a depth of two hundred metres by filling the ballasting chamber with water, which is pumped out and filled with air when the diver pleases. — *Galignani's Messenger.*

Japanese Fans.—Some notion of the quantity of Japanese fans used in Europe may be obtained from the official returns. During last year Hiôgo exported 2,647,966 fans; Osaka, 166,645 fans; and Kanagawa, 1,919,840 fans, or nearly four millions in all. There were 132,110 umbrellas and 16,299 screens exported from two of the ports, and the figures do not represent the entire quantity sent abroad. The exports of bronze, furniture and porcelain are also remarkable. Looking at the extent of the trade it is not surprising that a Japanese company is constructing an iron pier at Hiôgo, which is 450 feet long, at a cost of $100,000, and four warehouses as bonding stores, each measuring 42′ x 102′. — *The Architect.*

Cubic Space of Air in Stables.—Authorities on ventilation observe that a man makes twenty inspirations of air every minute, each inspiration being of a volume equal to 40 cubic inches, so that he requires 800 cubic inches per minute of fresh air to supply him with the necessary health-giving pabulum for his lungs. Each expiration unfits for breathing twice the bulk of fresh air; that is, the 800 cubic inches expired per minute contaminates 1,600 cubic inches of fresh air, or nearly a cubic foot. Hence, in round numbers, a man requires a cubic foot of fresh air per minute, or 60 cubic feet per hour. Thus, to give this amount of air-space in an apartment it requires a room of 600 cubic feet per individual. A horse or cow is said to have six times the breathing capacity of a man, so that it will require 360 cubic feet per hour, or 3,600 cubical feet of space. If every animal requires 1,000 cubic feet per hour, it follows that the dimensions of a stable with stalls 6 feet 6 inches wide, 9 feet long, with a passage behind of 6 feet, and having a height of 10 feet will afford this amount of space to each horse. The mode of ventilating a stable has long been a vexed question, though there is a very simple means at the disposal of the builder. The open roof is acknowledged on all hands as the most desirable; it admits of a ridge louvre or ventilator extending the whole length of roof. The ridge ventilation system was strongly recommended by the commissioners on barrack and hospital improvements, who specially reported on cavalry stables. They also recommended air-bricks, 9″ x 9″, introduced in the walls along the eaves, with their apertures arranged that the currents of air will flow in the direction of the ridge. A window to each stall on the swing principle, and with a series of inlets below, about six inches above the floor, one to each stall, give all that is required to produce a healthful stable. — *Building News.*

The French and their Clocks. — Watch-makers in dull quarters of Paris derive good fixed incomes from being employed to attend weekly to the chimney-clocks of prosperous bourgeois. Punctuality is not a French virtue, and half an hour's law is given at private dinner-parties to those invited. At public dinners the guests sit down at about an hour after the time specified in the cards of invitation. Railway-clocks on the façades of termini are five minutes in advance of those inside. An appointment is hardly ever punctually kept. Gambetta was one of the rare Frenchmen who are always to the minute. But his friend, M. Spuller, sometimes gives himself a couple of hours' margin. M. Clemenceau piques himself on the observance of social duties, and is in this respect a pattern radical; but when he makes an appointment he is not vexed if the person he is to meet is half an hour late. M. Barthelemy St.-Hilaire and De Lesseps keep time by marine watches purchased abroad. I know a Deputy who piques himself on his observance of social duties. One day I had an appointment with him for one o'clock; he came after two. When I ventured to reproach him with being so late, his answer was: "I am very sorry you had to wait so long, but why did you come so early?" The way in France is for each of the parties who have made a rendezvous, unless as duellists, to give the other half an hour's margin, which, being taken on both sides, makes in all an hour. This system of addition is analogous to what a Californian said of a big tree: "it grew so high that it took two men and a boy to see to the top." The Prussians have been branded, since 1870–71, with the name of *Voleurs de Pendules.* They were especially tempted by the pinchbeck-looking galvano-plastic articles which are usually protected from the air by glass shades. Timepieces of a severe style, and in real bronze, were not so often looted. Prince Bismarck took a fancy to a dark bronze clock, which stood in his sitting-room at Versailles on an elevated bracket. It represented the fall of Lucifer. The defeated archangel was more Byronic than Miltonic. When negotiating the preliminaries of peace, M. Thiers was placed at the table opposite this timepiece. He was nervous and fatigued, and though not habitually superstitious, felt very uncomfortable whenever his eye caught the sardonic visage of Lucifer. Bismarck secretly noticed his discomfort, and enjoyed it. At last M. Thiers vowed that he could no longer endure the irritation which the sinister-looking figure caused him, and asked to be allowed to change places with the Chancellor. He would have been glad if Lucifer had been taken out of the room. The proprietress of the house was asked by Bismarck to let him have the clock at a valuation. He wished to keep it as a souvenir of the event which took place under its shadow. It was reluctantly sold to him. In speaking of Thiers's nervous fear that the fallen archangel on the timepiece augured no good to France, the German Chancellor said: "He reminded me of what the Princess Palatine said of the Duc d'Orleans (the Regent), her son: "*Il ne craint pas Dieu, mais il a une peur blanche du diable.*" — *London Daily News.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

306,049. DEVICE FOR OPERATING ELEVATOR-DOORS. — Cyrus W. Baldwin, Chicago, Ill.
306,052. BENCH-CLAMP.—John Birch, Dayton, O.
306,053. HYDRAULIC MAIN FOR GAS-APPARATUS. — Arther E. Boardman, Macon, Ga.
306,072. CISTERN ATTACHMENT FOR WATER-CLOSETS. — James Foley, Brooklyn, N. Y.
306,078. FIRE-ESCAPE. — Karl Hubner, Paterson, N. J.
306,079. DOOR-HANGER. — Elmer N. Hutchins, Lawrence, Mass.
306,084. ELECTRIC ALARM AND CALL-BELL SYSTEM FOR HOTELS, ETC.—Warren T. Kellogg, Cohoes, N. Y.
306,092. WATER-CLOSET. — Owen J. McGann, Chicago, Ill.
306,123. CALIPERS. — C. Wilhelm Wessman, Chicago, Ill.
306,126. SAFETY-ATTACHMENT FOR ELEVATORS. — Otto Charles Berchtold and Emil I. Lauffer, Cleveland, O.
306,134. PORTABLE DERRICK. — Donald Crane, Woodland, Cal.
306,137. BRICK.—Jean Darrigan, Cagnottes, France.
306,149. FIRE-ESCAPE. — Jacob Haege, Garfield, Kans.
306,154. HAND-GRENADE FOR FIRE-EXTINGUISHERS. — Henry D. Harden, Chicago, Ill.
306,156. ELEVATOR. — Charles W. Hayes, Orange, N. J.
306,168-171. COMPOUND FAUCET. — Frederick W. Moseley, Poultney, Vt.
306,178. HOT-AIR GENERATOR FOR FIREPLACES. —Joseph H. Roberts, Toronto, O.
306,189. REAMER. — Thomas H. Thompson, Hartford, Conn.
306,195. BRICK-KILN.—Stephen W. Underhill, Croton Point, N. Y.
306,201-202. ALARM-APPARATUS FOR AUTOMATIC FIRE-EXTINGUISHERS. — Charles C. Worthington, Irvington, N. Y.
306,203. BENCH-STOP. — John Adams, Hancock, N. Y.
306,218. FIRE-GRATE. — Edward Card, Pawtucket, R. I.
306,235. FIRE-ESCAPE. — William A. Fries, Clifton Heights, Pa.
306,237. SCREW-DRIVER. —Willis B. Gilmore, Minneapolis, Minn.
306,286. SASH-FASTENER. — Frank W. Sawtells, Dedham, and Jas. T. Williams, Hyde Park, Mass.
306,316. AUTOMATIC FIRE-EXTINGUISHER. — Joseph R. Brown, Bridgeport, Conn.
306,320. PAINT-COMPOUND FOR ROOFS, ETC. — Edward Clark, Tiffin, Ohio.
306,334. SASH-FASTENER. — Horace L. Heaton, Indianapolis, Ind.
306,349-351. PNEUMATIC DOOR-CHECK. — Stephen Porter, Boston, Mass.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since our last report twenty-seven permits have been granted, the more important of which are the following: —

Wm. Collett, 5 three-st'y brick buildings (square), s s Lafayette Ave., w of Fremont St.

J. L. Bowen, 5 two-st'y brick buildings, s s Cross St., w of Washington Ave.

E. J. McMullen, 3 three-st'y brick buildings, n s Lanvale St., commencing n e cor. Stockton Alley.

A. L. Gorter, 6 three-st'y brick buildings, n s Robert St., commencing n e cor. McCulloh St.

St. James Home for Boys, four-st'y brick building, n e cor. High and Low Sts.

Church of the Star of the Sea, two-st'y brick building, 43' x 82', n e cor. Battery Ave. and Clement St.

Elias Hahn, 9 three-st'y brick buildings (square), e s Eutaw Pl., commencing s e cor. Pressman St.

Sheep Butchers' and Wool-pulling Association No. 2, 5 two-st'y brick buildings, e s Pennsylvania Ave., between Laurent and Robert Sts.

Geo. C. Hershman, 13 two-st'y brick buildings, s s Biddle St., commencing s e cor. Ensor St.

Hy. Schaumberg, 3 two-st'y brick buildings, commencing s e cor. Sterrett St. and Sterrett Alley.

C. H. Blanch, 5 two-st'y brick buildings, commencing s w cor. Broadway and Hoffman St.

J. H. Gable, 5 three-st'y brick buildings, e s Woodyear Alley, s of Cemetery Lane.

Brooklyn.

BUILDING PERMITS. — *Dean St.*, s s, 100' w Vanderbilt Ave., three-st'y brick tenement, gravel roof; cost, $4,000; owner, Thos. R. Farrell, 644 Dean St.; architect, I. D. Reynolds.

Vanderbilt Ave., w s, 40' n Dean St., three-st'y brick store and tenement, felt and gravel roof; cost, $3,000; owner, Wm. C. Marvin, Elliott Pl.; architect, Wm. V. Williamson.

Second Ave., w s, 10' s Thirty-ninth St., one-st'y brick manufactory, board roof; cost, about $3,000; owner, Phœnix Chemical Co., 87 Maiden Lane, New York; architect, Samuel Bennett; builders, Carlin & Son and John H. O'Rourke.

Sixth St. Basin, n s, 348' w Second Ave., three-st'y frame manufactory, gravel roof; cost, $9,000; owner, C. O. Wolcott, 55 Pearl St.; architect, M. A. Case; builder, Geo. H. Stone.

Sixth Ave., w s, 24' s Carroll St., 3 two-st'y brown-stone dwells., tin roofs; cost, each, $6,000; owner and mason, Theodore P. Cooper, New York Hotel; architects and carpenters, Martin & Lee.

Jefferson St., n s, 100' w Throop Ave., 3 two-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner and builder, Wm. Reynolds, 400 Jefferson St.; architect, I. D. Reynolds.

Gates Ave., s e cor. Franklin Ave., four-st'y brick flat, gravel roof, wooden cornice; cost, $14,000; owner and builder, Jas. B. Alexander, 108 Pacific Ave., Jersey City; architect, A. Hill.

Nostrand Ave., s e cor. Lafayette Ave., three-st'y brick and terra-cotta store and flat; cost, $9,000; owner, Mrs. M. E. Kohlman, Nostrand Ave., Kosciusko St.; architects, Parfitt Bros.; builders, Fitall & Scrivan and E. Hendrickson.

Meserole St., s s, 175' e Bushwick Ave., four-st'y brick beer-storage, tin roof; cost, $42,000; owner, Otto Huber, on premises; architect, C. Stoll; builder, —— McQuade.

Jefferson St., s s, 300' e Central Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $4,200; owner, Annie M. Armendinger, 83 Melrose St.; architect, Th. Engelhardt; builder, J. Armendinger.

South Oxford St., e s, 392' 10" n Atlantic Ave., three-st'y brick and brown-stone dwell., tin roof; cost, $12,000; owner, Wm. Bradley, 248 Sackett St.; architects, Parfitt Bros.

Tenth St., n w cor. Fourth Ave., three-st'y brick store and dwell., tin roof; cost, $6,000; owners, Assip & Buckley, 146 Sixteenth St. and 71 Waverly Ave.; architect, W. M. Coots.

Hewes St., *No.* 262, three-st'y and basement brown-stone dwell., tin roof; cost, $6,500; owner, John L. Mollenhauer, 250 Hewes St.; architects, Eastman & Davis; masons, W. & T. Lamb, Jr.; carpenter, not selected.

Halsey St., *Nos.* 142 *and* 144, 2 three-st'y brown-stone dwells., tin roofs; cost, each, $7,000; owner, etc., John S. Frost, 568 Franklin Ave.

Wyckoff St., *No.* 392, four-st'y brick tenement, gravel roof; cost, $6,500; owner and builder, John D. Anderson, 225 Raymond St.; architect, Geo. W. Anderson.

Tenth St., n s, 20' 9" w Fourth Ave., 5 two-st'y brick dwells., tin roofs, wooden cornices; cost, each, $4,000; owners, Assip & Buckley, 146 Sixteenth St. and 71 Waverly Ave.; architect, W. M. Coots.

Bedford Ave., w s, 80' n Ross St., three-st'y brown-stone dwell., tin roof; cost, $30,000; owner, Joseph F. Knapp, cor. Bedford Ave. and Ross St.; architect, Arthur Crooks; builders, W. & T. Lamb, Jr., and Smith & Bell.

Clifton St., s s, 90' e Bedford Ave., 4 two-and-one-half-st'y brown-stone dwells., tin roofs; cost, each, $4,000; owner, E. T. Rider, 128 Quincy St.; architect, Amzi Hill; builder, Wm. J. Rider.

Broadway, n e cor. Park St., three-st'y brick store and tenement, tin roof; cost, $9,500; owners and builders, Jno. L. Gans and A. Voltz, 24 Jefferson St.; architect, John Herr.

Sackett St., n s, 40' e Court St., three-st'y brick store and dwell., tin roof; cost, $3,800; owner, Jas. Calvert, cor. Second Pl and Court St.; architect and carpenter, Wm. Wilson; mason, Thos. B. Rutan.

Jefferson St., s s, 250' w Hamburg Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $4,000; owner, Annie M. Armendinger, 83 Melrose St.; architect, Henry Vollweiler; builder, Jacob Armendinger.

Locust St., n s, 225' e Broadway, three-st'y frame (brick-filled) store and tenement, tin roof; cost, $4,300; owner and builder, Geo. Loeffler, 78 Jefferson St.; architect, Henry Vollweiler.

Magnolia St., n s, 50' e Irving Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $4,000; owner, etc., Jas. Williamson, 676 Gates Ave.

Union St., n s, 212' e Seventh Ave., 2 three-st'y brown-stone dwells., tin roofs; cost, each, $10,000; owner, etc., John Magilligan, 56 Berkeley Pl.

Bainbridge St., n s, 178' w Reid Ave., 4 two-st'y brick dwells., tin roofs; cost, each, $3,500; owner, Kate Acor, 177 Bainbridge St.; architect and builder, C. Linken.

Columbia St., w s, 150' s Hamilton Ave., three-st'y brick store and tenement, tin roof; cost, $5,000; owners, architects and builders, M. Gibbons & Son, 55 Rapelyea St.

Boerum St., *No.* 159, n s, 150' e Graham Ave., four-st'y frame (brick-filled) tenement, flat tin roof; cost, $6,000; owner, Barbara Wischerth, 57 Troutman St.; architect, Th. Engelhardt; builder, Jacob Armendinger.

Ralph Ave., w s, 18' s Bainbridge St., 4 three-st'y frame (brick-filled) tenements, felt and gravel roof; cost, about $2,500 each; owner, Elizabeth Phelan, 362 Hart St.; architect, F. F. Thomas.

Fourth Ave., n w cor. Forty-sixth St., three-st'y frame (brick-filled) tenement, flat tin roof; cost, $20,000; owner and architect, W. A. Fries, 201 Forty-fourth St.

Rapelyea St., n s, 125' e Hamilton Ave., four-st'y brick tenement, tin roof; cost, $6,000; owner, Mr. Keegan, 59 Rapelyea St.; architect, Mr. Hayler; builders, M. Gibbons & Son.

ALTERATIONS. — *River St.*, w s, between South First and South Second Sts., add one st'y to a one-st'y building, gravel roof; cost, $7,000; owner, architect and carpenter, Brooklyn Sugar Refining Co., First St., cor. South Second St.; mason, S. J. Burrows.

Chicago.

BUILDING PERMITS. — T. Dowling, two-st'y dwell., 3600 Indiana Ave.; cost, $4,500; architect, A. J. Halberg.

D. Blair, 2 one-and-one-half-st'y cottages, 434-438 Idaho St.; cost, $3,600; builders, G. Lehman & Co.

Mrs. A. Portman, two-st'y dwell., 604 West Superior St.; cost, $4,000; architect, C. O. Hanson; builder, N. P. Laberg.

A. Fields, 2 three-st'y dwells., 192 and 193 Butterfield St.; cost, $6,000; architect, F. Doerr.

Mrs. M. Parratt, 2 two-st'y dwells., 227 and 229 Wilmot Ave.; cost, $5,000.

F. Little, 2 one-st'y cottages, 44-50 Whipple St.; cost, $2,500.

Mrs. S. C. Congdon, 2 two-st'y dwells., 3514 and 3516 Forest Ave.; cost, $5,000.

Howting & Crowhurst, 2 one-st'y cottages 609-613 Thirty-second St.; cost, $2,500.

A. Schulze, two-st'y addition to dwell., 566 Centre Ave.; cost, $4,000; builder, A. Loula.

H. Reese, two-st'y store, 881 Blue Island Ave.; cost, $4,000; builder, A. Loula.

A. Cerny, three-st'y dwell., Maxwell St.; cost, $8,600.

F. Hahn, two-st'y dwell., 481 South Wood St.; cost, $4,000.

J. S. Iverson, 2 two-st'y dwells., 3515 and 3517 Wabash Ave.; cost $8,000; architect, S. M. Randolph.

H. Cirbi, two-st'y dwell., 2707 Wentworth Ave.; cost, $3,000.

T. Reath, two-st'y dwell., 503 South Oakley Ave.; cost, $3,000.

J. Ludwig, 2 two-st'y stores and dwells., 3230 and 3232 Laurel St.; cost, $7,000; architect, J. Frank; builder, J. Lanch.

M. Rathgen, two-st'y dwell., 96 Evergreen Ave.; cost, $3,000.

F. Plischka, three-st'y store and dwell., 99 Blue Island Ave.; cost, $7,500.

D. Sullivan, two-st'y dwell., Lincoln Pl.; cost, $3,000.

A. C. Brackebush & Co., two-st'y barn, 30 Congress Park; cost, $2,500; architect and builder, Geo. Hinckley.

W. T. Goss, two-st'y dwell., 504 West Congress St.; cost, $3,000.

J. H. Overs, three-st'y dwell., 77 to 83 Pine St.; cost, $17,000; architects, Thomas & Rodger; builder, C. Moses.

M. Morgan, two-st'y dwell., 144 Lasalle Ave.; cost, $6,000; architect, J. Otto.

J. A. Barbier, 5 three-st'y dwells., 243 to 249 Centre Ave.; cost, $20,000; architect, N. S. Patton.

J. Hallowell, two-st'y dwell., 268 South Robey St.; architect, J. J. Egan; builder, M. J. Benson; cost, $4,000.

R. Hunter, three-st'y store and flats, 3640 and 3642 State St.; cost, $16,000; builders, McMillan Bros.

J. Kirkeby, three-st'y store and dwell., 1020 Milwaukee Ave.; cost, $10,000.

Wm. Hansburg, three-st'y store and dwell., 297 and 299 Clybourn Ave.; cost, $12,000.

Thos. Brown, three-st'y store and dwell., 165 West Chicago Ave.; cost, $7,000; architect, J. J. Matherson; builder, B. Olson.

Mrs. E. J. Hansen, two-st'y dwell., 895 Shuber St.; cost, $3,000.

J. J. Brown, three st'y livery-stable, 140 West Madison St.; cost, $3,000.

Tarrant & Ramsay, one-st'y foundry, 50-56 Indiana St.; cost, $4,200.

V. Topinka, three-st'y store and dwell., 175 West Twelfth St.; cost, $8,000; architect and builder, G. M. Krulover.

F. Cure, two st'y flats, 3427 Dearborn St.; cost, $4,000.

S. Wilken, two-st'y store and dwell., 191 Ambrose St.; cost, $4,200.

T. A. Shaw, two-st'y dwell., 2124 California Ave.; cost, $18,000; architects, Cobb & Frost; builders, Fox & Hinds.

A. Thule, two-st'y dwell., 493 Marshfield Ave.; cost, $4,000; architect, P. W. Ruehl.

J. Brenzel, two-st'y dwell., 12 West Ohio St.; cost, $2,500; architect, J. Otto; builder, A. Fagerlund.

J. J. Bufton, 2 two-st'y dwells., 939 and 941 West Jackson St.; cost, $7,000.

H. Miller, two-st'y dwell., 142 Evergreen St.; cost, $3,000.

J. Beek, three-st'y dwell., 662 North Park Ave.; cost, $5,000; architect, A. F. Boos.

P. Murphy, two-st'y dwells., 612 Loomis St.; cost, $2,700; builder, J. Wittner.

F. Slawik, two-st'y dwell., 512 Ashland Ave.; cost, $3,000; architect, Wilson; builders, Kreig & Demuth.

New York.

HOUSES. — Anthony Mowbray proposes to build on the s s of Eighteenth St., bet. Fifth and Madison Ave., 3 four-st'y brick and brown-stone residences, 25' x 60' each, to cost about $100,000; Messrs. McElfatrick Son & De Baud have the plans on hand.

FACTORY. — Messrs. Sypher & Co., will build a brick and granite factory, 75' x 90', on the s s of Forty-eighth St., 300' w of Tenth Ave., to cost $40,000; Messrs. Berger & Baylies are the architects.

BUILDING PERMITS.—*Lafayette Ave.*, w s, 100' s Gray St., two-st'y frame dwell., slate roof; cost, $3,500; owner, W. E. Andrews, Tremont; builders, W. Holder and Nonamaker & Saunders.

Lincoln Ave., w s, 54' n Southern Boulevard, four-st'y brick factory, tin roof; cost, $10,000; owner, Annie Derleth, 585 East One Hundred and Thirty-fourth St.; architect, J. W. Cole; builder, John Jordan.

McCombs Dam Road, w s, 600' n Two Hundred and Sixth St., two-st'y frame dwell., shingle roof; cost, $4,500; owner, Esther Jersey, 279 West One Hundred and Twenty-eight St., architect, Wm. Howe.

Ninety-first St., n s, 70' e Fourth Ave., 2 three-st'y and brown-stone front dwells., tin roofs; cost, each, $10,000; owner, Susan Sullivan, 1365 Lexington Ave., architect, J. Sullivan.

One Hundred and Thirty-fourth St., s s, 150' e Lincoln Ave., two-st'y brick factory, gravel roof; cost, $6,000; owner, N. Y. Wood Turning Co., on premises; architect and builder, Wm. J. Merritt.

Avenue B, *No.* 258, five-st'y brick tenement and store, tin roof; cost, $9,300; owner, Thomas Cunningham, 602 East Fifteenth St.; architect, Fred. Jenth.

Courtland Ave., *No.* 561, three-st'y frame tenement, tin roof; cost, $5,500; owner, Hugh Martin, 565 Courtland Ave.; architect, A. Janson; builders, Janson & Jaeger.

West Fifty-second St., *Nos.* 515, 517, *and* 519, 3 five-st'y brick tenements, tin roofs; cost, each, $16,500; owners, Elsworth L. Striker, 308 West Fifty-second

St., and John Quinn, n e cor. Eleventh Ave. and Fifty-first St.; architect, C. F. Ridder, Jr.

First Ave., n w cor. Seventieth St., four-st'y and attic brick school-house, tin and slate roof; cost, $110,000; owner, City of New York; architect, J. N. Stagg.

Sedgwick Ave., w s, 100' e Morris Dock Station, two-st'y frame dwell., slate roof; cost, $5,000; owner, Archibald Buchanan, 874 Eighth Ave.; architect, Chas. Baxter.

Sixtieth St., n s, 175' w Tenth Ave., five-st'y brownstone tenement, tin roof; cost, $13,000; owner, Thos. Cowman, 513 West Sixtieth St.; architect, M. Louis Ungrich.

Eighty-fourth St., s s, 150' w Second Ave., five-st'y brick tenement, tin roof; cost, $20,500; owner, Geo. Keller, West Farms; architect, John McIntyre; builders, Hollister & Friedlein.

Brook Ave., e s, 25' s One Hundred and Forty-sixth St., two-st'y frame dwell. and store, tin roof; cost, $3,600; owner, Wenzel Kraus, 623 North Third Ave.; architect, Adolph Pfeiffer.

Morris Ave., w s, 53' n One Hundred and Forty-eighth St., three-st'y brick dwell., tin roof; cost, $4,000; owner, Carl Hulster, Morris Ave. and One Hundred and Forty-eighth St.; architect, Adolph Pfeiffer.

Alterations. — *West Twenty-seventh St., Nos.* 348 *and* 350, three-st'y brick extension, tin roof; cost, $4,000; owner and builder, John L. Hamilton, 318 West Twenty seventh St.

East Thirteenth St., Nos. 410 *and* 412, two and part one-st'y brick extension, gravel roof; cost, $6,000; owner, Geo. B. Marx, on premises; architect, Ernest W. Greis.

East Fortieth St., No. 106, repair damage by fire; cost, $5,000; owner, Geo. C. Haven, 24 East Thirty-ninth St.; builder, Geo. Mulligan.

Philadelphia.

Building Permits. — *Hope St.*, n of York St., three-st'y dwell., 18' x 34'; T. Matthews, contractor.

Federal St., w of Broad St., two-st'y stable, 20' x 40'; W. T. Robinson, owner.

Allegheny Ave., cor. Frankford Road, three-st'y dwell., 20' x 70'; Thos. Quinn, owner.

Lehman St., bet. Little Wayne and Godfrey Sts., two-st'y dwell., 14' 6" x 30'; W. Oxford.

Catharine St., e of Fifteenth St., three-st'y dwell., 18' x 62'; Jno. O'Donnell.

Germantown Road, cor. Lehigh Ave., 7 three-st'y stores and dwells., six, 14' x 30'; one, 16' x 40'; P. Hogan, owner.

Franklin St., n of Cumberland St., 8 two-st'y dwells., six, 14' x 42'; two, 15' x 42'; A. D. Kennedy, owner.

Fairmount Ave., w of Thirty-seventh St., three-st'y dwell., 18' x 46'; Wendell & Smith, contractors.

Broad St., n of Norris St., 2 three-st'y dwell., 18' x 67'; C. C. Moore, owner.

Fairhill St., n of Susquehanna Ave., ice-house and storehouse, 30' x 44'; W. Techlenberg, contractor.

Hancock St., n of Dauphin St., 4 two-st'y dwells., one, 18' x 42'; three, 15' x 42'; J. Williamson, contractor.

Twenty-first St., s of Columbia Ave., three-st'y dwell., 16' x 52'; C. Backle, contractor.

Chestnut St., w of Thirty-eighth St., three-st'y dwell., 37' x 81'; W. C. McPherson & Sons, contractors.

Sixth St., s of McClellan St., 9 two-st'y dwells., two, 17' 7" x 45'; four, 16' x 45'; Wm. Morrow, owner.

Catharine St., No. 1434, three-st'y dwell., 18' x 65'; Cavanaugh & Brown, contractors.

Ash St., n of Salmon St., 2 three-st'y dwells., 16' x 30'; S. Heim, contractor.

Germantown Ave., No. 4067, three-st'y dwell., 17' x 50'; Ernest Zell, owner.

Carpenter St., No. 822, four-st'y dwell., 18' x 62'; J. B. Baratta, owner.

Limekiln Pike, cor. Mill St., two-st'y store and dwell., 24' x 70'; M. McGrath, owner.

Sixtieth St., e of Kingressing Ave., 2 two-st'y dwell., 20' x 42'; R. A. Parker, contractor.

Kensington St., cor. Tioga St., two-st'y dwell., 20' x 60'; J. B. Yerkes, contractor.

Eighteenth St., cor. Berks St., 9 three-st'y dwells., 17' x 64'; J. Lewis Kates, owner.

Montgomery Ave., e of Girard Ave., 2 two-st'y dwells., 18' x 45'; Rollison & Taylor, contractors.

Hillory St., bet. Reed and Wharton Sts., 6 two-st'y dwells., 15' x 38'; Thos. Marshal, owner.

Buckins St., w of Frankford Road, three-st'y dwell., 18' x 50'; M. B. Maybury, contractor.

Carlisle St., No. 1316, two-st'y dwell., 18' x 40'; Wm. Bunch, Jr.

Herman St., cor. Hancock St., 2 three-st'y dwells., 16' x 42'; Oliver P. Fisher, contractor.

Kensington Ave., n of Harrowgate Lane, 2 two-st'y stores and dwells., 17' x 45'; E. Schmid.

Fifth St., s of Clearfield St., three-st'y dwell., 16' x 35'; Pat McCaskey, owner.

Somerset St., bet. Fairhill and Sixth Sts., 2 three-st'y dwells., 17' x 29' and 16' 10' x 28'; M. Fox, owner.

Baring St., n of Fortieth St., three-st'y dwell., 18' x 54'; W. P. Fogg, contractor.

Harvey St., Nos. 52 *and* 54, 2 three-st'y dwells., 18' x 47'; W. H. Brunner, contractor.

Beach St., No. 1613, two-st'y machine-shop, 15' x 30'; R. A. Bears.

Penn St., n of Harrison St., three-st'y dwell., 33' x 34'; Duryea & Childs.

St. Louis.

Building Permits.—Fifty permits have been issued since our last report, eleven of which are for unimportant frame houses. The rest of those worth $2,500 and over are as follows: —

Stan. Jobrowicz, 3 adjacent tenements; cost, $7,200; Theo. Roesch, contractor.

M. Cosgrool, two-st'y brick dwell.; cost, $2,800; contract sub-let.

John Spurr, two-st'y brick dwell.; cost, $3,000.

C. Hage & Bros., alteration shop and warehouse; cost, $5,000; Helm & Bro., contractors.

St. Louis Mutual House-Building Co., two-st'y store and dwell.; cost, $2,700; E. Mortimer, architect; J. Kaiser, contractor.

L. Ph. Sichler, two-st'y brick dwell.; cost, $3,000; contract sub-let.

Thomas Menton, two-st'y store and dwell.; cost, $5,300; O'Malley & Bros.

Henry Fenerbach, three-st'y store and flats; cost, $3,500; contract sub-let.

Adam Reitz, 3 adjacent two-st'y tenements; cost, $5,300; O. Koenig, architect; F. Hermann, contractor.

L. Tompkins, 2 adjacent two-st'y stores and dwells.; cost, $6,500; T. Gugarty, contractor.

Bids and Contracts.

List of proposals received and opened at noon, on September 25, 1884, by Gen. M. C. Meigs, Supervising Engineer and Architect, for iron-work for roofs over the new Pension Building, in Washington, D. C.:—

C. A. Schneider Bros., Washington, D. C., for the whole work, $59,393.

Fort Pitt Steam Boiler and Building Works, Pittsburgh, Penn., $49,489.

Riverside Bridge and Iron Works, Paterson, N. J., $44,444.

Phœnix Iron Company, Trenton, N. J., $48,875.

Cheney & Hewlett, New York, N. Y., $65,000.

Penn Bridge Works, Beaver Falls, Pa., $44,375.

Post & McCord, New York, N. Y., $59,844.

New Jersey Steel and Iron Company, Trenton, N. J., for roofs over office room, 3½ cents per pound; for roofs over court-yard, 5 4-10 cents per pound.

Snead & Co. Iron Works, Louisville, Ky., for the whole work, $54,987.

Pittsburgh Bridge Co., Pittsburgh, Pa., $39,492.

Passaic Rolling Mill Co., Paterson, N. J., $43,833.

Keystone Bridge Co., Pittsburgh, Pa., $58,548.

W. C. Carroll & Co., Pittsburgh, Pa., $51,000.

King Iron Bridge Co., Cleveland, O., $47,000.

Haugh, Ketcham & Co., Indianapolis, Ind., $47,838.

Other bids were received, after the time for opening, from Schiffler Bridge Works, of Pittsburgh, Pa., for $47,450.

Union Foundry & Pullman Car-Wheel Works, of Chicago, Ill., for $58,227.

Baltimore, Md.—The following is an abstract of the bids on carving the stone panels and spandrels for the court-house and post-office: —

M. A. McGowan, 6 panels and imposts, for first story, $13,770; panels, A, $1,350; B, $1,260; C, $1,380; D, $1,400; E, $1,310; F, $1,500; G, $1,600; H, $1,500; 52 spandrels, I, $17,720.

John Monroe, 6 panels and imposts, first story, $11,297; panels, A, $880; B, $880; C, $1,320; D, $792, E, $792; F, $792; G, $1,320; H, $792; 52 spandrels, I, $9,659.

Cape Ann Granite Company; panels, A, $1,015.63; B, $1,015.62; C, $1,145.63; D, $982.29; E, $1,073.90; F, $1,098.96; G, $1,132.29; H, $992.29; 52 spandrels, I, $11,208.33.

Alex. Kemp, panels and imposts, first story, $6,000; panels, A, $890; B, $890; C, $950; D, $890; E, $890; F, $890; G, $950; H, $890; 52 spandrels, $8,320.

Rock Island, Ill. — The following is an abstract of the bids for supplying wrought-iron beams to the Ordnance Depot: —

A. and P. Roberts & Co., Philadelphia, Penn., $15,528.75 (*accepted*).

New Jersey Steel and Iron Company, Trenton, N. J., $16,091.02.

Phœnix Iron Company, Philadelphia, Penn., $15,536.36.

Passaic Rolling Mill Company, Patterson, N. J., $15,544.84.

Carregre Bros. & Co., Pittsburg, Penn., $14,559.11.

Pottsville Iron and Steel Company, Pottsville, Penn., $15,537.66.

Jones & Laughlin, Chicago, Ill., $14,403.88. This firm failed to bid on several articles.

PROPOSALS.

RIP-RAP GRANITE.
[**At Block Island, R. I.**]

Engineer Office, U. S. Army,
Newport, R. I., October 6, 1884.

Sealed proposals, in duplicate, will be received at this office **until 12 o'clock, noon, on Tuesday. the 28th day of October, 1884,** at which time they will be opened in presence of bidders, for furnishing rip-rap granite for the breakwater at Block Island, R. I., under the appropriation by the Act of Congress of July 5, 1884, of $15,000.

The United States reserves the right to reject any or all proposals.

Specifications, blank proposals, and full information as to the manner of bidding, conditions to be observed by bidders, and terms of contract and payment, will be furnished on application to this office.

GEORGE H. ELLIOT,
461 Lt.-Col. of Engineers.

ARMY BARRACKS.
[**At Newport, R. I., and New York, N. Y.**]

Office of Chief Quartermaster,
Department of the East,
Governor's Island, N. Y. H., October 15, 1884.

Sealed proposals in triplicate, subject to the usual conditions, will be received at this office, and the Offices of the Quartermaster at the posts mentioned below, **until 12 o'clock, M., Eastern time, on the 15th day of November, 1884,** at which time and places they will be opened in the presence of the bidders, for the construction of one set of barracks of brick, or frame, at each of the posts of Fort Adams, R. I., and Fort Hamilton, N.Y. H., in accordance with plans and specifications, which can be seen at this office, and at the Offices of the Post Quartermaster at Fort Adams, R. I., and Fort Hamilton, N. Y. H.

One copy of this advertisement should be securely attached to each triplicate proposal, and be mentioned therein as comprising part of it.

Blanks for proposals and information as to manner of bidding, etc., can be obtained at this office.

Proposals must be accompanied by a guarantee with two sureties in the sum of two hundred dollars.

A proposal not accompanied by such a guarantee will not be considered.

PROPOSALS.

Envelopes containing proposals should be marked "Proposals for Construction of Barracks."

The Government reserves the right to reject any or all bids. ALEX. J. PERRY,
462 Assistant Quartermaster General, U. S. Army.

BRIDGE.
[**At Cincinnati, O.**]

Cincinnati, September 29, 1884.

Sealed proposals will be received at the office of the County Commissioners, southwest corner Fourth and Race Sts., **until Wednesday, October 22, 1884, at 12 o'clock, M.,** for the iron superstructure and masonry of a bridge over Duck Creek, on the road from Red Bank to Madisonville, in Columbia Township, to consist of one span, of eighty feet, with clear roadway twenty feet.

To be built according to plans and specification now on file in the County Commissioners' office.

The Commissioners reserve the right to reject any or all bids.

By order of the Board of County Commissioners.

JOSEPH W. BREWSTER,
460 County Auditor.

STONE AND BRICKWORK.
[**At Terre Haute, Ind.**]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., October 6, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 31st day of October, 1884,** for supplying and setting all the stone-work, and furnishing and laying all the brickwork required for the basement and superstructure of the post-office, etc., building at Terre Haute, Ind., in accordance with drawings and specification, copies of which may be seen and any additional information obtained on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
460 Supervising Architect.

CROTON AQUEDUCT.
[**Near New York, N. Y.**]

Aqueduct Commission,
Room 78, Tribune Building,
New York, October 3, 1884.

Bids or proposals for constructing Sections A and B of the New Croton Aqueduct in the 24th Ward of the City of New York, will be received at this office **until Wednesday, October 29, 1884, at three o'clock,** P. M., at which place and hour they will be publicly opened and read by the Aqueduct Commissioners; and the award of the contract will be made by said Commissioners as soon thereafter as practicable.

The portion of the new aqueduct for which bids are hereby invited is in tunnels, and is divided into two sections, viz.: —

Section A, extending from a point near the High Bridge, northward a distance of about 11,850 feet; and having three working shafts.

Section B, extending from the end of Section A northward a distance of about 12,300 feet, and having two working shafts.

Bidders can bid for either one, or for both, of the above sections; but each section must be bid for, and will be awarded separately. Any bidder for both Sections who will not accept an award for one Section only, must so state in his bid.

Each bid must be inclosed in a sealed envelope, indorsed with the name of the person or persons making the same, and the Section for which it is made.

Each bid must state the name and place of residence of the person making the same, and the names of all persons interested with him therein; also that it is made without any connection with any other person making a bid for the same work, and is in all respects fair and without collusion or fraud; that no member of the Aqueduct Commission, or of the Common Council, no head of a Department, Chief of a Bureau, deputy thereof, or clerk therein, or other officer of the Corporation, or any person in the employ of the Aqueduct Commissioners, is directly or indirectly interested in the bid, or in the work to which it relates, or in the profits thereof.

Each bid must be verified by the oath of the party making the same, that the several matters therein stated are true, and must be accompanied by a certified check upon a National or State Bank, of the City of New York, drawn to the order of the Comptroller of the City of New York, for an amount not less than five per cent of the amount of the security required for the faithful performance of the contract. Such check must not be inclosed with the bid or proposal, but must be delivered to the Aqueduct Commissioners, or to their Secretary, for delivery to the Comptroller. All deposits, except that of the successful bidder, will be returned by the Comptroller to the persons making the same within three days after the contract is awarded. If the successful bidder shall neglect or refuse to execute the contract within ten days after notice that it has been awarded to him, the amount of the deposit made by him shall be forfeited to and retained by the City of New York as liquidated damages for such neglect or refusal, pursuant to the provisions of Section 29 of Chapter 490 of the Laws of 1883; but if he shall execute the contract within the time aforesaid, the amount of his deposit will be returned to him.

The amount of security required in the contract for Section A is one hundred and twenty-five thousand dollars; and for Section B, one hundred and thirty-five thousand dollars; with not less than two satisfactory sureties, who must be householders, or resident freeholders, of the State of New York.

The Aqueduct Commissioners reserve the right to reject any and all bids if they deem it for the best interest of the city so to do.

Blank forms of bid or proposal, and proper envelopes for their inclosure; forms of the contract, specifications, and bond, and all other information required, can be obtained at the office of the Aqueduct Commissioners, Room 78, Tribune Building, New York.

By order of the Aqueduct Commissioners.

460 JAMES W. McCULLOH, Secretary.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XVI. | No. 461.

OCTOBER 25, 1884.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

WHAT we should call a Social Science Congress was held recently at Blois, in France, at which, among other things, some very interesting statements were made concerning the experiments which have been tried to promote the improvement of the material and moral condition of workmen, by admitting them to participation in the profits of the business or manufacture which they help to carry on. The first person to apply this important principle in actual business seems to have been the great Leclaire, a workman by birth and training, who, having entered into business on his own account, with a small capital saved from his earnings, was inspired with the idea of using his limited opportunities to put in practice a theory about which he had thought much. He was himself but recently emancipated from the dull and hopeless drudgery of a journeyman, and could feel how much his new responsibility as a master increased his energy, and with it the amount of work which he could do in a given time, and he resolved to try whether the application of this stimulus might not be made on a small scale for the benefit of his men as well as himself. He was too poor and too prudent to bind himself to divide his own earnings among the men, but he reflected that if these, by the hope of securing an additional income for themselves, would work with a zeal enough greater than usual to accomplish ten per cent more work within a given time, he could give back to them this surplus ten per cent without losing anything himself. Wild as this scheme seemed to his friends, Leclaire carried it out, on a small scale at first, but later on a large one; and without, so far as he could see, any loss to himself, he succeeded in improving greatly the material as well as the moral condition of those whom he employed, and left an example which is every year more generally followed.

AFTER Leclaire's first successful experiment, two gentlemen, M. de Courcy and M. Charles Robert, undertook to diffuse the knowledge, and, if possible, the repetition of it, in the industrial world, and it is perhaps owing partly to their exertions that about eighty French manufacturers or contractors now deal with their workmen on this principle, and within the last six years has been established a society for the practical study of the methods of participation by employés in the profits of business. This society is composed mostly of business men or manufacturers, who carry on their "study" in the best possible way, by practising in their own workshops the theory which they favor. Among the enlightened employers who pursue this system is M. Chaix, the proprietor of a renowned Parisian printing-office, which maintains twelve hundred workmen, and keeps more than a hundred presses in operation, and the discussion of the subject at the Congress of Blois was signalized by the reading of an admirable paper by him. Before speaking of his own establishment, M. Chaix remarked that many difficulties interfered with the application of a system of participation, the most serious of these being, perhaps, the inability of workmen without capital to bear any share of the losses which fall to the lot of most business men; so that it is necessary, in order to protect the employer, who furnishes the capital, from the danger of giving away all the profits in good seasons, and bearing the burden of all the losses in bad times, to arrange for reserving a fund for contingencies. This is easily done, and may prevent the total collapse, in an unfavorable year, of an experiment begun with entire success. The form of participation is also unsettled, the practice of different houses varying greatly. Some pay over in cash to each workman his proportionate share of the profits at the end of each year; while others pay nothing in cash, but reinvest each man's profits in the business, securing thus for him, without his control, compound interest on his earnings. The best course, M. Chaix thinks, lies between these two. As he well says, although the principal end of participation is to encourage habits of prudence, order, responsibility, and economy, it is not best to push benevolence to austerity; and the most successful system is found to be one in which a portion of each man's share of the profits is paid over to him in cash at the end of the year, to serve as an immediate reward for the industry of the year, and as a stimulant to renewed saving and effort, while the rest is invested in his name and for his benefit. Another question is, whether profits should be divided in proportion to the wages earned by each man, or in accordance with his length of service, and this, again is variously answered in practice. In the Chaix printing-office, three years of service is requisite for admission to participation, but in order to concede something to the roving disposition of the Parisian workmen, this rule is so far extended as to admit men coming from other offices, managed on the principle of participation, after one month of probation. Once admitted, each man receives a share of the profits of the year proportioned to the amount paid him during the year, either as regular wages or for piece-work. The dividend is paid annually, one-third in cash, one-third as a credit on a reserve fund, the whole of which can be drawn out when the man leave the office; and the remaining third as a credit on a sort of superannuation and insurance fund, which can only be drawn at the age of sixty, or after twenty-five years of service, or in case of death, when it is paid over to the heirs of the deceased man. Credits on both these reserved funds bear interest at the rate of four per cent per annum. The average dividend paid to the men in the Chaix establishment for the last twelve years has been about seven-and-one-half per cent upon the amount of their wages, and the total sum paid to them in this way during that time is one hundred and forty thousand dollars. In regard to the effect of the system upon the workmen, M. Chaix says that its tendency to encourage economy and prudence is shown by the fact that about one-half of the sum paid in cash every year is at once invested by the men in savings-banks, or in life-insurance policies; and it is also remarkable that during the printers' strike of 1878 only sixty-two men, out of the whole number employed, quitted their places, and not one of these was a participant in profits.

THAT excellent as well as lively journal, *The Studio*, makes some very timely remarks in a late issue upon the carelessness and bad taste which seems to govern the application of signs to commercial buildings. In all our business streets the most prominent feature of the view, whether upward, downward, or across the street, is a mass of signs, almost all of them ugly, coarse, and vulgar, and each trying to thrust itself forward beyond all the rest into the faces of the passers-by. It is needless to say that architects are not responsible for this offensive habit, which tends, more than anything else, to destroy the effect of their façades, designed without reference to the signs; but it is singular that the instances in which some control of the signs has been given to the architect should be so rare. There are a few cases where signs have been put up in places intended for them, of sizes and shapes suited to those places, and colored and lettered according to drawings furnished by the architect; and these signs always attract attention, less on account of their dissimilarity from the ordinary kind than from their real interest as designs, which leads every person of taste to stop a moment to enjoy the carefully studied and artistic shapes of the letters, or the pleasant combinations of color which they present. So far, these architects' signs have been of the simplest description, but there is no reason why the same taste should not be displayed in more elaborate compositions. There is paint enough, of different colors, displayed on the Broadway fronts, to form, if skilfully distributed, a series of patterns, miles in length, of ever-changing richness and beauty, and it is certain that, until artistic signs become more common than they now are, those who possess them will be rewarded by a corresponding share of public notice.

THE *Builder* mentions that Mr. Petrie, the director of the explorations at Tanis, has returned to London with a collection of the smaller objects found in the excavations. There is an immense number of these, many of them consisting of personal ornaments, of a delicate and beautiful kind. Some of the most curious are mosaics, in glass, of such extreme minuteness of detail as to require a magnifying glass for seeing them properly. Besides these are many little silver figures, worn as amulets or trinkets, and modelled with great skill. The larger objects are mostly of bronze or terra-cotta, the former material being found in a great number of shapes, as in nails, staples, hasps, keys, lamps, and so on, as well as in a lattice window screen of considerable size. A bronze window grating, even of very simple design, would at this day be regarded as a costly luxury, but there is no reason to think that the owner of the house for which this one was made, in the fifteenth century B.C., was richer than many of his neighbors, so that a great deal of such work is likely to be found as the excavations proceed. The domestic architecture of the town seems, in fact, to have been luxurious and elaborate in character of buildings, fragments being found decorated with glass mosaic, while others are covered with delicate hand-worked ornament. Among the more interesting objects, as giving the most vivid idea of the tastes and habits, and even the appearance of the people who lived in Northern Egypt thirty-four hundred years ago, are many fragments of cloth, colored in simple patterns, mostly in red, as well as a quantity of human hair, found with some of the cloth, and probably belonging to the owner. The hair is long and wavy, and of an auburn color, the latter circumstance giving an interesting indication of the character of the race which held and enriched Tanis. A relic of some philosopher also, possibly the lady of the auburn hair, was found, in the shape of a glass lens, two inches or more in diameter. This would be a curiosity, if found in any collection of objects dating beyond the time of Galileo, but as an Egyptian utensil it is of singular importance to the history of science.

LE Génie Civil contains an account of certain semi-artistic industries carried on at Blois, which is of interest to amateur decorators, as well as to collectors of such objects. There is no manufacture, in the ordinary sense, carried on in the town, but the influence of the traditions and examples of pure taste and beautiful workmanship have served to encourage the production of tapestry and decorated earthenware on a commercial scale, by persons who began their work a few years ago as amateurs. One of the most remarkable cases of this kind is that of M. Ulysse Besnard, a young artist, who, after gaining a high reputation in Paris as a painter of genre subjects, returned to Blois, where he was born, and fitted up a studio there. As a decoration for the walls of his room, he painted some tiles in imitation of Italian specimens of the sixteenth century, and had them fired by a local potter. The results of this essay encouraged him to try more experiments, and in order to control more readily the medium with which he worked, he obtained clay and mixed his pastes and enamels for himself, and set up an oven for baking the objects which he painted. His very first works attracted the attention of connoisseurs, and he was applied to so frequently for specimens that he soon found it necessary to abandon his canvases and devote himself entirely to ceramic decoration. At present, the number of his executed works in ornamented clay exceeds twenty-eight thousand, all of them being distinguished by the beauty of their design and color. Although each of M. Besnard's pieces is distinguished by his signature, "Ulysse," they differ widely in style, many of them presenting genre subjects, like those which brought him reputation in his early days, while others are imitated from Spanish, Moorish and Persian works. The processes employed in M. Besnard's workshop are, however, the same in all cases. A red clay is taken for the ground, and over this is spread a coat of white enamel, on which the design is painted. In many of the pieces the decoration is put on the tin enamel before this is fired, but the difficulty of painting well on the soft, powdery surface of the unbaked enamel is so great that the first coat is often fired before coloring, and a second coat put on as a ground for the decoration.

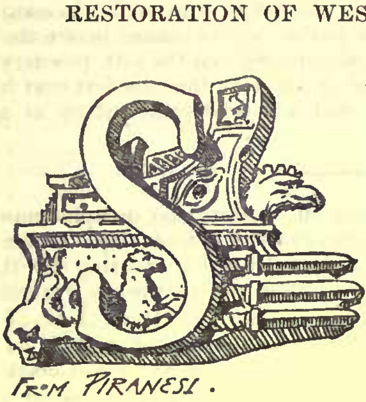
ONE of M. Besnard's pupils, M. Tortat, who occupies now a neighboring studio, has developed a different style of decoration, using the red clay for a basis, but covering it with a ground of blue, gray, green, yellow, or ivory white, instead of the pure white tin-enamel of his master. On this rich foundation he lays decorations of chimeras, masks, and arabesques, in various colors, heightened with touches of white and black. Still another talented and original artist, established in a suburb of the city, has devoted himself to a method of decorating clay differing from that of both the others, using white clay in place of red, and painting directly upon it, covering the whole finally with a brilliant lead glaze. This painter, M. Thibauld, chooses also a style of design peculiar to himself, but inspired by the beautiful faïence of the Italian Renaissance. These gentlemen, with their pupils, are rapidly gaining for Blois a place among the important centres of artistic production; and beside them a lady, Mme. Gagnot-Sausse, has had the courage to reject the stock patterns of worsted tapestry which she found in vogue among those who worked such materials for the market, and to substitute for them reproductions of the delicate and graceful arabesques which she found, ready to be sketched, in the ancient castle. The designs which pleased Francis First and Henry Second seem to have suited the taste of the present age admirably, and two hundred women and girls are now engaged in producing tapestries in the new style.

THE *Union Centrale des Arts Decoratifs*, of Paris, has just held two competitions of considerable interest. In the first of these, open to artists and designers of all nations, medals of different values were offered for the best designs or models for works in stone, wood, clay or glass; in the second, similar prizes were offered for completed works. The first prizes, of which there were two, of equal value, were large medals of gold, worth a thousand francs each, and there were to be in addition thirty bronze medals. The decision was to be given before the fifth day of October, so that the mails will soon announce the result, and the designs and objects selected for prizes will be exhibited in the Palace of Industry in Paris.

THE art of aerial navigation has again been slightly advanced by an experiment made in Paris, about four weeks ago, by the celebrated Tissandier brothers, whose trial, a year ago, of a navigable balloon, was then regarded as an event of great importance. In the present instance the same balloon was used that served in the test of 1883, but additional power of movement was secured by increasing the size of the zinc plates used in the battery which furnished energy to the electric motor, and by using a much stronger exciting liquid. With the help of these, a force of one and one-half horses was obtained, and the propelling screw was driven at the rate of one hundred and ninety turns a minute. The balloon was allowed to ascend to a height of thirteen hundred feet above the earth, and found at that point a breeze blowing from the northwest at the rate of about seven miles an hour. The motor was then set in operation, and drove the balloon at the rate of nearly ten miles an hour, so that it was rapidly steered through a complete circle, and then moved against the wind as far as Grenelle. The ascent was made late in the afternoon, and, as it was getting dark, the aeronauts then allowed the balloon to float away to the suburb of Varenne, where they descended safely. Although the voyages made by the Tissandier and Renard balloons seem to us absurdly short, they indicate, nevertheless, that the time is not far distant when balloons of a force as much superior to them as that of a steamship is to the weak struggling of a dory, will navigate the air to some practical purpose. No attempts at doing this have ever yet been really made, but the evolutions of the ingenious toys which the French engineers have devised will soon point the way for applying the principles which they discover to air-ships made with serious purpose.

RESTORATION OF WESTMINSTER HALL.

LONDON, September, 1884.



FROM PIRANESI.

SHORTLY before the close of the last parliamentary session, Mr. Pearson's plans for the restoration of this historical building were exhibited in the Library of the House of Commons, and his exhaustive report which accompanied them was printed by order of the House. When bringing the subject before Parliament, Mr. Shaw-Lefevre, the First Commissioner of Works, announced that, should there be serious opposition to the general scheme of Mr. Pearson's designs, he would ask for the appointment of a select committee to consider the whole subject; but that in the event of their general approval, he would ask for a vote to commence the work during this autumn. Later on, he intimated that as there was a "general concurrence of opinion favorable to the plans," he proposed to begin operations, and obtained a small vote for the purpose. Thus, then, we may consider that generally the designs as shown in the Library of the House have been adopted, and are about to be carried out, and we therefore propose to examine them with the interest their importance, both historically and architecturally, seems to demand. Mr. Pearson's report is, in every sense of the word, a most valuable document. It is in fact a history of the building, from its foundation by William Rufus, in 1097, to its renovation by Sir Robert Smirke, in the reign of William IV, and between these two Williams is comprised a period of something like seven hundred and forty years of English history, in most of which the great Hall at Westminster is more or less mixed up. Mr. Pearson is not only an accomplished architect but a learned archæologist, and this report alone is a sufficient justification of Mr. Shaw-Lefevre's opinion of him, when he said: "There is certainly no architect in the country better qualified, whether from his great experience in such cases, his great knowledge of Gothic architecture, or his well-known tenderness in dealing with restorations, to investigate the subject." And accordingly we have a minute and careful account of its checkered career throughout those hundreds of years. We are told of its foundation, of its repairs, of its burning, of its rebuilding, of its additions, of its partial demolition, of its restorations and repairs over again, till the recasing of its walls by Smirke; and now again, in his own designs, Mr. Pearson takes up the thread of its history, telling us what he proposes to do, and his reasons for it, adding thus another half-century to its story.

Mr. Shaw-Lefevre tells us that when he first took up the matter, all he expected to have to do was simply to restore the walls and the flying-buttresses, and probably lengthening the windows (which are rather short) on the west side to about the same proportions as those on the east side, and the thing was done; but in going to such a learned pundit as Mr. Pearson, he evidently reckoned without his host. Mr. Pearson immediately plunged into his researches amongst old books and prints and foundations, and the result is the designs we are now considering.

After passing through various vicissitudes, the most important event in the Hall's life, after its foundation, seems to have been its rebuilding, by Richard II, at the end of the fourteenth century. He built the magnificent roof as we now see it, and the great flying-buttresses to support it, inserted the side windows, and generally gave it the form with which we are all familiar. In addition to this, Mr. Pearson, grubbing amongst the old foundations and marks and indications on the walls and buttresses, finds that he also built a double-storied cloister under the flying-buttresses along the west side of the Hall, and not only this, but that in early English times there existed at the north end of the Hall, and at right angles to it, a wing or projection of considerable size, and against which the double-storied cloister abutted. These out-buildings have long since been destroyed, but their foundations have been laid bare, and they give the key-note to the new scheme of restoration. Rebuild this double-storied cloister, says Mr. Pearson, and you have a fair idea of the appearance of the Hall in the days of its glory under Richard II. He claims to have found enough remains to enable him to do this with tolerable accuracy, but as he can hardly say the same for the projecting building at the northwest angle of the Hall, since it was destroyed and rebuilt more than once, he proposes to adhere to its dimensions in regard to plans, and carry it out in harmony with the rest of the work of the time of the said Richard. All this sounds feasible enough, though it must be confessed it looks somewhat like merely building for building's sake, since some use or other has to be found for the two long, narrow stories of the cloister and the two rooms of the projecting wing. Accordingly, the upper floor of the cloister, it is said, might be useful for keeping papers in, and the ground floor for a carriage-drive; the upper floor of the wing for the use of "grand committees," whatever that may mean; and the ground story as a "stand for horses," in place of the old shed now on the site. The first thing one is apt to think about it is: Is this the most likely method the builders of Richard II's time would have employed? Parliament sat in the Hall in his time, and doubtless the rooms along the west side were required for business connected therewith; but to build them now without a purpose, just because their old foundations have been discovered, seems a strange doctrine to preach. We are told, however, there are other reasons; first, the old Norman wall now exposed needs the protection of such a cloister to preserve it from destruction, and secondly, the west side of the Hall was never meant to be a "front," but had always buildings of some kind alongside of it; also, that no instances of flying-buttresses such as we have here are ever found without some low aisle or building between and under them; and that lastly, Mr. Pearson tells us that even from a "purely architectural point of view, it is the treatment he would desire to see carried out."

From a careful examination of the report and the remains it speaks of, we are inclined to think too much weight is being attached to what after all is very slender evidence indeed, and even after we have got this double-storied cloister it may be fairly said to swamp the buttresses and hide nearly all the side of the Hall itself. The "carriage-drive," some eight or nine feet below the level of the surrounding streets, and into which you have to wriggle in and wriggle out, is surely a mistake, while if it is desired to provide rooms alongside of the Hall, for any or most of the reasons above quoted, why cannot the cloister be one story high? The advantages gained would be that the windows of the Hall could then be seen, and the flying-buttresses stand out as leading features in the composition.

Mr. Pearson indeed included an alternative design for a one-storied cloister among his drawings, and his opinion thereon is entitled to every respect. He says in his report: "I can conceive no advantages from this (one-story) treatment; there is no gain in accommodation, and the elevation is much impaired. To carry it out would be to discard the distinct evidences which remain of two stories having formerly existed." As to the question of "accommodation," it is rather wide of the mark, seeing a point has to be strained to find a use for the "accommodation" after it is provided; as to its effect on the elevation, that may be a matter of taste; as to the rest, if we are to restore in the style of Richard II, why not work in the spirit rather than the letter of the fifteenth century? Can it be supposed for an instant that when Richard remodelled his Hall and built his cloister, he cared a brass farthing for any old lines of foundations he might come across in the process, or considered himself bound to follow them, and build rooms, whether he had a use for them or not, or, for the matter of that, he even had any particular respect for the old work he destroyed? Not a bit of it. He doubtless set about to build only what he required, making the useful beautiful in the spirit of all true art. A great deal of nonsense is gravely promulgated under the plea of "restoration." By all means preserve all the old work we can; it is so much history, which we have no right to destroy. But when it is a question of rebuilding, which this cloister essentially is, why on earth should we be bound to build a long, semi-useless corridor, of two stories, each twenty feet by two hundred feet, simply because Richard II did so before us? Richard built the best architecture he could, and we may be sure never troubled himself about such superfluities. Mr. Pearson can give us quite as good architecture, even from a strictly art point of view, as ever Richard bequeathed to us, but he cannot give us the old work back again; it will be only an imitation, after all is said and done, always open to question, historically, if not architecturally. If a cloister must be built to preserve the old Norman wall, well and good. Let Mr. Pearson design one for the purpose, and doubtless it will in every way help the elevation and dignity of the Hall; but don't hamper him with a pretence. Let it be his own, in fifteenth-century Gothic if you like, and in harmony with the old work, but adapted to its purpose and nothing more.

If all this can in any way be urged for the cloister as now designed, what can be said for the wing at the northwest angle? It was originally built in the thirteenth century, but it is not pretended to restore *that*. No; only the ground plan is adopted, the architecture being that of our friend Richard again. Does it help the grouping? Seriously we question it very much. Certainly it cuts off the view of the side of the Hall as one approaches it from Parliament Street. With all due deference to Mr. Pearson's cultivated taste and matured judgment, is he wise in hampering himself with all these complicated problems of "carriage-drives" he cannot very well get into, and "grand committee" rooms which are out of the way? Would the old Hall not look grander and nobler with its long, impressive side unbroken by any "wings," with its old windows and splendid flying-buttresses well defined, and with a moderate-sized cloister, if you like, running between and under them?

Mr. Pearson's designs also embrace the heightening of the towers at the north end of the Hall, and here we think he is clearly in the right, though he admits it cannot be defended by any "reference to history or past record." He is quite right in saying the whole present front "has an air of spuriousness," and that his remodelling of the towers will render them more "worthy of their position and importance in the group in which they now play so insignificant a part." And how charmingly his towers are designed! Unhampered by any idea of reproducing some questionable past, he is thoroughly at his ease, clever and graceful in design and pure in detail, as he knows so well how to be. Architecture is, after all, something more than a mere study in archæology; here we have the artist at his best. He tells us he designed his new upper stage in two floors to preserve a more domestic character, and to harmonize Sir Charles Barry's work with that of the old Hall, and we think he has admirably succeeded. No one could mistake them for "church" towers, and cutting the stage into two floors seems to keep it more in scale with Barry's elaborate work. We consider this remodelling of the north end by no means the least important part of the so-called restoration; on the contrary, it is a most essential element. Correspondingly, at the south end of the Hall, the north side of St. Stephen's porch (against which it abuts) is shown to be completed in the style of Sir Charles Barry's work, as Mr. Pearson believes Sir Charles himself "would have desired to have seen it completed under present circumstances," and it is needless to add it is thoughtfully and artistically done. In matters of minor detail, the side wall of the Hall is shown to be battlemented, and the modern dormers are got rid of, showing sound judgment in both cases; but as the interior is not over-well lighted at present, why not lengthen the windows of the west side to the same proportions as those of the east? This we know Mr. Shaw-Lefevre thought of doing from the first.

Another point of much importance must still be noticed, and that is the sunken condition of the Hall itself. Its floor-line is some eight feet or so below the level of the surrounding streets. It is in "a hole," as some one has said, and this is one of the difficulties of the problem. It is so difficult that, in order to make his carriage-drive or shelter, or whatever it is, on the ground floor of his cloister, at all accessible, Mr. Pearson is obliged to propose to lower the levels of New Palace yard, so as to get into it from the north, and make a long, inclined plane for a similar purpose towards the south—a clumsy arrangement altogether, it must be confessed. Now there is on an average a space of about seventy feet wide from the outside of the flying-buttresses to the street line of the old Law Courts, and it would certainly be a pity that this small space should either be cut up by "inclined planes" or encumbered with buildings as it was formerly; but surely with a little judicious arrangement of the levels of the ground along the west side of the Hall, and a liberal allowance of green turf, the dip might be got over in such a way as rather to assist than detract from the height of the building itself. Any clever landscape gardener could manage this, as once the so-called "carriage-drive" is got rid of, the problem is shorn of half its trouble. Indeed, it is really the said "carriage-drive" proposal that creates any serious difficulties at all. Once give it up, and the matter is comparatively simple; once give up the double-storied cloister for a single one, and the "carriage-drive," dragged in to make "use of" unneeded accommodation, vanishes with it.

Another project for disposing of the levels and other matters is to erect a new wing northwards from St. Stephen's porch, on the site of the old Law Courts, as originally proposed by Sir Charles Barry, thus placing Westminster Hall in a court-yard and out of sight. This would certainly give plenty of "accommodation," which, however, Mr. Shaw-Lefevre tells us is not wanted. But it would at the same time close up the open space now gained, block up the view of the grand old Hall, and destroy what is unquestionably one of the most interesting groups of buildings in the world. We may therefore rest assured this will not be done. Indeed we feel sure that if Sir Charles could see the view now, he would be the first to abandon the proposal.

The Government invited criticism on the plans; we have endeavored to do so fairly and impartially. They are so fortunate in their architect, that it seems a pity he should be asked to build what may afterwards be found to be a mistake. There is a considerable feeling that the objections we have urged are well founded. Surely, as another critic has remarked, "a little delay would be better than a wrong decision."

Mr. Pearson goes carefully into the question of cost; we do not propose to follow him there. We are told the total will be £35,000, a mere nothing for a country like England, and cost should certainly not be the primary consideration in dealing with one of the most historical buildings in the empire. If the work is worth doing at all, it is worth doing well, *very well*, and if it costs £50,000 instead of £35,000, it will be well worth the money. It is very much more important that we make sure of doing the right thing, than the cheap thing, and if that is secured, nobody will grudge our clever First Commissioner the outlay; the money will be voted without a murmur.

THE VENTILATION OF THE HOUSES OF PARLIAMENT.

THE description of the arrangements for heating and ventilating the Houses of Parliament published in the *American Architect*, for September 20, will make the following statements more intelligible to our readers:

In last July the members of the House of Commons were compelled to complain of the prevalence of disagreeable and noxious smells. A select committee was appointed, with Mr. W. H. Smith for chairman, to investigate the subject. The evidence has been published as a Parliamentary paper. Dr. John Percy, who has charge of the arrangements for the ventilation of the Houses of Parliament, was the first witness examined, and he told the committee that he could not give any information as to the cause of those smells, but he was perfectly certain that they did not arise from any condition within the House. The apparatus employed for the ventilation of the Houses of Parliament, with the exception of some minor improvements, such as the addition of an accessory machine for injecting the air, has been correctly described in the report of 1866. The fans for propulsion of air have been abandoned, and ventilation is now produced by heat applied through coke fires of the simplest construction. In very hot weather, a sort of double-acting pump is likewise used for injecting the air, which is drawn from the river front. Some years ago Dr. Angus Smith was commissioned to test the air which passed through the House of Commons on one of the fullest nights, the House being quite crowded. He took samples of the air from different parts of the House; he took some of the air which had passed through the ladies' gallery, and his report was that he could find no sensible difference between its composition and that of the external air. The conclusion to be drawn from the experiment was that the ventilation is so rapid in its effects that there is no contamination of the air by the presence of several hundred people within the building. The air can be changed in every part in ten minutes. It is regulated according to the number of people in the House; and by long experience the assistants are so well trained, they know exactly what the right quantity of air is. Dr. Percy's principle has always been that too much air cannot be given, provided there is no sensible draught; that is a fundamental principle, he believes, in ventilation. It is found that if the velocity of the air does not exceed one foot six inches per second, then the majority of people will feel no draught. That was determined by Sir Goldsworthy Gurney, and Dr. Percy's experience confirms the accuracy of the statement. At that rate, the thermometer being 60° Fahrenheit, the motion is not sensible; but a good deal depends upon the temperature. The slightest movement of the air in very cold weather becomes very sensible.

As regards the cooling of air, Dr. Percy said that if he had the power of cooling the air to a low degree, he would not take the responsibility of cooling it very much in hot weather, because then great danger would arise to the members. But the air can be cooled to the extent of several degrees by causing it to pass over blocks of ice in the passage through which the air comes from the river front. It is also more or less cooled by the action of spray jets. That is a little apparatus for the injection of a small stream of water from a high elevation upon a small disc in front. The water seems to become pulverized. It is converted into a fine spray which covers a circle of about nine feet in diameter. In weather when it is necessary to raise the temperature, the air is moistened by steam. But there is great difficulty in producing steam free from odor. At one time leaden pipes laid in open troughs were used; but the steam so produced from the water in the troughs was not quite free from smell, and Dr. Percy had a great deal of difficulty. At last the expedient was adopted of passing the steam through large copper tubes or pipes, and letting small jets of water drop down upon the pipes. In that way steam is generated which is perfectly odorless, and the plan was found so successful it is still adopted. The sewers are ventilated in a simple way. There is a little chimney-shaft communicating with the main sewer which passes along near the base of the Clock Tower. At the base of the Clock Tower there is a large fire kept burning, and in front of that fire there is an opening connected with the sewer, up which the sewer-gas passes. So satisfactory was the evidence of the officials respecting the ventilation of the Houses of Parliament, it is not surprising the committee came to the conclusion that the noxious smells did not arise from any deficiency in the sanitary arrangements of the Houses of Parliament. At the same time it was said that it would be impossible for the most perfect system of ventilation to prevent the entrance of offensive smells if they pervade the atmosphere outside the House.

The evidence made it plain that there was a possibility of the sewers in the neighborhood of the House affecting the air. In spite of what surveyors might say, there were too many witnesses to testify to the malodorness of the atmosphere when some of the flaps were opened. But there was also some other cause more remote, and the committee if they have not been successful in tracing it, are at least on the track. It was supposed, for example, that the smell was derived from the potteries in Lambeth. Mr. Henry Doulton was, however, able to explain that no smell or odor of any kind emanates from his firm's potteries, with the exception of the salt fumes which arise for a short time when the kilns are at a very high heat. There is no vegetable matter in the clay, and calcined bones are never used. About a year ago Messrs. Doulton felt aggrieved by the unwarranted statements respecting salt glazing, which had been made by members of a deputation to Sir Charles Dilke. They explained their process to Dr. Angus Smith, and he said there had been gross exaggeration. But Messrs. Doulton were eager to remove even the semblance of a nuisance, and, after several experiments, they have been able to reduce the quantity of salt, so that fastidious persons would hardly say there is the least nuisance. Mr. Fletcher, the Chief Inspector of Alkali Works under the Local Government Board, gave evidence to the same effect, comparing the results of experiments in St. Helen's Pottery, and he found that the air at Lambeth now contains only one and one hundredth-and-fifty-seventh part of the quantity of salt which he found in 1873 at St. Helen's. Messrs. Doulton have done much to put down the bone-boiling nuisance in Lambeth, but now the place is made a receptacle for much of the refuse of London.

One of the members of the committee was Sir Lyon Playfair, and it is remarkable that from his own observations he was able to demonstrate that the offensive odors have been perceptible over a large district of London for more than two years. Sir Lyon's house is in Onslow Square, and during the hot weather of 1884 and 1883 it has been found impossible, owing to that cause, to keep the windows open at night. The odors pass over the district generally between two and three o'clock in the morning, occasionally at seven o'clock at night, and sometimes but rarely on Sunday evenings. The medical officer of health for Kensington has received numerous complaints on the subject. He believes the origin of the smells is to be found in the brick-kilns at Shepherd's Bush and Hammersmith, where the refuse from dust-bins is burnt. Sir Lyon Playfair, who has the acute smell of a chemist, says he believes the smells arise from some burning matters, and from the presence of clay, or a combination of impure clay and impure fuel. At Kensington the odor appears to prevail when the wind is from the west, at Onslow Square it is when the wind is from the south-west. The dust-yards, where refuse that cannot be sold to brickyards is consumed, and of which there are several within a limited area of the Houses of Parliament, are also considered to be a source of nuisance, although the inhabitants of the neighborhood make no complaints about them to the sanitary officers. The evidence would thus seem to point to the conclusion that the noxious smells which gave annoyance to many other people, besides Members of Parliament, proceed from dust heaps, refuse of furnaces, or from gases emitted from gas-works, saccharine works, and other factories. As it was recommended that an officer of the Local Government Board should be directed to make further observations, it may be assumed that in the next session much more will be heard on the subject. — *The Architect.*

ART IN CHALDEA AND ASSYRIA. — II.[1]

Rossetti's Tomb, designed by Ford Madox Brown.

WITH such methods of construction as have been described, we are not surprised to find that Chaldean and Assyrian architects secured space by lateral extension, not by elevation. The Assyrian palace covers an immense extent of ground, and consists of an infinite number of rooms grouped around various interior courts. There seems to have been no second story in our sense of the word. If a few rooms were elevated above others they appear to have been raised on a solid foundation, not superimposed on the lower voids. To obviate the insignificant appearance that even the largest building of this sort would have presented, set in the midst of a limitless plain, the architect raised his palace on one of those lofty mounds, to which I have already referred. Its summit was carefully paved, and it answered the further purpose of providing an imposing court around the palace proper. These mounds still stand, but the palace walls, even in the best-preserved examples that have yet been unearthed, seldom retain a height of more than ten or fifteen feet. Their thickness varies from twelve to twenty-eight feet. The rooms they encircle are rectangular, almost always longer than broad, and sometimes elongated so as to be, more strictly speaking, galleries rather than rooms. The temples and so-called observatories, known to us as "staged towers," were likewise raised on mounds and consisted of a series of cubes, decreasing in size, that were placed one upon another, and encircled by external ramps or stairways.

The arch plays a prominent part in Mesopotamian architecture. Necessity prompted its invention; for how could such small units of construction have been used without its aid? It must have been first used in Chaldea, but the only existent examples of its true-centered form stand on Assyrian soil, though specimens of the false, "set-off" vault may be seen among the tombs of early Chaldea. The gateways of the town of Khorsabad which had not perished, were roofed with semi-circular vaults. One, demolished by M. Grace, for the examination of its structure (after it had been mutilated by the removal of its sculptures), was built of bricks, not burned but carefully dried and skilfully cast into the requisite shape for voussoirs. The side walls passed into the vault without any break or preparation, and the arch had no inward projection. Three rows of voussoirs were superimposed upon each other; but there were no mouldings or structural decorations of any kind. A softer clay was used to bind the bricks together.

Excellent drains — perhaps the most admirable results of Mesopotamian building — traversed all sub-structures. Their construction was extremely skilful, and showed various curious methods of vaulting. Pointed-arched forms were here employed at times, but there is no evidence to show that any but the round form was used in visible places. M. Perrot examines these drains and conduits at length, as they give valuable information with regard to the origin of the keyed vaults in its various shapes. The old idea that the Etruscans were the first inventors of the vault has been exploded by later discoveries. We know now that the Egyptian well understood its principle, though his use of large stones obviated the necessity of making it a prominent feature in his work. But the Assyrian employed it in many forms, on a large scale, and in the most conspicuous functions. And knowing how he clung to Chaldean traditions, and remembering that small units were alone at the command of the Chaldean builder, we may believe that the latter, too, was skilful in its use from very early times, though no relics remain to prove such proficiency. The vault was in fact the necessarily national mark of Mesopotamian work, as the column with its lintel was of Egyptian. It is thus impossible to say to what nation we should credit its first invention. Most probably it was more than once invented; most probably the Egyptian, the Chaldean, and the Etruscan each evolved it for himself as necessity arose, and that neither received it as a lesson from the other. But to the Assyrian may unhesitatingly be accorded the credit of being the *greatest* vault-builder of antiquity.

We realize this very clearly when we enter upon the much-disputed question as to the mode or modes of roofing he adopted. But before summarizing what M. Perrot has to say upon this subject, I must give a word to the use of the column in Mesopotamia.

To Chaldea we should hardly look for stone columns. And in truth all we find there are traces of cylindrical piers (built of bricks specially moulded for the purpose, or of fragments of stone bound together by a coating of masonry), and sculptured representations of slender columns, the nature of which is clearly revealed by their appearance: they were evidently of wood, covered with a sheath of metal. Passing to Assyria we find that an actual wooden column, covered with metal representing the scales of a palm-tree was discovered in a fragmentary condition by M. Place, at Khorsabad. And the hint thus received from Chaldea was also carried out in stone, but only in a timid and subordinate way. Only one fragment of a stone column has been found in all Assyria, and again by M. Place at Khorsabad. It is of carefully worked limestone, about forty inches in height, and includes in one piece the capital and a portion of the shaft; thus plainly showing that it is a survival from similar works in wood. The shaft is plain, and the capital cushion-shaped and decorated with raised lines forming festoons or scallops. This type seems to have been frequently repeated, for we see it with but slight variations in four bases found in position in front of the palace of Sennacherib. But the most common type of capital — as proved by the sculptured pictures and by many objects of industrial art — was the capital with volutes, originating in ancient Chaldea, afterwards to be seized upon by the Greeks, and beautifully developed in their Ionic order. From the same source we learn how these columns were used — to support the roof of small temples or open pavilions; to form an open upper story or *loggia* in country houses; to make a small porch — by no means a portico, in the Greek sense; or to support the roof of a covered gallery that stretched from the palace door to the edge of the platform-mound. Furthermore we learn that a row of animals placed at the foot of a façade sometimes supported such bases on their backs, which bases supported in their turn columns that were affixed to the wall, apparently for the sole purpose of decoration. Diligent research has thus demonstrated the existence of the column in Assyria, but it has proved at the same time how unimportant were its uses; that it was employed mainly, to quote M. Perrot, "for the decoration of out-buildings." The whole genius of Mesopotamian architecture was opposed to its employment as an important structural feature. The colonnade as the Egyptians and the Greeks understood it was never developed; and that combination of shaft and arch which in the hands of Mediæval builders produced the most wonderful and almost the most beautiful architectural effects that have ever been attained, certainly never occurred to an intelligence which was keen and great in its own way, but was evidently not of an innovating kind.

Let us return now to the question of roofing. An infinite deal of discussion has been printed on the subject, and even the explorers who are best entitled to our credence, here differ among themselves. Mr. Fergusson's "*Palaces of Nineveh and Persepolis Restored*" has done more than any other book to popularize the subject among those who speak our language. His theories, as M. Perrot says, "are implicitly accepted to this day by English writers." And yet as our author adds — giving ample warrant for his verdict — they are "purely fanciful." Mr. Fergusson founded his opinions less on the testimony of Assyrian work itself than on that of the Persians in the later relics of Persepolis. Indeed, at the time he wrote Assyrian evidence was not sufficiently full to warrant any theory. Speculations were alone possible, and Mr. Fergusson's speculations — formulated in that *ex cathedra* manner which has misled the popular mind with regard to other architectural questions as well as this — have certainly not been sustained by later discoveries. When he wrote Mr. Layard had not yet published his second narrative or his second book of plates; nor had M. Place yet described the palace of Sargon, which to-day is our best known, most completely uncovered, and most instructive example. His book, with its elaborate Assyrian restorations patterned after the hypostyle halls of Persepolis, proves nothing save how unwise it is to hold an imaginary theory, and to attempt

[1] *A History of Art in Chaldea and Assyria,* from the French of Georges Perrot and Charles Chipiez. Illustrated, translated, and edited by Walter Armstrong, B.A. London: Chapman & Hall, New York: A. C. Armstrong & Son, 1884. Continued from page 176, No. 459.

to prove it by imaginary evidence. No slightest trace has been discovered, as M. Perrot explains at length and in a conclusive manner, of the great interior rows of supporting columns which his arguments demand.

The immense heaps of rubbish — consisting of brick-earth mixed with broken bricks and pieces of stucco — that fill all Assyrian ruins, prove that the roof must have been of great thickness. Indeed, we might expect as much, for that protection against heat which was insured by the immensely massive wall, must have necessitated massiveness overhead as well. Wooden beams could not have supported such a superincumbent weight, even if they could have been obtained long enough to serve in every case. A *vault of crude brick* seems to M. Perrot the most probable device, and the one most in keeping with the general character of Assyrian building. And such a vault would have been amply able to support the immense weight that is proved by the rubbish found to-day. A curious item of evidence is that the terrace-roofs of modern houses in the East are kept in condition by being rolled with heavy cylinders of stone, and that similar cylinders of enormous weight were found by M. Place pierced at each end with a square hole into which wooden spindles had been inserted. Such a roof would perish quickly with its supporting vaults, were constant care once relaxed; but the soft materials of which both were formed would not injure — would indeed, protect from injury — the sculptured slabs of the interior. And such is the condition of things in the Assyrian mounds to-day. Traces of fire have occasionally been found, and in these traces the theory of wooden ceilings once seemed to find confirmation; but as evidence has accumulated, such instances prove to have been but rare. In the hundred and eighty-four rooms and twenty-eight courts M. Place uncovered at Khorsabad, he failed to discover the slightest sign of fire. Nor were there any remains of the timber supposed to have been used, though portions of it, in the absence of any conflagration, must surely have been preserved, since near the doorways pieces of broken beams and panels were discovered. This might be esteemed but negative evidence. Positive evidence, however, exists in the vaults still in place in the drains and conduits, and the city gateways of Khorsabad, and in the bas-reliefs, upon which we constantly see arched openings represented. And even more positive evidence than this has been unearthed. In the most deeply buried portion of Sargon's palace, blocks of clay were exhumed, the undersides of which were hollowed segmentally, and covered with stucco; and, most convincing of all, even a section of a tunnel vault was found, the blocks of which still adhered together, though it had fallen bodily from its place. Its under surface showed signs of decorative painting. The existence of such vaults explains, not only the thickness of the outer wall, which might be attributed solely to the desire to exclude heat, but the thickness of the interior dividing walls also; this, as I have said, varying from not less than twelve to as much as twenty-eight feet. The advocates of the timber-ceiling theory found one of their strongest proofs in the great length of most of the rooms as compared with their width; but the peculiarity is equally well accounted for by the difficulty of building a crude brick or *pisé* vault which should be of great dimensions in *both* directions. MM. Flandrin, Loftus, Place and Thomas are the authorities upon whose opinion M. Perrot bases his own, and their theory of vaulted ceilings rests, to quote his summary, upon several distinct pieces of evidence: "in the first place the incontestable fact that the entrances to the town of Khorsabad were passages roofed with barrel vaults; secondly, the presence amid the débris of the fragmentary arches above described; thirdly, the depth of the mass of broken earth within the walls of each chamber; and finally, the singular thickness of the walls, which is only to be satisfactorily explained by the supposition that the architect had to provide solid abutments for arches that had no little weight to carry."

Of course it is impossible to decide just how the Assyrian vaults were constructed, but the great skill they imply need not seem to us improbable. The Assyrian clay has been found by modern explorers more tough and plastic than any other with which they were acquainted. And even to-day the ignorant workmen of Mesopotamia are clever at vault-building, dispensing even with the assistance of any centering.

The vault in its most perfect development, in the shape of the dome, is also believed to have been familiar to the Assyrians. We could hardly have stronger testimony to this fact than that borne by certain bas-reliefs illustrated in M. Perrot's volume — sculptured representations of towns in which the most important structures are covered by semi-circular or conical domes. Such domes are not only common to-day in the East, but the line of their descent may be traced down through the ages. In the typical-domed buildings of this part of the world, says M. Place, in Byzantine churches and Turkish mosques, we see "nothing but late examples of a characteristic method of construction which had been invented and perfected many centuries before at Babylon and Nineveh." No Assyrian domes exist, but they are universal in the relics of a later age, in the remains left on Mesopotamian soil by the Parthians and the Sassanids. And these structures, too, were built of brick. Some day when the history of the arch and dome shall be fully written; when we shall have consecutively described for us those buildings of Parthia, later Persia, Syria, and Asia Minor that are still but vaguely known to the general reader, but are so interesting and historically so important; and when the story shall have been carried down through the Byzantine centuries into modern Europe, we shall better appreciate the immense and double importance of Assyrian architecture. We shall better understand how its influence not only affected the Greeks — as, for example, in their Ionic order — but in its more characteristic forms affected in another way all the products of the East. We shall realize that the builders of Nineveh and Babylon were the direct ancestors of those architects who, constructing the great dome churches of the early Christian East, and later on the magnificent cupola of Renaissance Italy, perfected the most sublime form of roofing that the world has ever seen.

M. G. van Rensselaer.

THE ILLUSTRATIONS.

DESIGN SUBMITTED IN THE ROTCH TRAVELLING-SCHOLARSHIP COMPETITION BY MR. T. O'GRADY, BOSTON, MASS.

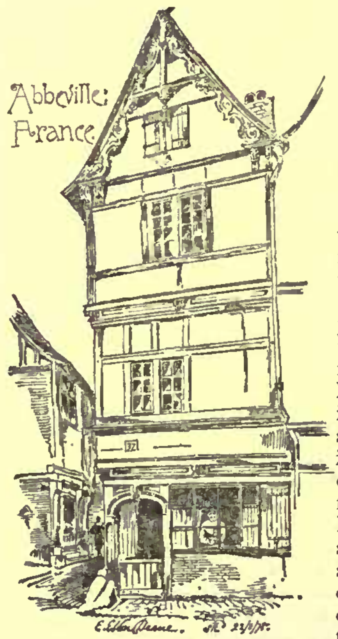
In consequence of a blunder, the responsibility for which lies between ourselves and the committee in charge of the competition, we never had it in our power to publish the designs which won the prizes in this competition, and only now are enabled to exhibit one of the "rejected addresses." It will serve, however, to show the character and grade of work that future competitors must strive to excel.

SKETCHES OF THE HOUSE OF HENRY HIGGINSON, ESQ., PRIDE'S CROSSING, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

DESIGN FOR THE HOUSE OF MR. —— BOSTON, MASS. MR. J. H. BESARICK, ARCHITECT, BOSTON, MASS.

HOUSE OF C. H. MOORE, ESQ., ST. ANTHONY'S HILL, NEAR MINNEAPOLIS, MINN. MESSRS. DUNNELL & ELLIOT, ARCHITECTS, MINNEAPOLIS, MINN.

THE COLONIAL CAPITAL OF VIRGINIA.

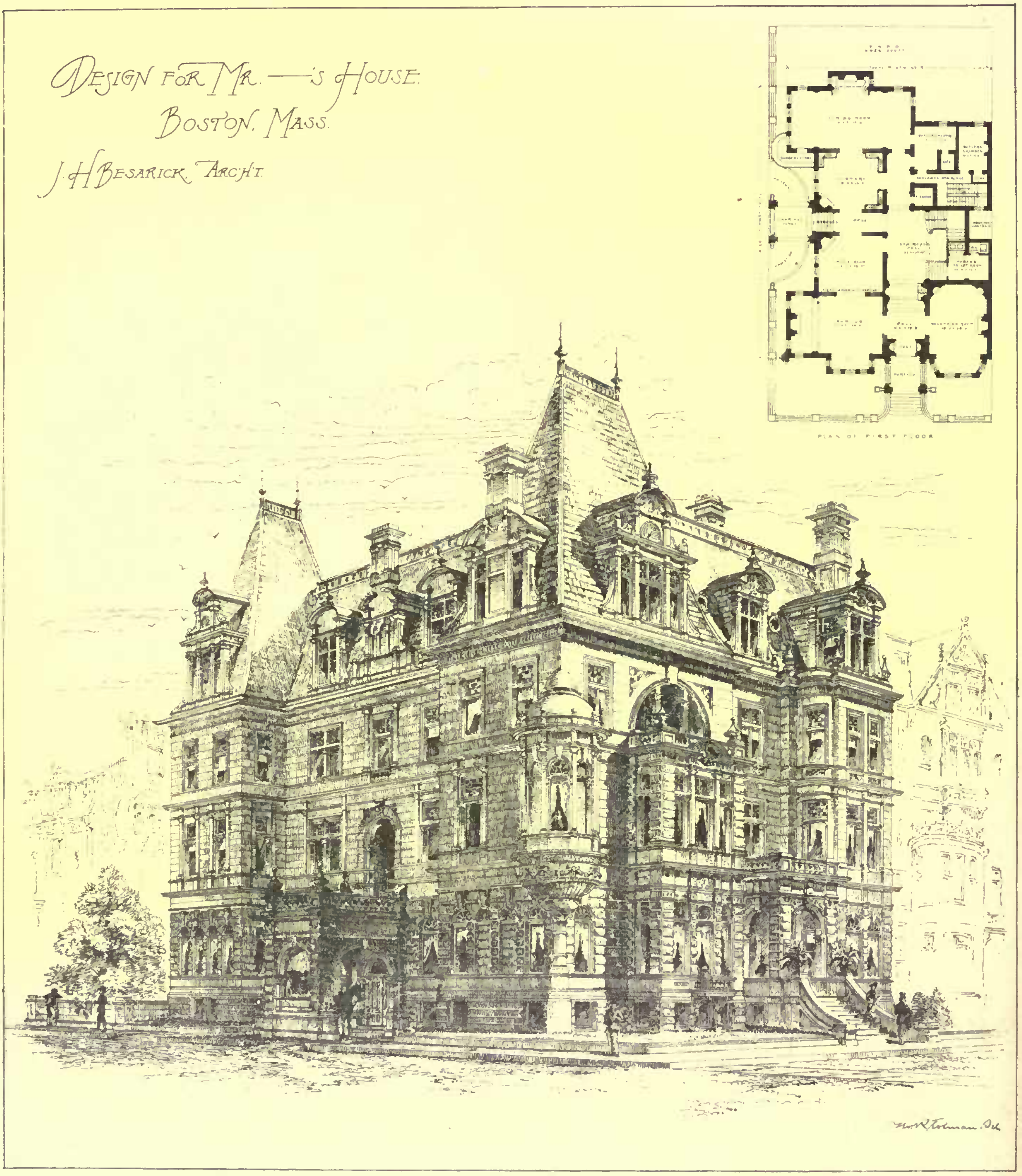


In Thackeray's "*Virginians*," we read that over a century ago Madam Esmond took her place in the family barouche, with liveried footmen mounted behind, and drove in great state from the little village of Richmond to the gay, merry-making metropolis of Williamsburg, some sixty miles to the eastward, where his Excellency the Rt. Hon. John, Earl of Dunmore, then Governor, held his vice-regal court.

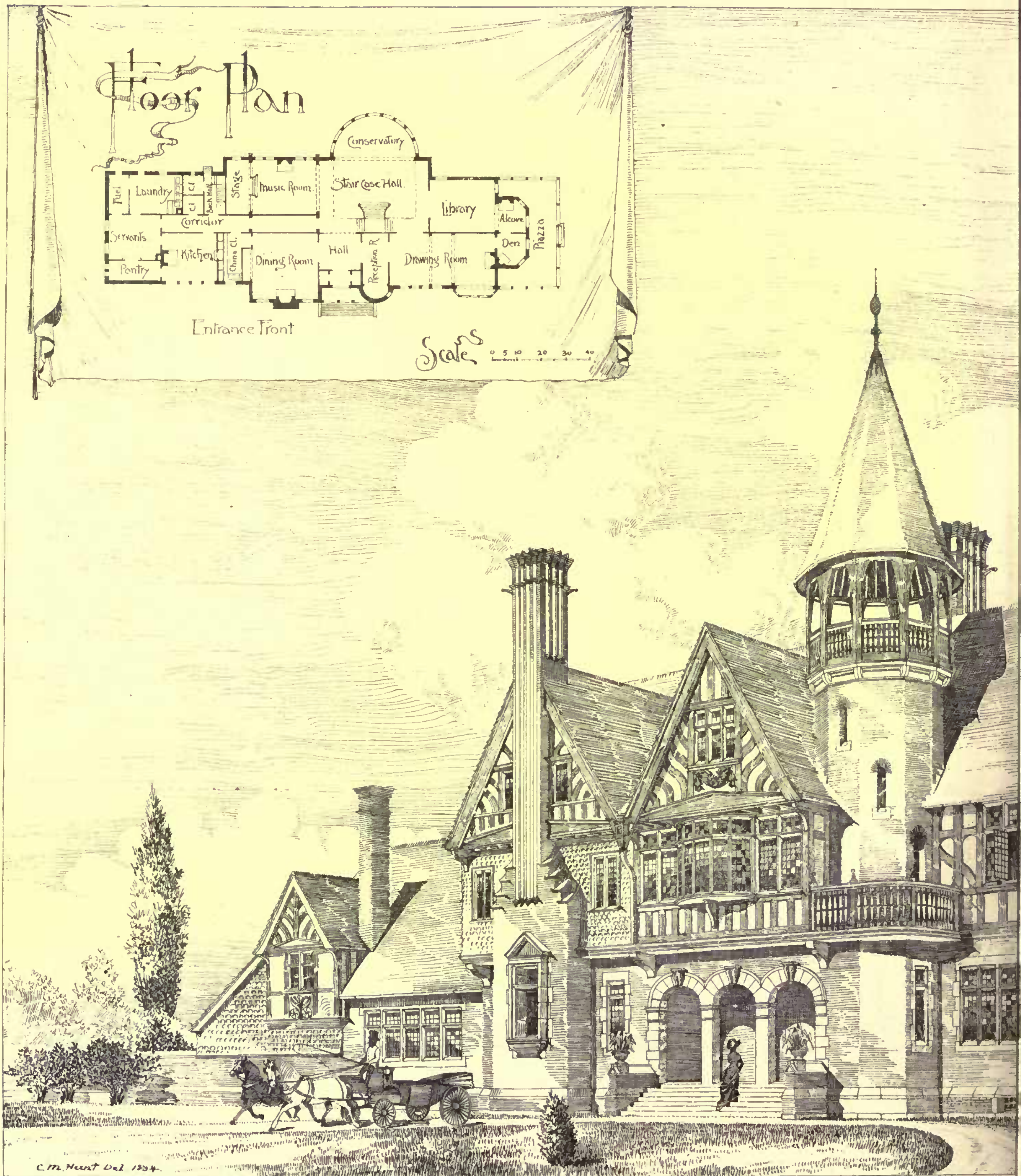
One bright morning in the May just gone by, I took the train at the flourishing city of Richmond, now making rapid strides toward her hundred thousand souls, and in something less than two hours alighted in Virginia's colonial capital, no longer the brilliant metropolis, but a picturesque village of fifteen hundred inhabitants. Madam Esmond doubtless made an early start, and dozed comfortably for many hours in the capacious recesses of her lumbering chariot ere it rolled into the busy thoroughfare of the capital known as Duke of Gloucester Street, when the shadows of night had fallen. The liveried footmen stretched their stiffening legs and dozed also, I will venture to affirm. But when the lights of the busy little city glimmered in the distance, her Ladyship straightened herself with dignity, the lackeys up behind grew rigidly statuesque, and the coachman cracking his whip, drove up with a grand flourish before the door of my Lady's town residence.

Here, a century later, when Madam Esmond's chariot wheels have rumbled away, clean out of the world, after two hour's ride in a parlor-car, our train whizzed across the grounds of the colonial palace, once laid out with great taste and elegance, where of yore their Excellencies, the Viceroys of their most sacred Majesties, the sovereigns of Great Britain and Ireland, and Virginia, were wont to take the air, and the brakemen shouted out "Williamsburg!" in that untranslatable guttural peculiar to brakemen, and never intended for the enlightenment of the travelling public. Being of an imaginative turn, I could but picture to myself the consternation of the Right Hon. Norborne Berkeley, Baron de Botetourt, his Majesty's Governor-General of the Colony and Dominion of Virginia, and Vice-Admiral of the same, could he have been called back once more to take the air along the freshly-rolled gravel paths winding through the park which of old surrounded his Gubernatorial palace. Would not his Lordship's periwig have been lifted from his noble head, when that hideous, puffing, screaming monster came dashing along right through the sacred precincts of his own proper domain? I shrewdly suspect that his Majesty's Governor-General of the Colony and Dominion of Virginia would have turned and fled.

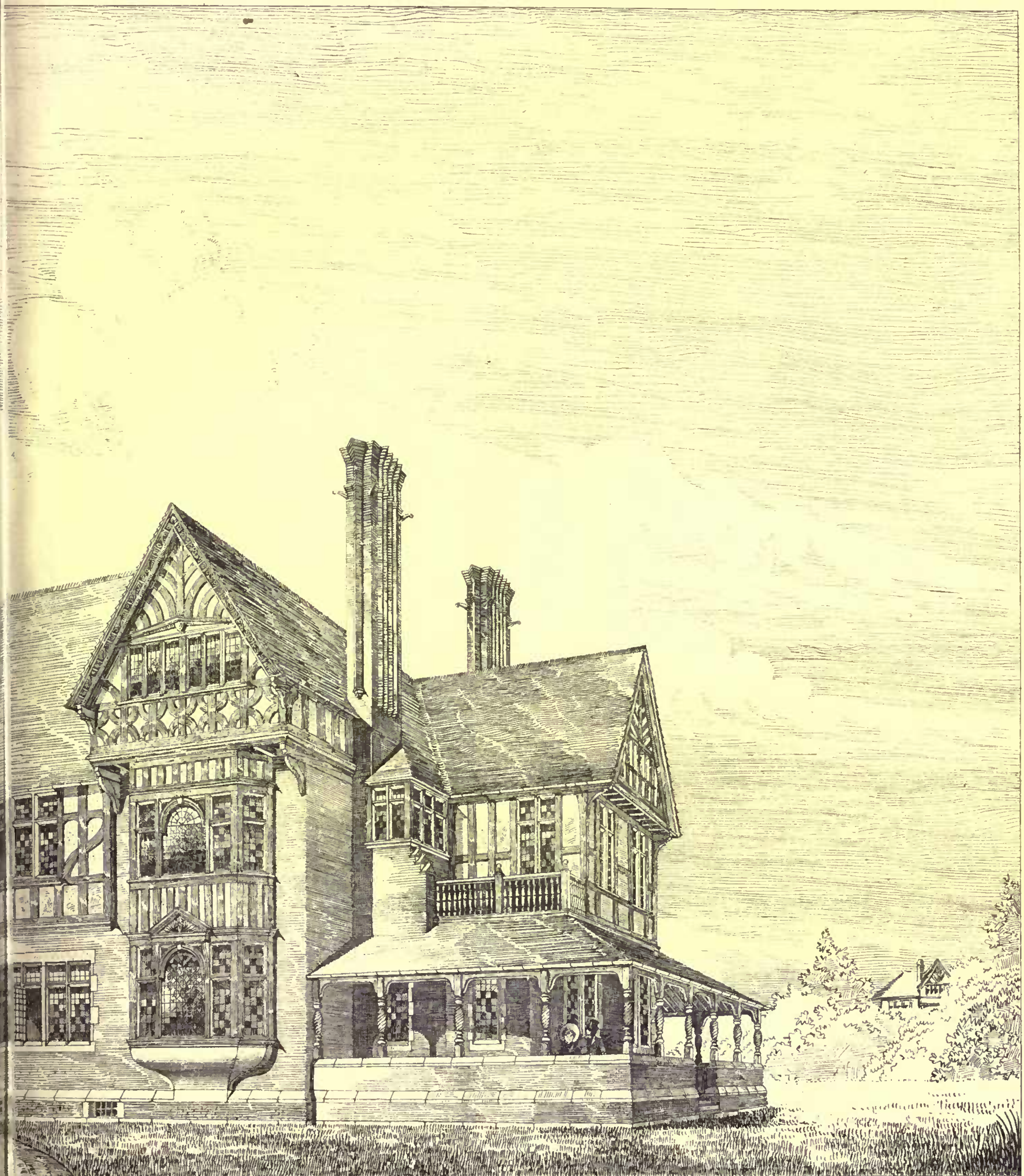
No. 461 American Architect and Building News, Oct. 25 1884



The Heliotype Printing Co Boston.

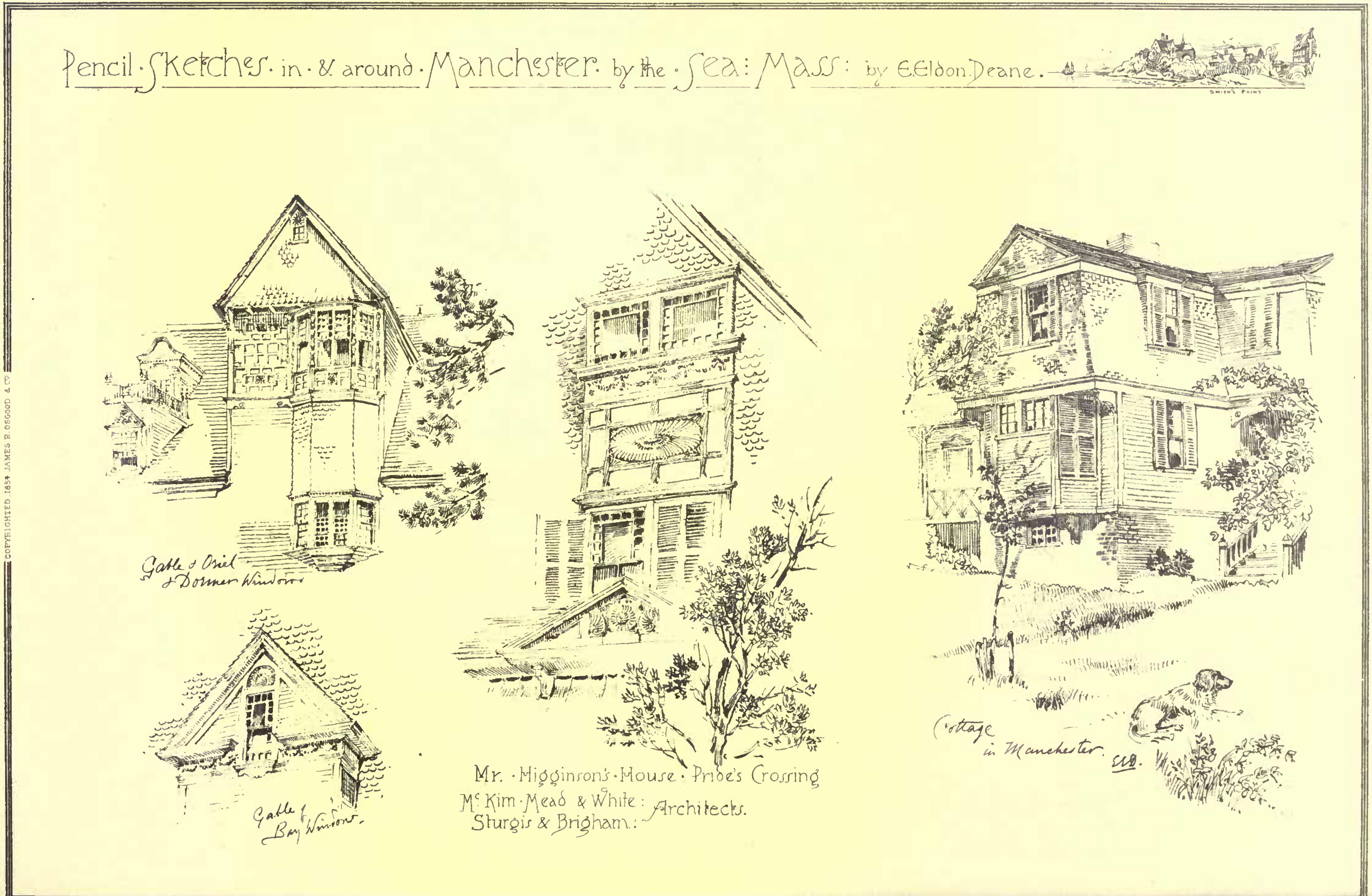


HOUSE ON ST ANTHONY HIL



for Charles·H·Moore·Esq·
Dunnell & Elliot Architects·
Minneapolis·Minn·

The Heliotype Printing Co. 211 Tremont St. Boston.


Pencil·Sketches·in·& around·Manchester·by the·Sea: Mass: by E. Eldon Deane.
Smith's Point
Gable & Oriel & Dormer Windows
Gable & Bay Window.
Mr. ·Higginson's·House · Pride's Crossing
McKim·Mead & White:
Sturgis & Brigham.: Architects.
Cottage in Manchester. E.E.D.

There are few traces left of the palace in which Virginia's Colonial Governors once dwelt in state. The main building was long ago destroyed by fire, after Patrick Henry had lived there as the first Governor of the Commonwealth, and the seat of government had been removed to the "town of Richmond." The two wings left standing—one used for offices, the other occupied by the Rangers, his Excellency's body-guard—became private residences until the late war, when they were destroyed by Federal troops. Portions of the foundations are still visible, and upon the site of the palace proper now stands a grammar school, endowed by one Mrs. Mary Whaley, a worthy citizen of this place, who died some one hundred and fifty years ago. A granite slab set in the wall above the porch commemorates this fact. It also states that the building is "the Grammar and *Matty* School of the College of William and Mary," also situated at this place. But why "Matty?" Possibly in honor of Dame Mary, its founder.

In the palace grounds, or rather what were formerly the palace grounds, is a large earthern mound. Trees have grown upon it, and the bamboo-briar and Virginia creeper, run riot there, while the Chesapeake and Ohio Railway curves around its base. In the side away from the railway is a cavernous opening, down which one peers suspiciously. The shaft is circular, walled up with brick, and is some seventy-five feet in depth. This place is familiarly known as Lord Dunmore's ice-house. An enthusiastic young lady of my acquaintance declares it as her belief that it never was an ice-house, but was connected with the palace by a subterranean passage, and that they put refractory Indians there.

The palace fronted upon a long, narrow common, known as Palace Green, stretching from the palace gates to the Duke of Gloucester Street. Down the centre of this green ran an avenue of catalpa trees, along which Lord Botetourt drove in his coach of state, drawn by six milk-white horses, the gift of his royal master, King George III, while on either side are situated at wide intervals, stately old mansion-houses. In one of these, a massive two-storied brick structure, General Washington had his headquarters for a few days before the siege of Yorktown. It was the home of Chancellor Wythe, one of the signers of the Declaration of Independence, and in one of its rooms he died from poison administered by the hand of his nephew. His ghost is said to haunt the establishment on the anniversary of his death, the only portion of the spectre visible being an ice-cold hand, which is passed over the face of the person who chances to occupy the apartment in which the murder was committed. There is another spectral inhabitant of this mansion—a stately dame in powdered locks and crimson brocade, whose high-heeled slippers go tapping along the corridors and broad stairway at the dead hour of night; yet the cheery little lady, its present mistress, really seems quite contented, and not at all afraid of ghosts. This is not the only house in the quaint old town enjoying the reputation of being haunted, but the spectres of greatest renown are these two who dwell in the stately pile where Chancellor Wythe was poisoned, and General Washington had his headquarters.

At the corner of Palace Green and Duke of Gloucester Street stands Christ Church, massive and cruciform. This venerable structure was completed as it now stands in 1682, though a portion of it was erected so soon as 1642. It was the court church, and the spot is now pointed out where Sir Alexander Spottswood, the founder of the Order of Knights of the Golden Horseshoe, and the first to lead an expedition across the Blue Ridge Mountains, had his pew covered with a crimson canopy when he was Governor of the Colony in 1710, and the gallery occupied by Earl Dunmore, the last of the Colonial Governors, and his family, the Countess of Dunmore, Viscount Fincastle, heir to the earldom, the Hons. Alexander and John Murray, and the ladies Catharine, Augusta, and Susan Murray.

The interior of the church has been greatly altered, a pitiable mistake in my opinion. The square, high-backed pews have given place to those of a more modern pattern; the goblet-shaped pulpit, with its spiral stairway, has been taken down from its perch on the corner of the wall; the flag-stone pavement of the aisles has been removed, and a wooden flooring substituted in its stead. Lamentable changes! But the tombs of those who went to dust beneath the sacred edifice near two centuries ago may still be seen along the aisles, and in the walls are imbedded marble tablets—one dating so far back as 1672—erected to the memory of persons of note in the colony. There are three rose-windows in the north and south transepts and above the choir-loft, the latter being almost entirely concealed by ivy, indeed, the east end of the church is enveloped in ivy, the body of which has grown to the size of a small tree.

In the belfry is the early tomb of Colonel John Page, who died in 1691–2. He gave the land for the church and grave-yard. He is buried outside, his resting-place being marked by a handsome marble shaft erected by his descendant, Dr. R. C. M. Page, of New York, who also collected the fragments of the original monument, and placed them in the belfry.

I climbed the dark and winding stair to the very top of the spire where the bell is hung. An inscription on the bell states that it was "the gift of James Tappley to Burton Parish, 1760." Owing to its peculiarly silvery tone, a tradition runs that when it was being founded in London, an old lady threw a lapful of silver coins into the seething metal.

There are three communion services of great historical interest belonging to the church. The oldest of these consists of a huge silver chalice and paten, and was brought from Jamestown when the church there was destroyed. Both pieces bear the inscription, "Mixe not Holy Things with Profane;" and on the bottom is another inscription in Latin, which shows that the service was presented in 1661, by Francis Morrison, who acted as Governor on one occasion when Sir William Berkeley was absent in England. The second service was the gift of Queen Anne, and is of solid gold beautifully wrought, consisting of a chalice and paten. The third service, which is of silver and consists of three pieces—flagon, chalice, and paten—was the gift of George III, and bears the royal coat of arms and monogram. The last two services are still regularly used.

Outside in the church-yard, which is surrounded by a brick wall with large iron gates, moulders the dust of generations from the middle of the seventeenth century to the last quarter of the nineteenth. I wandered in and out beneath the tall locust trees, among the *Hic Jacets* and *In Memoriams* for many hours. Massive marble tombs splendidly emblazoned with armorial bearings, "the boast of heraldry, the pomp of power," tell where my lord and lady sleep, the grandees of the cavalier Colony of Virginia. Time and weather have done their work here. The eulogistic inscriptions are worn indistinct, the carved cherubim and death's-heads are covered with lichens and moss; the marbles, in many instances, are broken into fragments. Under yonder great marble sepulchre, with its coat-of-arms, its grinning skulls, its smiling angels "rest ye ashes of His Excellency Edward Nott, late Governor of this colony, who departed this Life the 23d Day of August, 1706, aged forty-nine years." Here beneath this slab reposes Sir Thomas Lunsford, Kt. In that unmarked grave over there among the buttercups and grasses lies Lady Christina Stuart, whose descendants became the earls of Traquair. That splendid pyramid of marble, with its Latin inscription and heraldic display, was erected a hundred and fifty-one years ago above a woman, whose race is extinct, and whom the world has forgotten. *Sic transit gloria mundi.*

But all is not pomp and pride here. There is a moss-eaten slab which tells of a woman who "after a Pilgrimage of Forty-three yeare in a troublesome world, Laye Down here to Rest in hope of a joyful resurrection. Obij June 6, 1695." Upon another handsome tomb, now sadly mutilated, we read that the woman beneath "blest her Husband with a sonn and a daughter, and departed this life the 12th day of November, Anno Dom. 1702, and in the 20th yeare of her age." Poor little girl, wife and mother, hid away here for near two centuries beneath this massive tomb, emblazoned with the family crest and arms!

I stumbled upon one of those queer chest-shaped tombs, which bore the name of James Whaley, husband of one Mary Whaley, the same I imagine, who endowed the "Grammar and Matty School." Upon the panel supporting the foot of the slab is carved, in all the emphasis of capitals and italics, the following couplet:—

"Matthew Whaley lyes Interred *here*
Within this Tomb upon his Father *dear*."

The grave-yard muse does not seemed to have flourished in the Colony and Dominion of Virginia, though in this old church-yard there are two or three rather florid specimens of the poetical epitaph dating in the latter part of the seventeenth century. The following is taken from the monument erected to the memory of Mrs. Mary Page, who died in 1690–91:—

"Thy modest meek and Pious Soul Did Shine
With well Tempered Nature and Grace Divine
One to excell in beauty few Could Finde
Yet thy Rarest Features were of the Minde
Thou wast a Faithfull and Vertious wife
Thou greatly loved peace and hated Strife
Thou wast a prudent and tender Mother
A true loving sister to Each Brother
A Choice Friend a Kind Neighbour to all
A Good Christian Ready at God's Call
Thou livd and dyd upon Christ Relying
Thou dyd to Sin and now live by Dying
Thy Faith Doth yield, Thy Piety Doth Give
Restoratives to make thee Ever Live
Thrice blest Friend, this Epitaph is thy due
When Saints arise thy Lord will say its true."

It is difficult to reconcile the paucity of punctuation marks and the prodigality of capitals; but it is comforting to know that the worthy lady commemorated "greatly loved peace and hated Strife," even though strife is honored with a capital letter while peace is not.

Among the modern monuments are handsome marble shafts to the memory of Dr. John Millingham and Judge Beverly Tucker, the author of "*The Partisan Leader*," and other novels, and half-brother to Randolph, of Roanoke.

It was difficult for me to tear myself away from this peaceful city of the dead of so many generations. The locust trees in their fresh May green were heavy with fragrant bunches of white blossoms; the long grass was studded with thousands of buttercups and purple violets; birds fluttered and sang in all the joyousness of spring among the tree-tops, through which

"The gray church tower with its glittering cross
Points up to the throne of God."

Sleep on, in the shadow of those ivy-mantled walls, Sir Knight, My Lady Christine, your Excellency, you gentle dame, who "greatly loved peace and hated Strife;" the battle is done and rest is come.
—*Correspondence of the Evening Post.*

CHEAP HAND-BOOKS OF ART.

THE Librairie de l'Art has proved itself a public benefactor, by issuing a cheap, popular edition of these works [1]; for as now given to the public at the ridiculously small price of 75 centimes (15 cents) a volume, it is within everybody's power to possess a first-rate work upon art at a nominal price. At present, only seven volumes are ready; but when complete, the collection will consist of about forty. The little volumes are full of wood-cuts; the type is good, and the letter-press concise and to the point; and now that so many persons discourse upon art matters without knowing much about them, and lacking a similar work in their own language, they cannot do better than invest in M. Ménard's volumes.

The work is divided into three series. The first is purely technical, consisting of arithmetic, geometry, perspective, building, stone-cutting, carpentry, architecture, anatomy, and the principles of decorative composition. The second series comprises paper-hangings and fans, textile fabrics, tapestry, glass and rock-crystal, enamels, ornamentation of books, ivories, furniture, iron-work, arms and armor, silver and goldsmith's works, and jewelry. The third series treats of the history of costume, French sculpture and architecture, walks about the Louvre and Cluny Museums, and decoration in Egypt, Greece, Rome, the Middle Ages, the Renaissance, and the seventeenth, eighteenth, and nineteenth centuries.

By this list it will be seen how thorough is the treatment of the subject, making the book as useful to the mere amateur as to art students and workmen. Each volume, moreover, is divided into sections in the same manner, thus: 1. Decoration as applied to architecture; 2. Decoration as applied to furniture and common objects; 3. Decoration as applied to the person or to costume. This is a much better system than that of treating of the architecture of several centuries under one head, and the furniture under another; for the reader gets a precise idea of the entire decoration, whether of building, furniture, or costume, during a particular period. Thus, whether we open the volume on Egypt, or that on the eighteenth century, we find first an account of the buildings; secondly, an account of furniture, enamels, glass, iron-work, etc., and thirdly, an account of the costumes worn, the manner of dressing the hair, etc. The book proves once more the fact that there are no people who so well understand organization as the French, be it in their museums or in their literature. Perhaps the only fault we can find with the book, is the form of question and answer in which it is written; better would it have been to put the question as a marginal note.

In the volume on the sixteenth century (the Renaissance, or *style Henri II*), M. Ménard gives account of the work of Vignola and Serlio, the author of the treatise upon architecture, and of much of the work in the Louvre, and the Palace of Fontainebleau; of Pierre Lescot and Philibert Delorme, both of whom worked upon the Louvre. Delorme also built a great part of the Tuileries, and the charming Château d'Anet, which was erected for Diane de Poitiers, a fragment of which may now be seen in the court-yard of the Ecole des Beaux-Arts in Paris. Then we have an account of the works of Jean Goujon, some of which may still be seen in Paris, at the Hôtel Carnavalet in the Rue Rambuteau, the former residence of Madame de Sevigné, and now a museum; and also in the Louvre, one side of which is said to have been entirely his work.

But it is on the Loire that the richness of this period of French architecture may be studied. The Château of Blois is a magnificent example. Nancy and Orléans, Sens, and Toulouse, are also towns full of Renaissance architecture. From châteaux, M. Ménard invites us to the study of tombs, Ligier Richier being one of the principal sculptors of this period for such work; Goujon confining himself to secular work, such as fountains (fragments of the Fontaine des Innocents yet remain in the Louvre), mantelpieces and wall decorations of a semi-classical style. One of the finest works of Richier is the tomb of René de Châlons, Prince d'Orange, in the Church of Bar-le-Duc. It shows the curious taste of the day in being a representation of the defunct *after* death. The prince wished this, and his widow so rigorously carried out his views, that the monument represents him, not as a skeleton, but in the actual state of decaying, the flesh hanging from the body, and all other hideous details of putrefaction; but at the same time offering to God his heart which he holds in his hands. So realistic is it that it makes the spectator shudder. Richier's style is rather that of the Middle Ages than purely Renaissance, although one sees in it the transition of the former into the latter. Another fine tomb attributed to Richier is that of René de Beauvais, in the museum at Nancy. Michel Colomb is well represented by the mausoleum in Nantes Cathedral, erected to the memory of François II, Duke of Bretagne and his wife Marguerite de Foix. Succeeding these sculptors were Germain Pilon and Jean Cousin; both of whose work may be studied in the Louvre, in the tombs of Birague and his wife, and of Admiral Chabot. The beautiful marble group of the Three Graces in the same museum is by Pilon. Goujon's Nymphe de la Seine (also in the Louvre), is a beautiful bas-relief of a woman, elegant in form, though somewhat too elongated for classical tastes.

While glass-painting sensibly declined during this century, it saw the birth of various kinds of faïence, Palissy, and that called Henri II, or d'Oiron ware (without much authority, for it is exceedingly doubtful if it was made there.)

Architecture declined during the seventeenth century: the religious wars had destroyed the Renaissance buildings in a great degree, and the restorations were more or less wanting in elegance. Slate roofs replaced tiled ones, and grandeur was preferred to grace in the constructions. Still there is a certain character of their own in the buildings of this period, a very good specimen of which is the Luxembourg Palace in Paris, which was built for Marie de Medici.

During the regency of Anne d'Autriche, the dome appears in French architecture. The erection of the hospital of Val de Grace was due to a vow made by the queen (who was twenty-two years childless), upon the birth of Louis XIV. The architect was François Mansart, but it was completed by Lemercier; Leduc terminating the dome. That of the Invalides was also the work of Mansart, and that of the Sorbonne was by Lemercier; of these and others in Paris, the Invalides is the most beautiful in form. The Italian, Bernini, played an important part in the art history of this period. He managed by flattery to gain the patronage of the king (Louis XIV) but in spite of intrigues his design for the east end of the Louvre was rejected in favor of that by Claude Perrault, which was preferred by Colbert. The justice of the minister's judgment is shown by comparing the present magnificent colonnade facing the Church of St. Germain l'Auxerrois with an extant medal representing Bernini's project. The palaces of Versailles and Marly were the work of Mansart and Le Brun. Marly had a central pavilion, surrounded by twelve others, which was called the signs of the Zodiac. Louis XIV having taken the sun as his attribute, it was but natural that the courtiers should name themselves the signs of the Zodiac, as their pavilions surrounded the King's. This is a fair example of the sort of conceit to which the people gave way in those times.

Le Brun was the great decorator of this century, Versailles containing many examples of his talent. Perhaps the best example of decorative work of this period is the Salle d'Apollon of the Louvre by Bérain. It is rich in design, and though a mass of gold, not overloaded.

M. Ménard gives an account of the change in furniture decoration, that of the Renaissance being sculptured and rarely gilt; that of the seventeenth century being ornamented with ormolu mouldings and boule, while later on, in the eighteenth century, the taste for painting the wood came in. Much of the furniture, so-called Marie Antoinette's, is still to be seen in Paris, at Versailles, and at the South Kensington Museum, London. It is of extreme elegance of design, decorated with branches or wreaths of flowers upon gold or white grounds, and sometimes with medallions, painted by Boucher, or plaques of Sèvres, porcelain or Wedgwood ware.

M. Ménard gives examples of Sèvres and Dresden china, of Limoges enamel, and iron-work, of which that of Jean Lamour is the most celebrated.

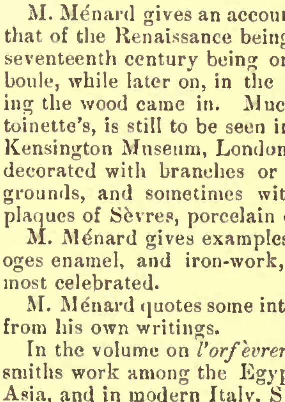
M. Ménard quotes some interesting accounts of Lamour's processes from his own writings.

In the volume on *l'orfèvrerie*, the author gives us notices of goldsmiths work among the Egyptians, Greeks, and Romans, in ancient Asia, and in modern Italy, Spain, Germany, Flanders, and England. This volume has numerous illustrations of chalices, reliquaries, and secular plate. In the volume on Egypt, M. Ménard explains the meaning of the various attributes given to their statues; the sphinx, the ostrich feather, the vulture, the solar disc, the lotus flower, and the scarabæus. This is most useful, as few people are acquainted with the subject, and yet without such knowledge it is difficult to understand the art of ancient Egypt.

In conclusion we can only say that we hope the remaining volumes will soon appear. S. Beale.

[1] *Bibliothèque Populaire des Ecoles de Dessin. Publiée sous la direction de M. René Ménard, Professeur à l'Ecole Nationale des Arts Décoratifs, Paris, Librairie de l'Art, 33 Avenue de l'Opéra. Prix, 75 centimes.*

THE SALT MINES OF NORTHWICH, ENG.



THE property of this firm comprises several independent works in Cheshire, which are situated respectively at Winsforn, Over, Moulton, Middlewich, Northwich, Marston, and Wincham. All these are white salt works, there being also rock-salt works at Northwich and Marston. They form in the aggregate by far the largest salt works in this district, which is equivalent to saying they are the largest in the world; the annual production is close upon a quarter of a million tons of salt per annum.

The Adelaide Works, at Marston, are those which it was proposed that the members of the Iron and Steel Institute should visit; but as we have lately had an opportunity of inspecting the other works of Messrs. Verdin, we shall not altogether confine ourselves to those on the programme. It was proposed that the first part of the forthcoming visit should be devoted to the rock-salt mine at Marston. This is one hundred and ten yards deep, and has two shafts sunk within a few feet of each other. The first twenty yards of the shaft are five feet square, and are lined with a double casing of timber, with puddled clay between. Below this, for a farther distance of forty yards, there are cast-iron cylinders, three feet six inches in diameter, which carry the shaft to a bed of rock that lies between two strata of rock-salt. The upper bed has not been excavated, the quality not being considered good enough. The rock is thirteen yards thick, and is bored to the same size as the iron cylinders. The lower part of the shaft consists of twenty-three yards of rock-salt. Especial precautions have to be taken in order to prevent water getting to the shaft, and at the back of the tubing, otherwise the rock-salt would speedily dissolve, and the shaft would fall in.

The opening to the mine is bell-shaped, and the underground workings are very extensive, the rock-salt being excavated to a height of twenty-six feet. The air is unusually pure for a mine, being, in fact, to all appearance as good as that on the surface; this is to be accounted for by the loftiness of the workings. The exhaust air from the engines used in cutting the rock-salt assists the ventilation, but we understand there are no other means of creating an artificial circulation.

The area already excavated is about eleven acres, and the roof of this large surface is supported by pillars of rock-salt of exceptionally massive proportions, being ten yards square, in place of the ordinary eight yards; they are placed twenty-three yards apart. This is a wise provision, and no doubt some of the extraordinary subsidence to be seen in the neighborhood would not have occurred if better supports had been left in old times. . . .

The cutting-machines are of much the same type as those used in coal mines, the cutting-wheel, which works horizontally, being of steel. The operation of getting out the rock-salt commences at the top, the upper part, which is the most troublesome, being got out by the air-engine and by hand, and also by blast with powder; this is for a depth of six feet. The remaining and lower part is blasted down as required, and as orders for the particular description of rock-salt of which it is composed are received. The shot-holes are made by hand, and a straw filled with powder is used as a fuse. There is practically no danger in this work, as the salt does not fly, and there is no fire-damp in the mine. A series of tramways are laid down, on which run small trucks carrying loose tubs, which are taken up the shaft. The hauling is done by ponies.

The illumination of the mine is by candles, both gas, the electric-light, and paraffin lamps having been tried, but on the whole, candles are found to be the most convenient. The mines when illuminated have a very pretty appearance, and as seen from the pit-eye, or from the elevated parts, bear a strong resemblance to a city at night.

The rock-salt is sometimes sent away in the lump, just as it is brought from the mine, a great quantity in this state being shipped to Australia, America, Russia and other countries as cattle salt. For other purposes, such as those of copper works and alkali works, or agricultural purposes, it has to be crushed and ground. This is done at the pit mouth, where there is a mill of special construction, not unlike a large bone-mill, and which is driven by a powerful pair of horizontal engines. There are first two sets of toothed rollers, which break the large lumps up into smaller pieces, and below these are smooth horizontal rollers. The powdered salt is then taken by a small bucket-ladder, and is either passed over blanks or else screens of the degree of fineness required. A good deal of rock-salt is used for making salt-cake by the Hargreaves process, to which purpose only the finest quality can be applied. . . .

At the Marston Works there are also brine springs close to the mine. This is a combination seldom met with, as where there is brine it is difficult to gain the rock-salt. . . .

The manufacture of salt from brine is the simplest thing possible, and is said to be conducted to-day on the same principle as in the days of the Romans. Numberless patents have been taken out for schemes which have been suggested, but in the end they have nearly all been abandoned. Almost the only exception is the process by which patent butter-salt is made. The plant in this case consists of circular covered pans fired from below, into which the brine is constantly fed. The salt as it forms is drawn to pockets in the sides by means of revolving rakes worked by a central vertical shaft. The waste gases from the furnace are conveyed in flues to beneath other pans of the ordinary open kind. The steam given off in the closed vessel is also used for a similar purpose. This system has been in operation at Messrs. Verdin's works at Winsford for some time, on a somewhat extended scale. Although there is a theoretical saving in heat, the test of actual practice shows that it is more costly to produce salt in this way than on the old simple principle, and the patent pans will probably be dismantled at an early opportunity.

It may be mentioned that the different grades of salt very largely depend on the temperature at which they are produced, and in this way the product is often divided into "boiled" and "unboiled" salt, the former being produced by boiling the brine, and the latter when the evaporation is carried on at a lower temperature; it is no doubt needless to remind our readers that the stronger the brine the higher its boiling point. The brine also requires to be agitated during the process of evaporation. This is always done, excepting in the special case above referred to, by hand, the operator using a large rake with which he draws the salt as it collects to the sides. Attention must be paid to keeping it away from the part over the furnace, otherwise the plates would speedily become burnt through, and care is required in moving hard scale as it forms on the bottom of the pans. The pans used are large rectangular vessels made of iron plating. Those at the Adelaide Works are sixty-six feet long and about two feet deep, but it is said that some of the new pans in this district are one hundred and forty feet long and thirty feet wide. As there is but one furnace to the pans, and that is only four feet or five feet long, it will be easily seen that there is considerable difficulty in keeping a large pan full of brine at a high temperature, and therefore the smaller pans produce the better qualities of salt. In old times leaden pans were used. There is one to be seen at Northwich which is two feet three inches square.

This brine, which is drawn from the springs by pumping-engines of ordinary type, is fed constantly into the pans, and the salt as it forms is, as we have stated, drawn to the side. Here it is filled into small square moulds, known as tubs, which form it into the rectangular lumps, weighing about fourteen pounds each, and which are so familiar in domestic life. Some of the brine springs are more valuable than others, according to the quantity of salt held in solution. At Messrs. Verdin's Winsford Works, the full saturation is about twenty-seven degrees; from this two pounds ten ounces per gallon is obtained. Extensive stores are required for drying the lumps, and packing-floors for putting the produce into sacks for shipment.

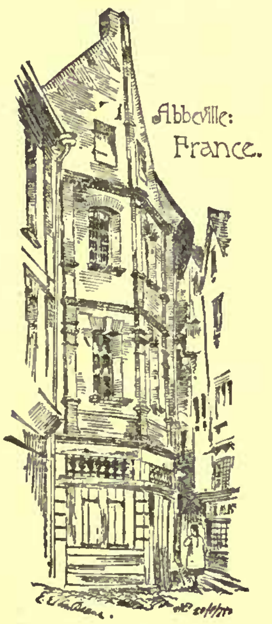
To make the finest table salt, the lumps are ground in a mill, and the product is then passed over screens in order to exclude any chance impurity. Afterwards it is put through centrifugal machines which work at a very high velocity, making several thousand revolutions per minute, and it is then carefully packed in bags or jars, marked or labelled as necessary for exportation. A large quantity of the very finest salt is exported to America, the citizens of the United States being choice, even to fastidiousness, in the quality of the article they consume.

In the neighborhood of the Newbridge Works, at Winsford, Messrs. Verdin, who are the owners of most of the adjacent property, have built a model village, the greater part of the inhabitants of which are employed on the works. Substantial brick-built, six-roomed cottages, with excellent domestic conveniences, are let at the rate of 3 *s.* 6 *d.* per week, including rates and taxes. Four-roomed cottages are 2 *s.* 6 *d.*, and some smaller ones even cheaper. There are also here an institute, with a billiard-room containing two tables, a fine lecture-room capable of holding several hundred people, and a library and reading-room. This has not long been opened, and must in time lead to very beneficial results. A nominal subscription to the employés is charged which is sufficient to keep the place in order; the whole of the buildings and equipment having been presented by Messrs. Verdin. . . .

Any account of the salt industry of this district would be incomplete unless some reference were made to the remarkable instances of subsidence of the land, evidences of which are to be seen on every side in the Northwich district. The River Weaver, which is the highway for all the water-borne salt, is constantly sinking, and unless Northwich Bridge had been bodily raised at times, there would probably be hardly room for a rowing-boat to pass under it now. At various parts of the course of the river, one meets with large meres, locally known as "flashes." One of these, at Wilton, is, we are told, about eighty acres in extent, and in parts sixty feet deep. These flashes are caused by the sinking of land, where only a few years ago there was high ground twenty feet or thirty feet above the level of many of these pools. In one part, not far from the mine we have described, there is an irregular-shaped basin in the high ground, of two or three acres in extent. The bottom of this is partly covered with water, said to be thirty feet deep, and the surface of which is twenty feet to thirty feet below the surrounding level. In one part of this basin there is to be seen about two hundred yards of a railway bank, this length having dropped from the remainder of the track, which lies twenty feet or thirty feet above it. In the town of Northwich itself there are very few buildings the outlines of which are square. Walls lean all ways, and the brickwork shows lines of most devious courses. Windows originally rectangular become what may be described as lozenge-shaped, and the floors of rooms abound in picturesque undulations. Some of the houses are iron-bound, so that the brickwork may hold together; one in particular, which we noticed, was in a perfect cage-work of iron. It is part of the regular experience of a Northwich landlord to have to "jack up" his property every few years, and in order to facilitate this, the walls are generally placed on heavy balks of timber, so that the whole may be comfortably lifted together. Unless these precautions are taken, the house will gradually sink into the earth, and we are informed that at the present time there is one dwelling in which the original first floor is now on a level with the ground, and the front door has been cut through the brickwork in order that entrance may be made from the street into the first floor direct.

At Winsford, close by, there are also remarkable evidences of earth-sinking, and the houses have gone down so that rooms which were once bedrooms are now shops on a level with the street. The town-hall has been raised eight feet since it was built, a year or two ago. The church has been raised seven times, and the market-hall, which was originally entered by a flight of steps, has disappeared altogether. It is a delicate thing to discuss the reason for all this in the Northwich district, where party feeling runs very high on the question of subsidence. The landlords somewhat naturally object to maintain this continual struggle to keep their property above ground, and a short time ago attempted to bring in a bill by which a tax on the salt should be levied, the proceeds to be applied to maintain the buildings on the surface. Although no one, we believe, altogether denies that the abstraction of salt causes the settlement in question, yet the salt-owners managed to make out so good a case that a committee of the House of Commons came to the conclusion that the preamble of the bill was not proved. It is argued on the side of the salt-owners that the brine springs are natural water-courses, and that the water is taken in at higher ground, so that it would in any case come to the surface, even if not pumped, and it is by brine-pumping that by far the greater part of the salt is now obtained. That being the case, the salt people say it can make no difference to the subsidence question, whether the salt is extracted artificially from the brine, or whether it is allowed to find its way into the rivers and water-courses or to the sea direct. However this may be, the salt-owners claim that as a matter of law they have a right to any water found on their land, and there is no law by which they are compelled to consider where any substances held in solution may or may not be taken up. The interests of both landlords and salt-owners are identical to a certain extent. The salt trade is the staple of the district, 1,600,000 tons of white salt and 166,740 tons of rock-salt being produced in Cheshire during the year 1881. If any tax were placed on the commodity which would unduly handicap this business, so as to drive it to other quarters, the landlords' property would be of little more value than the salt-owners' workings.—*Engineering.*

A LIGHTNING-STROKE AT CHICHESTER, ENG.



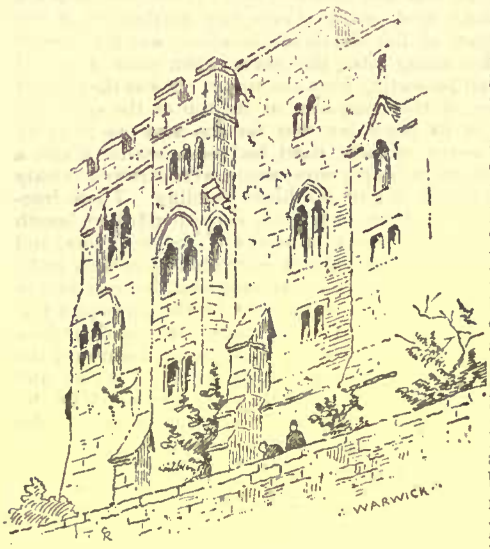
In a very large majority of the cases in which accidents have occurred to buildings which have been furnished with lightning-conductors, the mischief has been actually traced by competent inquiry to some easily recognized fault or deficiency of construction. A very instructive illustration of the accuracy of this remark has quite recently presented itself in a form which is worthy of notice. Shortly after midnight, on the 26th of November, during a thunder-storm of some severity, a flash of lightning struck the lightning-conductor attached to the spire of Chichester Cathedral, and scattered a considerable portion of it into fragments. A letter from "A Fellow of the Royal Astronomical Society" forthwith appeared in the *English Mechanic and World of Science*, drawing attention to the accident, and commenting upon it in the following words: "This seems to open a very serious question indeed, because, if so elaborate an affair as the Chichester conductor proved so much worse than useless when a thunder-storm came, what security have we that a similar disaster may not befall at, say, the Government magazines at Purfleet and elsewhere?" In reference to the accident which called forth this note of alarm, it may be at once, however, said that it belonged essentially to the class of occurrences which have been pointed at in the beginning of this paragraph. The conductor which was attached to the spire was not adequate and competent for the protective work which it was intended to perform. It had been put up sixteen years ago, when a new spire was erected in the place of the old one, which fell in consequence of having been added as an after-thought to a tower that had not been prepared to bear its weight, and was of a form which is, happily, now obsolete. It originally consisted of twelve No. 15 gauge[1] copper wires arranged in a double series, side by side, and held together by a double strand of zinc and copper wire crossing them transversely, and acting as a kind of weft to the longitudinal copper warp. The conductor was thus a sort of ribbon of copper wire, with transverse binding-threads of zinc. The weight of the metal in this compound conductor was ten and a quarter ounces per yard, instead of being thirty-six ounces per yard, as it ought to have been at the very least, if it had fulfilled the conditions that are now required for such a task as it had been required to perform. But, besides this, in consequence of having been exposed for sixteen years, in its sub-littoral situation, to the blasts of the moist sea-wind, the copper wires were in many places eaten into by corrosive action where the zinc wire of the woof crossed them, so as to reduce to some considerable extent their original conducting capacity. The conductor was so fixed that it descended from the summit of the spire along the slope, and along the face of the tower, then crossed the lead flashing of the roof, passed down the main wall of the building near the intersection of one of the transepts with the nave, and was finally plunged into a well dug into the grave-yard about twenty feet from the place where it reached the ground. At the time of the storm a flash of light was seen to pass along the upper part of the track of the conductor, and this flash was accompanied by an instantaneous crash of thunder, that awoke most of the slumbering inhabitants of the close. The destruction of the conductor, however, was not discovered until the second morning after the storm, when some shattered fragment was observed projecting from the tower. It was then found that about forty feet of the conductor at the top of the spire still remained uninjured in its place, but that for the next one hundred feet below this the woven metallic band had been scattered into a shower of short fragments of copper wire, which were strewed thickly upon the roof of the tower and of the lower building. These fragments were three-quarters of an inch long, corresponded in length with the materials of the transverse crossings of the zinc wire, and bore unmistakable indications of galvanic corrosion upon their ends. The lower portion of the conductor was uninjured, but one of the iron rain-pipes, which descended from the roof of the transept a few feet away, had been shattered by the discharge. It was therefore manifest that from the leaden covering of the roof downward the incompetent conductor had been assisted in its work by the roof and its numerous iron rain-pipes, and this intelligibly accounted for its own preservation through that portion of its course; and it was also clear that the earth communication of the conductor was not ample enough for the transmission of the entire discharge, as, if it had been, the lower part of the conductor would have been shattered like the upper part, and the rain-pipe would have remained uninjured. The resistance of the earth communication of the conductor, measured through the uninjured fragment, was sixty-five ohms; that is, some twelve or sixteen times greater than under any circumstances it ought to have been. So far, therefore, from this maligned conductor being open to reproach, it had done exactly what it was scientifically bound to do, and what any expert could have foretold that it would do, under the circumstances which have been described.

But the critic who sounded the note of alarm in *The English Mechanic* was also egregiously wrong in another by no means unimportant particular. The unfairly maligned conductor had not "proved worse than useless when a thunder-storm came." As some more appreciative commentator figuratively but not inaptly remarked at the time, it had "gallantly died at its post in the efficient performance of its duty." Although the lightning-conductor was destroyed, the exceedingly beautiful stone spire remained absolutely uninjured. It had not even a scar upon its face. This circumstance of the destruction of a lightning-rod of too narrow capacity without injury to the building to which it is attached is by no means of infrequent occurrence. About five inches of the top of the second conductor which Franklin himself erected in Philadelphia were destroyed by a discharge which was seen to strike the rod, and which also made itself visible in a luminous blaze in the dry earth around its base; and Franklin adroitly claimed the incident as a proof that Nature itself had borne testimony in favor of his invention. The brass wire conductor of the war-ship Jupiter was struck at sea on June 13, 1854, and the sixty brass wires of which it was composed were shattered into fragments the size of a pin; but no injury was done to the vessel. A large number of instances of a kind very similar to this well-known and altogether typical case might be adduced, did space permit; but it must not therefore be inferred that so desirable a result is in the proper order of events. When a lightning-rod "dies at its post" in a successful defence, as in the memorable Chichester case, the auspicious issue is due to the accidental circumstance that no better extraneous earth contact is within the striking reach of the discharge. If this were the case, the lightning would certainly be diverted from the course of the conductor into the more facile way, and, in making its devious leap into the more available path, would be quite sure to leave the marks of its divergent passage in some undesirable form. It is on this account, as well as because of the wasteful outlay which is required to supply a new rod when an old one has been destroyed, that lightning-conductors of insufficient dimensions, and of bad principles of construction, are by no means to be looked upon with tolerance, to say nothing of favor, notwithstanding the occasional good service that may be entered to their account. —*Edinburgh Review.*

[1] That is, of one sixteenth of an inch in diameter.

The Bridge over the Straits of Messina. — In the exhibition now open at Turin, says a foreign exchange, the directors of the Novara & Pino Railway show the drawings and plans for the projected bridge over the Straits of Messina. The narrowest portion of the straits is two miles across, but the depth there is 150 metres (487′ 6″), while the shallowest part, which is 110 metres (361′) deep, runs between Cap del Pezzo and Ganzirri. Although the distance across at the latter point is half a mile greater than at the narrowest portion of the straits, its greater shallowness has caused it to be selected as the spot for the bridge. In addition to a double line of rails, it is intended to make the bridge wide enough to include a road for ordinary carriage traffic. The viaduct will be supported by two land towers and three piers, each 1000 metres (3280′) apart. The foundation of the three piers will be constructed of granite ballast up to within 23 metres (75′ 6″) of the surface of the water, and of granite masonry, the latter being carried to 10 metres (33′) above the water. The bridge will terminate on either shore in tower-shaped piers, constructed also of granite, with the ordinary dry foundations. The height of the bridge above the water will be 100 metres (328′). The entire upper portion of the bridge is to be built of steel, and the construction is to be carried out in the same way as the bridge over the Mississippi at St. Louis. — *Exchange.*

LABORERS' COTTAGES IN IRELAND.



AN Act of Parliament was passed in August 1883, with the object of bettering the condition of agricultural laborers in Ireland by providing improved house accommodations for them. By it the local sanitary authority is, after certain formalities are accomplished, enabled to obtain a loan from the Treasury for the purchase of sites and erection of buildings. The money is to be repaid in twenty, twenty-five, thirty, or thirty-five years, and the annual instalment of £100, for those periods vary from £7 0*s*. 8*d*., to £5 7*s*. 2*d*. If a cottage should cost £100, which it must if the expenses of investigation are counted, the local authority will have to pay £5 7*s*. 2*d*., for thirty-five years. But it is not anticipated that tenants can pay more than a shilling a week, and in consequence the deficit between £2 12*s*. and £5 7*s*. 2*d*., must fall upon ratepayers. There will also be a charge for repairs. It is not surprising that the Poor-Law guardians are not enthusiastic in carrying out the provisions of the Act. In two out of the four provinces in Ireland, as there have been no petitions presented, the Act is a dead letter. The committee who were appointed this year for the purpose of ascertaining whether any amendments to the Act are necessary have not completed their inquiry; but enough was said to suggest the difficulties which attend the least improvement of Irish properties.

The local authority is to take the initiative by asking the Local Government Board to hold an inquiry before an official inspector. After it has been held, the project is to be advertised. Next there is to be an application for a provisional order. Then there is to be an appeal to Parliament for confirmation of the order. All this circumlocution has to be got through before the guardians are in a position to execute the scheme, or, in other words, to tax themselves. Very few and very weary are the victors. It appears that only one union has as yet got as far as the application for a loan, and not one cottage has been commenced in all Ireland.

At the inquiry, plans and specifications of the proposed cottages must be exhibited, which may be prepared by an architect or a builder. The Local Government Board desire to interfere as little as possible with the discretion of the sanitary authorities in regard to the designs, but the plans are to comply with the following conditions: —

1. The number of rooms must be sufficient to provide for the due separation of the sexes, and there should be a kitchen and at least two bed-rooms in every house.
2. Every habitable room should have a height of not less than eight feet throughout, except in the case of a room constructed in the roof, when one-half of the area of the room should have a clear height of seven feet.
3. Each habitable room should have one or more windows of a total area of glass of at least one-twelfth of the floor space, and all bed-rooms should be floored with boards or tiles; the ground floor should be raised not less than nine inches above the level of the external ground.
4. A proper privy should be constructed, in each case separate from the dwelling-house, and distant at least ten feet therefrom; the floor should be flagged or otherwise rendered impervious, and raised at least four inches over the adjoining ground.

It is estimated by the officials that a cottage with the minimum accommodation described in the above conditions will cost from £65 to £70. Half an acre of land at 10*s*. a year, would at twenty-five years' purchase be £12 10*s*., and the difference between £82 10*s*., and £100 represents the cost of employing a surveyor, fees to officers, Parliamentary, and other costs. Seventeen-and-a-half per cent, for fees, or seven years' rental, appears entirely disproportionate when the character of the work is remembered.

There is diversity of opinion as to whether such a cottage as is proposed by the Local Government Board can be carried out for £70, or for much less than £90. The simplest way to solve the problem would be to erect a model cottage, but probably a special Act would be necessary for so simple an experiment. According to the official specification the walls are to be of rubble eighteen inches thick, the living room is to be floored with concrete, the bed-rooms with wood, and the roof is to be of slates. As the cottages are security for the re-payment of the loan it is wise to make them substantial, and it is hardly fair to compare the Board's type of cottage with one that has been erected by a private landlord. On the Duke of Devonshire's estate cottages have been built at £105 the pair. The floors in all the rooms are of concrete, but the inspector of the Local Government Board maintains that the material is not adapted for a bed-room floor, and he doubts whether it has any advantage over mud or clay. The objection to concrete arises from its porosity and slowness in drying whenever washed. A civil engineer who has acted for two of the Poor-Law unions, said that he had erected a brick and stone and slated cottage, containing a kitchen and two bed-rooms for £70; but that if a large number of them were built the cost would be about £65. The floor of the kitchen would be of flags, and the bed-rooms would be boarded. His objection to concrete was the difficulty of getting it properly made, imperfect concrete being dangerous. In Wexford plans have been prepared for cottages to cost £60 2*s*. 7*d*., and if concrete were available it was expected that there would be a reduction of about £5 on that sum. One witness went so far as to say that houses for which the guardians will pay £70 could be erected by a farmer for £35; but it supposes that labor will be thrown in. It is, however, unwise to be scrutinizing the cost of building rather than the legal and official expenses. When it is found that the cost of proving the title for the site of a single cottage can amount to £75, and for a row of forty-five houses can be £575, it is evident that an opportunity is offered for law reform. — *The Architect.*

VENTILATING HAY-MOWS.

MARSHALLTOWN, IOWA, October 6, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I notice an article in the *American Architect* of Sept. 27, referring to the suggestions of the *Scientific American* in relation to the frequent burning of barns. After endorsing the theories of the *Scientific American*, you also advise architects to give thorough ventilation to barns and hay-lofts. As this matter is of more vital importance than most people, even scientific men, are aware of, I will venture a few suggestions, to bring out and develop a proper mode to ventilate hay-lofts, and to give veterinary surgeons something to think of. I will venture to say that one half of the diseases in horses and cattle is brought on by feeding spoiled hay, either taken from hay-mows or stacks, also from grain feed that has been heated and spoiled. I believe that the heating process, the mouldy parts and must that it produces, will create germs of various kinds that cause diseases in horses and cattle and perhaps swine. I will now venture to suggest a mode of ventilating hay-mows, stacks or graineries. I will suggest introducing various air-ducts through the hay-mows, both horizontal and perpendicular, opening directly outside, so as to admit a current of fresh air, which will cool and cure the hay or grain, and leave it in a healthy state. This may be done by building board ducts and perforating them as much as possible, and then running from the horizontal ducts perpendicular ducts up through the mow, not more than eight feet to ten feet from each other. Or this may be accomplished in another manner, by using some round instrument, six inches to ten inches or even larger in diameter, say a galvanized-iron tube; stand it over the openings in the main air-duct, and as the mow is filled up, draw these pipes up through the hay, until the top is reached. This will afford complete ventilation, which will be increased as the mow becomes heated; hence the fresh air drawn in will cool and cure the hay or grain, and by this process thousands of tons of hay and grain can be saved and a vast amount of property will be saved from the destroying elements. Hoping we may receive further light upon this subject, I am,

Yours truly, F. M. ELLIS, Architect.

QUESTIONS CONCERNING CHIMNEYS.

HARTFORD, CONN., October 10, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — A. Do gases resulting from combustion contract or expand when rising?

1. Should the flue of a high steam chimney be of the same area throughout, or gradually increase, or gradually diminish as it approaches the top?
2. Would it be advisable in any case to suddenly flare or contract the top of such a flue.
3. Would the same treatment apply to the small chimney of a house.
4. Is it preferable, as regards draught, to carry the flue of a house chimney vertically to the roof, or to give it an oblique, undulating course?
5. What is the proper area of flue for an open fireplace, 3′ 6″ wide, and 2′ 6″ high?
6. If a 12″ circular flue would allow sufficient area for a given amount of smoke, is there any objection to making the flue 12″ square, and has the latter arrangement any merits aside from economy of construction.
7. Is an 8″ x 8″ flue large enough for an ordinary coal grate?

B. What treatment is employed to produce the peculiar effect of the shingles on Mr. Mitchell's house and stable, Gardner Road, Brookline, Mass. X.

[ANSWERS. A. Gases generated in a confined space expand on emerging from it, but contract again subsequently as they lose heat.

1. In theory, the flue of a steam chimney should be cylindrical, and of the same area throughout. In practice, however, it is now not unusual to increase the area slightly with the height, at the rate of perhaps one additional inch of diameter for every twenty-five feet rise above the base, and the effect is thought to be good.

2. If such a flue were of sufficient capacity throughout, it is very doubtful whether any advantage could be gained by flaring at the top, although, if the flue were originally too small, a little improvement in the draught might possibly be gained in that way. In many cases a damper is placed over the top of the chimney, which of course contracts the outlet more or less, without material disadvantage.

3. The same principles apply to small as to large chimneys.

4. For draught, it is almost always best, unless the flue is large, to carry it up as nearly vertically as possible. If the chimney is exposed to down draughts from higher buildings or hills in the neighborhood, or if it is too large for its work, change of course may help to check downward currents, and such deviations from the vertical line help to prevent the fall of soot in summer from the chimney into the room.

5. An open fireplace three-and-one-half feet wide, and two-and-one-half feet high should have a flue 12″ x 24″, or 16″ x 16″, if possible, although a flue 12″ x 16″ might do, if carried up nearly straight.

6. There would be no objection to using a 12″ x 12″ square flue instead of a circular one 12 inches in diameter. The circular flue will, however, be rather the better of the two, as being less liable to down-draughts.

7. An 8″ x 8″ flue is too small for a soft-coal grate, except, perhaps, one of the miniature English ones. For hard coal or coke it may be made to do, if the chimney is high, and the flue straight; but 8″ x 12″ would be much better.

8. Staining with oil of creosote. — Eds. American Architect.]

A QUESTION OF COMMISSIONS.

Minneapolis, Minn., October 7, 1884.

To the Editors of the American Architect: —

Dear Sirs, — What are the usual commissions charged when an architect furnishes complete plans and elaborate details for a house costing from seventy-five to one hundred thousand dollars, two-thirds of the work being done by the day, the architect buying all materials and paying all bills for labor and materials, and being responsible for same. An early answer will confer a favor on

Respectfully yours, Architect and Subscriber.

[We do not think there is any rule or custom in regard to the proper charge for the extra work imposed upon an architect by employing him to buy the materials and pay workmen. Perhaps the commission allowed by courts to trustees of estates for buying and selling property for the trust estate, which is, we believe, two per cent on the amount involved, might be a guide, although the labor and special knowledge required of an architect for performing such a duty are greater than those expected of trustees. — Eds. American Architect.]

ARCHITECTURAL PICTURE-MAKING.

Chicago, September 14, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I write you to inquire where I may be able to obtain a first-class work on architectural picture-making, with ink and water-colors. Have seen the work recently published by Mr. Linfoot, but it is not exactly what I wish. Would be much obliged if you could give me any information in regard to the matter.

Yours truly, R. B. Hotchkin.

[To our mind, the most useful book ever published for those who wish to work effectively in various styles is J. D. Harding's "*Principles and Practice of Art.*" It is illustrated by Indian-ink washed drawings and woodcuts, but they are so admirable of their kind, and the explanations of the methods of obtaining effects by light and shade and composition are so clear, that the ambitious perspective draughtsman will find it a treasure. After this, any of Samuel Prout's books or lithographed drawings will be excellent, showing the application by a great artist to architectural drawing of the technical science to which Harding's book furnishes the key. These books, with the exercises in Ruskin's "*Elements of Drawing*," as practice for the hand and eye, will teach our correspondent all he will need to learn for a long time. The "*Principles and Practice of Art*" is out of print, but may be picked up at the second-hand book-stores, and the same is true of the Prout works. Ruskin's "*Elements of Drawing*" should be procured, if possible, in the English edition, but in default of this, Wiley & Sons' reprint, published in New York, is better than nothing.—Eds. American Architect.]

NOTES AND CLIPPINGS.

The Weight of Hard-Woods. — The following is given as the weight of hard-woods per foot, board measure. Some allowance must be made in the weight of fresh cut, as the same wood when green differs somewhat in weight in different localities: —

Name of wood.	Green. lbs. to 1 foot.	Dry. lbs. to 1 foot.	Name of wood.	Green. lbs. to 1 foot.	Dry. lbs. to 1 foot.
Ash	4½	3½	Hickory	5	4½
Apple	5	4	Holly	5½	4½
Beech	5	4½	Lignumvitæ	9	8½
Birch	4½	3½	Maple	5	4½
Basswood	3½	2½	Mahogany	5¼	4½
Chestnut	4	3	Oak	5	4¼
Cherry	4½	3 1-5	Poplar	3¼	2¼
Cypress	4	3	Rosewood	8	6¾
Cedar	4	3	Walnut	4½	3 1-5
Elm	4	3			

— *Miss. Valley Lumberman.*

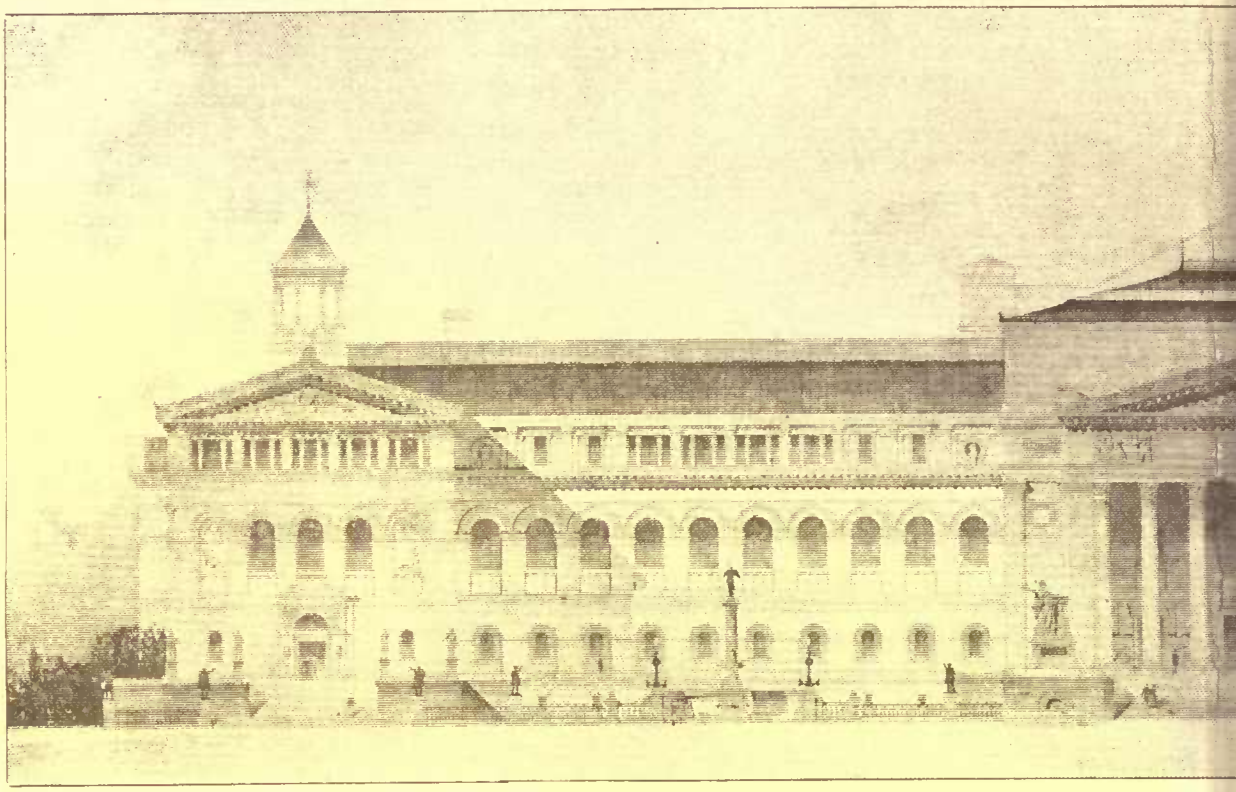
Electric Light-House at Rio de Janeiro. — An electric light-house has lately been erected on the island of Raza, at the entrance to the Bay of Rio Janeiro. The light-house proper is eighty-five feet in height, and is built upon a rock two hundred and thirty feet in height, so that the focus of the light of the apparatus is fixed at a total elevation of three hundred and fifteen feet above the sea. The electric current is produced by a continuous-current Gramme machine, working at the rate or seven hundred revolutions, and feeding a light rated to be of two thousand candle-power. The Gramme machine mentioned is worked by a stationary surface condensing steam-engine, such arrangement being rendered obligatory, owing to the lack of fresh water. All the fittings are double, so as to prevent interruption by unforeseen accidents; still, to render positive certainty, oil-lamps of high lighting power are always kept in readiness. The light is of the revolving class, having two white disks and one red, succeeding one another at intervals of fifteen minutes. It is asserted that, on clear nights, the light is visible as a distance close on to thirty-five statute miles; but the general efficacy of the system is tremendously impaired during foggy weather. — *Engineering News.*

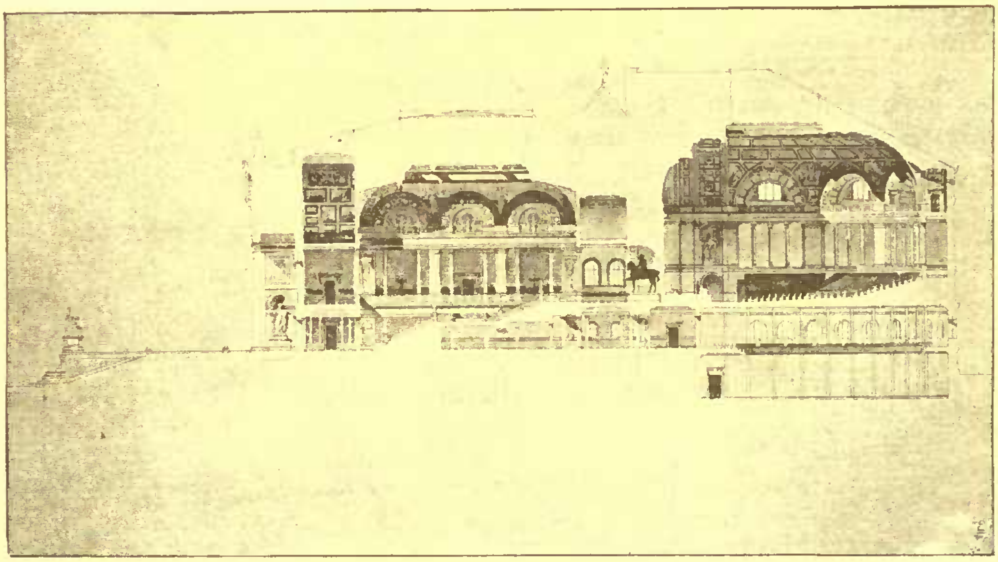
In the Style of Queen Anne. — Let me offer a few reflections on the mania for Queen Anne houses that is now rife, and which I venture to pronounce a failure, and which, with more certainty, will be decreed a failure a generation hence. The thing is all wrong and on wrong principles. The Queen Anne architects indulged in no such ridiculous, fantastic freaks as we see now exhibited, and simply because such was entirely opposed to the nature and character of brick. Brick is a simple, honest, plain material, with a good color and hard, smooth surface — that is all. Whatever style can display these qualities best is the Queen Anne style and no other. The result of the modern caprices will be seen ten or twelve years hence, when certainly decay will have disintegrated or destroyed the whole, or when the owner's heart will have sickened of the frequent repairs and restorations. The old Queen Anne houses produced effect by the beautiful color and surface, the bricks being laid almost touching, with the thinnest wash of mortar between. The result is that no rain or damp ever gets between. The modern system of building is opposed to this, thick layers of mortar being interposed, with the certain result that all the elaborate gables, etc., soon begin to separate. Bricks put together in elaborate forms have no strength, no more than stones laid on earth, but displayed in surface it becomes as firm and smooth as a billiard-table. Even mouldings should be raised in the faintest degree, and the less they are the richer the effect There is an old house out at Clapton, a "seminary for young ladies," that for design, simplicity, and pure brickwork, mixed with stone and design of outline, puts to shame all the brick phantasmata that are now covering the city. Looking at the pretentious masses that cover the new settlement of Cadogan Square or line the Embankment, one does not feel at all drawn back to the days of Queen Anne. There is a coarse, raw treatment in their embroidery, to which the brick lends itself but reluctantly. The material is too rude for such fine work. There is another fad in house adornment, which, it may be said, has run its course. This was the daubing over houses "liver-red," green, blue, etc. These efforts looked daring enough at first, but presently, as the dirt accumulated, they turned all kinds of horrid tints, and the house looked dirtier and shabbier than ever. — *Tinsley's Magazine.*

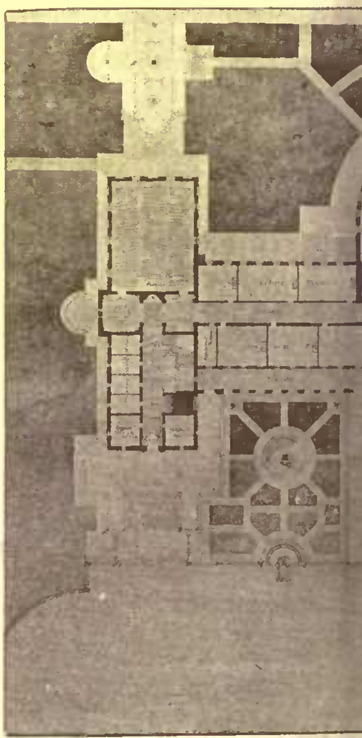
A Gravity Railway.—Some interesting particulars regarding a curious railway at Falcon Cliff Castle, on the Isle of Man, have recently been supplied by a British railroad journal. The railway, as described, consists of an up and a down line of four-foot gauge, running parallel for about fifty yards on a gradient of about one in three. The vehicles, two tramway cars, are moved by water poured into an iron tank upon which each car rests, and the running is controlled by a stationary hand-brake. The tank is of angular shape and rests upon four wheels of the usual railway-coach pattern, with a single flange on the tire. The shape of the tank necessitates two of the wheels being placed lower than the other two, while the body of the car, resting on the horizontal line of the angle, admits of it preserving a perfect level, although running on so enormously steep an incline. A cable, permanently fixed at each end to the cars, runs in the centre of the four-foot gauge, and round a wheel about six feet in diameter stationed at the top of the gradient. The brake referred to is upon this large wheel. The length of the cable is such that, when one car on one pair of rails is at the top of the gradient, the other upon the parallel pair of rails is at the bottom. The tanks upon which the cars are fixed are fed with water at the top of the incline and emptied at the bottom, the weight of water in the filled tank being sufficient to sink this car to the bottom of the gradient, and at the same time, by means of the attached cable, to draw upon the car. The mechanism for filling the tanks can be worked by the same man who has charge of the brake of the wheels upon which the cable revolves, and by means of which the speed of the running of the cars is controlled.—*The Iron Age.*

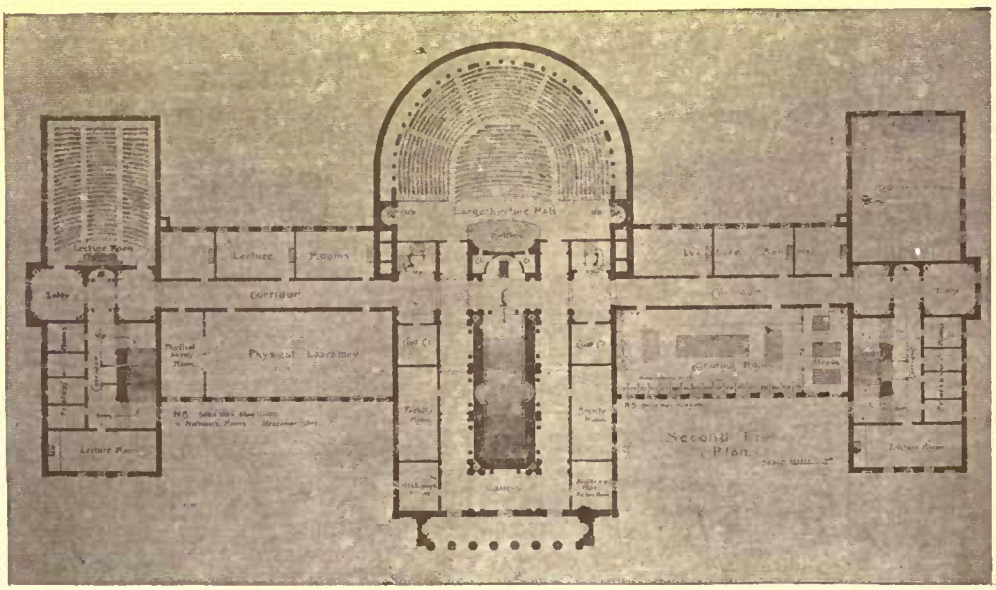
The Bennington Monument. — The Bennington Battle Monument Association elected Thomas Allen, artist, of Boston, a member of the body, Saturday evening. Mr. Allen is a great-grandson of the Rev. Thomas Allen of Pittsfield, Mass., who won renown as the fighting parson of the Revolution, at the battle of Bennington. The sculptor, Olin L. Warner, of New York, who has for some years been a member of the Association, and who is a descendent of Samuel Warner, a brother of Col. Seth Warner, of Bennington battle fame, and Mr. Allen were elected the confidential advising artists of the Association. The Association is a close corporation, and its list of members is generally full, but the policy of the body is to keep a few vacancies for the election of persons like Messrs. Warner and Allen, who are artists, and are descendants of those who fought in Bennington, or are otherwise likely to be disinterestedly identified with the monument project. The object of this is to bring an art element into the Association, which shall not only aid in the erection of a suitable monument, but shall have an æsthetic care for it when it is erected. — *Troy (N. Y.) Times.*

A Church Built from a Single Tree. — A redwood tree, cut in this county, furnished all the timber for the Baptist church in Santa Rosa, one of the largest church edifices in the country. The interior of the building is finished in wood, there being no plastered walls. Sixty thousand shingles were made from the tree after enough was taken for the church. Another redwood tree, cut near Murphy's Mill, in this country, about ten years ago, furnished shingles that required the constant labor of two industrious men for two years before the tree was used up. The above statements are vouched for as true by Supervisor T. J. Proctor. — *Santa Rosa (Cal.) Republican.*









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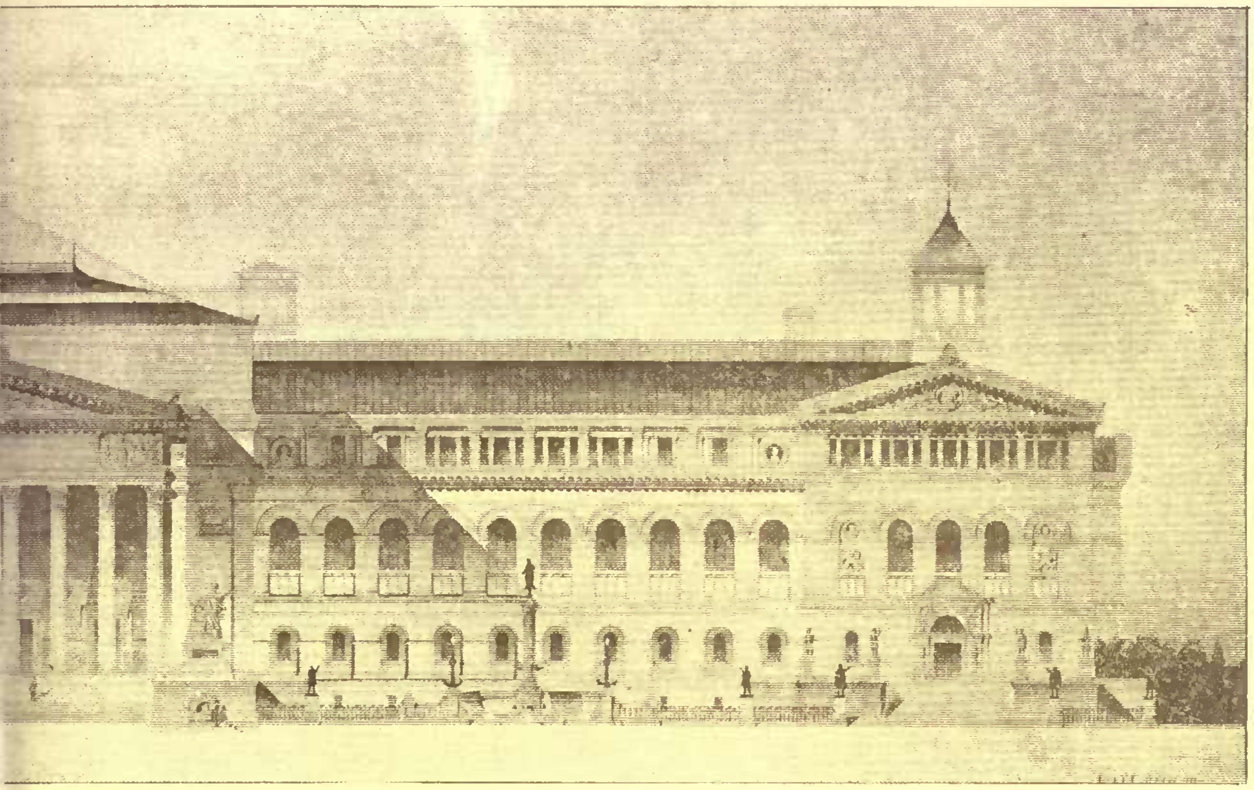

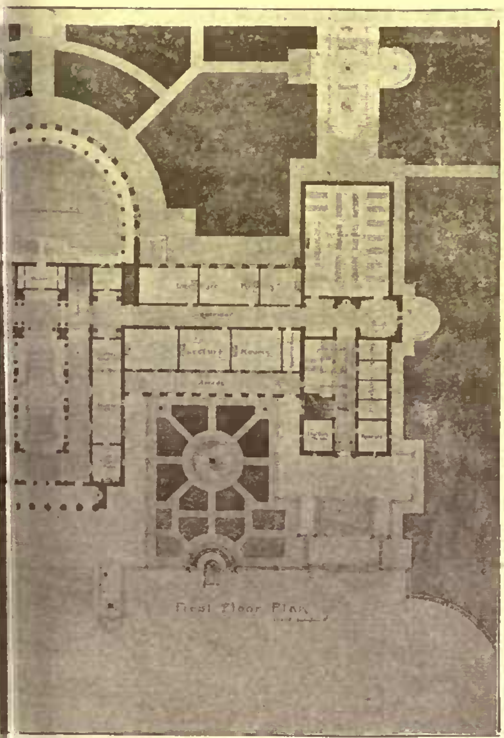

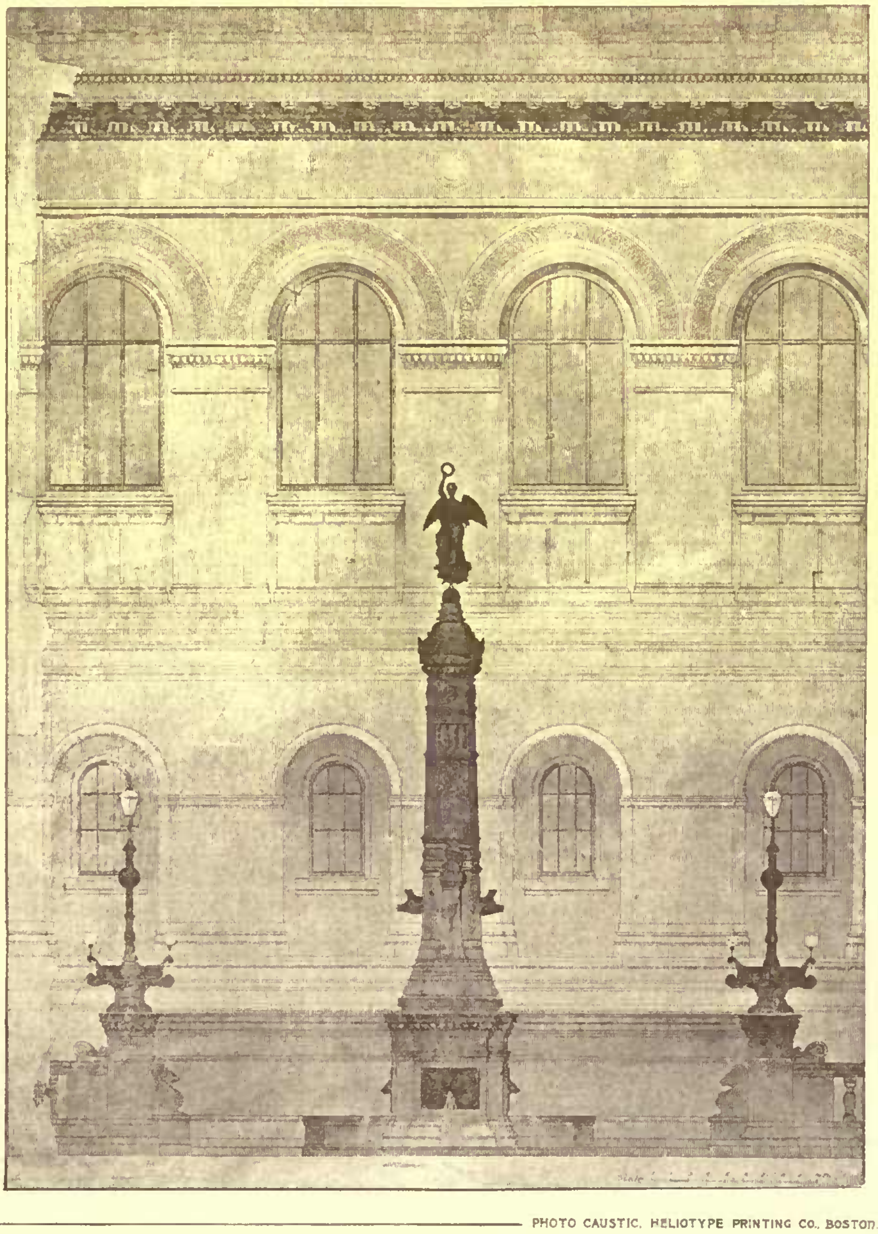

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…CH TRAVELLING SCHOLARSHIP.

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CONTENTS.

REPORTS of the proceedings at the recent Convention of the American Institute of Architects at Albany have not yet reached us; so we are only enabled to announce that the following officers were elected for the ensuing year: President, Thomas U. Walter, LL. D., of Philadelphia; Treasurer, O. P. Hatfield, of New York; Secretary, George C. Mason, Jr., of Newport, R. I.; Board of Trustees, H. M. Congdon, E. T. Littell, Napoleon Lebrun, and A. J. Bloor. Committee on Publications, H. Hudson Holly, of New York, T. M. Clark, of Boston, and J. McArthur, Jr., of Philadelphia. Committee on Education, Alfred Stone, of Providence, Henry Van Brunt, of Boston, Prof. N. Clifford Ricker, of Champaign, Ill., Prof. W. R. Ware, of New York, and T. M. Clark, of Boston. Secretary of Foreign Correspondence, W. L. B. Jenney, of Chicago.

THE Bulletin of the Entomological Division of the Department of Agriculture calls attention to the ravages of a certain worm among the spruce forests of Maine, pointing out such facts in regard to the mode of attack of the insect, and its habits of life, as may best suggest a remedy. The "spruce bud worm" is the larva of a moth, resembling that which produces the common measuring-worm, and like the measuring-worm moth, it deposits its eggs in the spring in the tender shoots of trees, choosing the spruce, as other insects of the same kind do other trees. The worm hatches out in June, just as the young growth of the trees is developing, and immediately begins to feed upon the buds, which are soon devoured. Unlike most other trees, the spruce puts forth annually a comparatively small number of buds, which are developed from the ends of the twigs, and when these are eaten away, as there are no surplus buds to grow in place of them, the tree dies. The pine tree, in some localities, has for many years suffered in the same way from a worm which attacks the terminal bud on the leading shoot, causing rather the distortion of the tree than its destruction, but the spruce worm leaves the forests dead. Extensive tracts of this brown woodland now occupy the coast of Maine west of the Penobscot River, and although the insect seems to have advanced as yet but a few miles inland, it is likely to reach before long the best forest regions of the State. There is something interesting, as well as ominous, in the way in which certain insects appear, no one knows whence, or how, and in a few years almost extirpate some particular plant from a whole country. The little phylloxera, which a few years ago came near putting an end to the culture of the grape in France, presents a signal example of the power of an insect plague; and the Colorado beetle, the pine worm, and more recently the spruce worm and the elm beetle, threaten to compel the abandonment of woodland property of great and increasing value. The secret of the increase in the destructive power of insects is probably to be found in the reckless cruelty with which birds, the natural enemies of insects, have been killed or driven away from the more thickly settled parts of the country. It is often remarked that in comparatively wild regions injurious insects are almost unknown, and the prevalence in a given locality of cats and boys is always indicated, in summer, by gardens and orchards brown and leafless, hung with worms instead of flowers and fruit.

THE *Builder* gives an interesting account of the new temporary hospital for infectious diseases, just constructed at Liverpool. This city has been very inadequately provided with means for isolating and treating persons attacked by infectious disorders, and it was not until an epidemic of small-pox broke out there recently that decisive steps were taken for supplying the need. By the courtesy of the Board controlling the harbor and docks, a tract of land, containing about thirty acres, situated on the river bank, was placed at the disposal of the city authorities, and immediately put in condition for receiving the hospital buildings. A mansion-house already existing on the premises was appropriated as an administration building, and at some distance from it, on the river bank, two terraces were formed, each four hundred and ten feet long, and forty feet wide. The terraces were carefully under-drained, and then entirely covered with a sheet of Portland cement concrete, six inches thick. This forms a floor, on which the hospital buildings are constructed in sets of three. Four of these triplets of buildings are of the lightest possible description, the central portion being of wooden framing, covered outside with thick water-proof paper, and sheathed inside with matched boards, the space between the sheathing and the outside papering being filled with mineral wool; while the two remaining divisions consist simply of tents. The latter form the hospital wards, the wooden structure in the middle containing only nurses' day-rooms, bath-rooms, water-closets, and so on. All the central buildings communicate by means of covered passageways, floored with cement concrete, and enclosed with wooden framing, covered with water-proof paper. To accommodate patients who could not bear the exposure of a tent, two triplets of buildings are placed in the same range as the tents, planned in the same way, but constructed of corrugated iron, with lining of matched sheathing, filled in, between the sheathing and the iron, with mineral wool. A separate convalescent hut, of iron, is provided at one end of the group, and kitchens, sculleries, and other necessary buildings, of brick, are situated near by.

THE plan of heating is a novel one. Circular open grates are placed in the centre of each tent or iron ward building, to give radiation and ventilation, and in addition to this steam pipes run around the outside walls, conveying steam which is generated in the fireplace itself, by means of a coil of pipes, some of which form the grate-bars. We confess to a little doubt as to the efficiency of such an apparatus, unless hot water were substituted for steam, but this change could probably be made without difficulty. The drainage system is less remarkable, but seems to be well designed, one noticeable feature being the provision of flush-tanks at the head of each line of drains, which are supplied from special tanks with a strong solution of carbolic acid. The flush-tanks are set to discharge four times in every twenty-four hours, and the mixture of the water which fills them with the carbolic acid solution gives it a strongly disinfectant quality, and perhaps assists in destroying the poisonous germs which the drains may contain. In order to prevent the possibility of communicating infection through the city sewers, a special sewer is laid, carrying the drainage from the entire hospital directly to the river. As the site was found to be exposed to severe winds, the unusual plan was adopted of building a screen, thirty feet high, and six hundred feet long, to protect the buildings and the patients in them. This screen is made of poles, set six feet apart, with horizontal battens every fifteen inches in height, and laths over the whole. Wire ropes at suitable intervals prevent the screen from being blown over. The entire cost of the hospital, exclusive of the land and the administration building, is less than sixty thousand dollars; which, considering that it will accommodate two hundred patients under very favorable conditions, is moderate.

THE *Sanitary Engineer* quotes from the *Bulletin of the Bussey Institution* a description of some experiments made by Professor Storer to determine whether mice were likely to eat away the putty used by plumbers for making certain joints, so as to endanger the tightness of the joint. Every one knows that they, as well as rats, will occasionally eat putty, and for that reason it is common for plumbers to mix red lead with the putty used in making joints; but before Professor Storer's experiments were made, very little was definitely known about the subject. To find, first, how much putty a mouse would eat, he put three in a cage, and fed them with scanty rations of oats, but gave them in addition all the putty they wished for. Under these conditions the mice ate about one-third their weight of putty every day, showing that where they can get no other food, these little animals are capable of doing much mischief to plumbing work where this substance is used for jointing. After the mice had become accustomed to plain putty, they were tried with mixtures colored with various pigments. Red ochre was first given them, mixed with one part whiting to three parts ochre and the usual proportion of oil. This compound they would not touch; but putty made with equal parts of ochre and whiting they would eat, though not very freely. Putty made entirely of yellow ochre instead of whiting they at first refused, but were gradually brought to eat it. A compound of oil and clay was offered them, but they would not eat it unless whiting was mixed with it. The carbonate of lead, baryta, and zinc, and oxide of zinc, all proved fatal, even in small doses, to the mice that ate them, but these pigments, when adulterated with whiting, seemed to lose something of their deleterious quality, and the mice could eat a certain quantity with impunity.

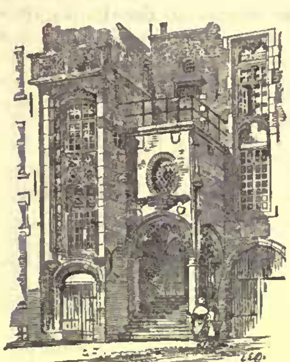
THE *Builder* gives a curious account of a "competition" which took place in some country town between candidates for the position of local surveyor. As those officials are more numerous in England than here, the circumstances of the examinations through which they obtain their appointments are not of such serious consequence to us, but perhaps some of our readers may remember occurrences in which they have been concerned which will be recalled by the account of this one. A choice was to be made among a certain number of candidates, selected from many applicants, by a committee of town magnates of the usual sort, and one of the candidates, who seems to have understood human nature quite as well as engineering, paved his way to success by the ingenious device of having his testimonials and references printed in brown ink on tinted paper, with his own photograph as a frontispiece, and distributing these documents among the committee. This "little attention," as the *Builder* calls it, won the hearts of the judges from the first, and he was appointed to the post. His luckless competitors, who had not thought of this way of ingratiating themselves, were examined, with unfavorable result, upon problems such as that propounded by one of the committee, a shoemaker of much authority, who inquired "how much water a windmill would pump in a year?" while another requested the candidate under trial to state "what size drain-pipe should be laid in a certain street?" and seemed, with his fellow committee-men, to be unfavorably impressed with the reply of the candidate, who said that it would be necessary for him to know the length and grade of the street, and the number of houses on it, before he could answer the question. Absurd as such questions seem to professional men, they do not appear so to those that ask them, who are not accustomed to consider the various conditions affecting any particular case, and many queries, just as ridiculous, are put with the utmost gravity to architects. We remember being asked, quite seriously, "how much a school-house ought to cost?" without any further particulars whatever. Having a general notion of the sort of school-houses fashionable in the surrounding region, we hazarded a bold guess, and answered promptly, "Twenty-five thousand dollars," and gained thereby the reputation of great sagacity, as having estimated within a few dollars the cost of a building which we knew absolutely nothing about.

EVERY one may not know that a very important agreement has recently been entered into by the Governments of Great Britain, France, Italy, Belgium, Spain, Holland, Portugal, Switzerland, Servia, Brazil, Guatemala, San Salvador, Ecuador, and Tunis, for the formation of an International Union for the Protection of Industrial Property, under the rules of which "the subjects or citizens of each of the contracting States shall enjoy, in all the other States of the Union, in everything that concerns patents for inventions, designs, models, and trade-marks, the same advantages that the law of these States accords to their own citizens, including the same protection, and the same legal remedy against persons infringing their rights, on the sole condition of submitting to the formalities and regulations which each State imposes on its own citizens." Under the same treaty it is agreed that commercial names shall be protected in all the States belonging to the Union, by the seizing, at the request, either of the party injured, or a diplomatic representative, of articles imported into any of the Union States under a fictitious name of a person or place, or otherwise marked in a way calculated to deceive purchasers, or to injure the business or reputation of established manufacturers; and, moreover, that applicants for patents or inventions, who have filed their application in any one of the treaty States, shall be entitled, by that act, to a term of six months for European countries, and of seven months for countries beyond the sea, within which he shall have the right, prior to all others, to file applications for patents in any or all the other States of the Union, in accordance with the regulations of each State in regard to patents.

IN many countries the holder of a patent is obliged, under penalty of forfeiting his exclusive rights, to proceed within a given time after the granting of his patent to the manufacture of his protected goods, or the application on a commercial scale of the process which he has devised; and the regulations of the Union do not change these local laws, but the privilege is given to any inventor who may have secured patents in two or more of the contracting States to import from one into another the articles made under his patent, without forfeiting them, provided that he complies also with the rules of both countries in regard to the local manufacture of them. This, like many of the other stipulations of the treaty, is of great importance to the inventors of improved articles, and to those who deal in them; while the shameless forgery of trade-marks and labels which is carried on in this country shows plainly enough how valuable to honest manufacturers would be an effective repression of such practices. In order to carry out the provisions of the treaty, an International Bureau is to be established, under the protection of the Swiss Government, which will have general supervision of the management of industrial property, and is to collect and publish statistics, and answer questions submitted to it. Besides this International Bureau, each of the treaty States will establish a local Administration, which is to gather information for transmission to the central Bureau, and is to publish a periodical account of matters relating to the subject in each country.

ACCORDING to the *Academy*, Dr. Schliemann has made some important discoveries at Tiryns, perhaps the most ancient Pelasgic town in Argolis, and the scene of the early life of Hercules. The palace of the city, through whose hall the centaur Chiron may have trotted when he went to give music lessons to his athletic pupil, has been excavated, and found, like that at Mycenæ, to show marks of fire, the clay with which the limestone walls are laid, instead of mortar, being converted into brick, while the stones are burnt into lime. In some places the walls are covered with stucco, which still shows traces of painting in black, blue, red, yellow and white. The blue pigment has been analyzed and found to contain glass and copper. The plan of the palace and the character of the objects found in it recall those of Orchomenos and of the second prehistoric city of Hissarlık, or Troy, but there are many knives and hammers of stone, indicating an antiquity for the palace and city more remote than for those of Mycenæ. No trace of writing has been met with, although intelligible drawings are found, as well as a decorative pattern, which is the same as that found on the ceiling of one of the rooms connected with the so-called Treasury of Minyas at Orchomenos. Twenty-seven bases of columns of limestone have been found among the ruins, and one capital, in the ancient Doric style, which, however, is of sandstone, and may be a fragment of a much later building, since at Mycenæ, where much more has been excavated, the forms are completely different from those of the Doric order, resembling the Assyrian more than any other style.

SALT-PETRE EXUDATIONS UPON BRICKWORK.—I.



House in Bruges; Belgium:

USUALLY in the spring and about this time in the autumn it is not uncommon to see brick walls covered in places with unsightly whitish blotches on the surfaces. These efflorescences are especially noticeable when such walls are constructed of an outer facing of fine pressed-bricks, and an inner or main wall or backing of common bricks. Architectural enrichments of brickwork, such as decorative panels, friezes, etc., when made of terra-cotta, which is but brick in ornamental form, are also often covered with these objectionable exudations, which mar and detract from the beauty of designs which would otherwise appear more harmonious and pleasing. When heavy rains are prevalent, and at all seasons in damp positions, in old works as well as new, these efflorescences are most noticeable, and they appear to be composed of a crystalline, semi-transparent substance, of a white, fleecy appearance, suggestive of hoar-frost. It is of a slightly acid, or rather of a pungent, saline flavor, and works its way through any ordinary coat of paint, and, as the substance absorbs the humidity of the atmosphere in efflorescing, it renders the wall damp on the surface, and if there should be paint covering the brickwork, it carries it off in large patches.

The process is termed by the English workmen "saltpetring," and sometimes in this country it is called "whitewashing," but it is in fact the production of nitre, or, as it is also called, saltpetre, from the materials employed in the construction of walls. The term "stone-salt" has also been applied to the substance, as it sweats out of or exudes from rocks or walls.

In brickwork these saltpetre exudations are due primarily to soluble alkalis and alkaline earths present as impurities in the lower grades of clays from which building-bricks are made, and to the lime and magnesia from calcareous pebble deposits present in most of these clays; also to the lime and magnesia of the mortar with which the common bricks are laid.

Saltpetre is a salt consisting of nitric acid and potassa — nitrate of potassa, and although it is usually regarded as the sole cause of the appearances which have been described, it is far from being the only substance produced in particular instances, as the nitrate of soda and the chloride of potassium are often met with in connection with saltpetre. But few chemists pay attention to the fact that nearly all limestones contain a certain quantity of soda and potassa; or at least in the analyses contained in chemical works mention is but seldom made of their presence.

The disagreeable effect which saltpetre produces upon decorations, internal as well as external, should render the research of its cause highly interesting to the architect and to the builder. Its action of greatly lessening the durability of stone, as shown in the appearance of portions of the new Parliament Building in London, and the archways under the eastern porticos of the Capitol Building, and the lower or older portion of the great Washington Monument in Washington, is such that the study of this singular chemical phenomenon should engage the attention of engineers to an equal extent.

Saltpetre is not always caused by the material of which the bricks are made, but sometimes by the sand, and, as has been stated, often by the lime employed in making the mortar. Sea-sand, unless washed in fresh water, and exposed for a period of not less than one year, always produces it. The evil is further promoted by the general manner of constructing walls when pressed-bricks are used as a facing. Such walls are usually built with the facing of one width of a pressed-brick, the other part, or "backing up," being of one or more lengths of common bricks to form the thickness desired. Pressed-bricks are as a rule made of even, straight surfaces, so as to form sharp and well-defined arrises, and of suitable size to lay a close joint for "tucking," while common bricks are roughly made, have uneven surfaces, and are laid with a wide, thick joint.

In building a wall faced with pressed-bricks, the latter are laid in advance of the common bricks, usually six courses high, when they are "backed up," or the wall is "filled in" with common bricks to the height of the six courses of front bricks. It is the common custom among bricklayers to make five courses of "salmon" bricks, which are commonly used for "backing up" walls faced with pressed-bricks "come level" with six courses of the latter. In order to accomplish this it is necessary to greatly increase the thickness of the mortar joints for the common bricks. Realizing that mortar is cheaper than bricks, the bricklayers "shovel it in," and hence it is that many expensive structures built with pressed-brick fronts have inside walls composed almost wholly of lime mortar. When such walls become thoroughly wetted, either during or after construction, the result is that the saltpetre exudations at once commence. Then again, the manner of tying the facing course of pressed-bricks to the common bricks, or "backing up," further aggravates the evil.

When the six courses of pressed-bricks are laid and backed up, as has been described, it is the custom to split a sufficient number of pressed-bricks, so as to make one brick appear like two when laid "stretcher fashion," in the wall. Thus it happens that walls that are faced with pressed-bricks, laid so as to appear like all stretchers, have each seventh course only about two and one-fourth inches in thickness, instead of a full brick or four and one-half inches.

The "split course" is then tied to the common bricks by interlacing courses of rough bricks, termed headers, which are made to penetrate and overlap the longitudinal rows of strechers at every "split" or seventh course. This manner of bonding the facing bricks to the common bricks is called a "blind tie;" but such ties are highly objectionable, on account of the intimate capillary contact of the facing and common bricks and with the mortar, which inoculate and supply the efflorescing germs to the front or pressed-bricks.

It was not our intention to make this paper a treatise on the construction of walls; but we would feel that our whole duty was not performed if we failed to express our disapprobation of the manner of building walls faced with pressed-bricks and constructed, as we have described, with "blind ties."

Such walls are weak, and the construction is meaningless and a sham. An examination of the exterior of such a wall would be unfruitful, as rows of stretchers, laid course upon course from the bottom to the top of a building become monotonous, and the continued dull uniformity becomes wearisome. In addition to the annoyance arising from the poverty of ideas expressed by such a wall, we are disappointed at knowing that soft, salmon bricks are often within one and one-half or two inches of the exterior, and tremble for the safety of the occupants of a structure the front or veneering of which is blindly tied to a rotten wall, the principal material of which is lime mortar.

But to return to the subject of "saltpetring," from which we have strayed farther than was our intention. It is also the custom in constructing such walls as we have described, to use for the pressed-bricks a mortar-paste made of bone or marble dust combined with sand and a suitable coloring matter, such mortar being laid on sparingly; while the common bricks are laid, as we have described, with very thick joints of common lime-mortar, this mortar being grouted into the joints and between the contiguous front and common bricks, thus making the entire wall of pressed and common bricks practically one body.

The substances of the wall coating are sulphate of soda, sulphate of magnesia, and sulphate of lime, the first being commonly present in variable quantities in the clays, especially the drift-clays, being the result of igneous agencies and of chemical changes. In the second case, the magnesia in the brick clay or magnesia in the lime of the mortar is converted into the sulphate of magnesia, either by the sulphurous fumes evolved in the process of burning in the kilns, from iron pyrites present in the clays or the sulphurous fumes of the fuel, or by the absorption of sulphurous vapors of coal-gases from the general atmosphere. A like conversion takes place from the lime of the clay and mortar, which is converted into the sulphate of lime. These salts are dissolved by the water with which the common bricks are generally saturated just prior to laying them in the wall, to prevent the too rapid absorption of the water from the mortar by the bricks, which would cause the mortar to set too rapidly. The water of the mortar-paste used for laying the pressed-bricks also dissolves the salts which have been mentioned, and which are readily absorbed by the dry facing-brick of the wall, and evaporating through the pores of such bricks and efflorescing upon the surface.

During the autumn of 1882, more of this efflorescence was to be seen upon buildings on both sides of the Atlantic than had appeared for many years, and old structures, such as the Pennsylvania Hospital, in Philadelphia, which were usually free from it, appeared to have developed as much of the deposit as those in process of erection, as for instance, the new Technical College at South Kensington, London, which was also covered in places with this objectionable eruption.

What this efflorescence was, and the cause of it, was investigated by scientific societies, some of the members of the Academy of Natural Sciences, in Philadelphia, discussing it at length. The substance of their decision was, that it was simply ordinary Epsom salts or sulphate of magnesia, which dissolved in the water passing over the bricks, and in evaporating left the deposit; the sulphurous acid resulting from burning coal combining in the presence of moisture with the magnesia in the mortar and forming the salts.

The earth's surface has from the most ancient times been known to yield nitre, which appears in some cases as an efflorescence on soil. W. J. Palmer[1] describes the manner in which a class or caste of men, called *sorawallahs*, from the Hindu word *sora*, meaning nitre, collect the earth impregnated with that material in the northwestern provinces of India. When the *sorawallah* detects a faint, white, veil-like patch of crystalline formation on or near the dark-colored borders of the little drains, which issue from holes in the mud-walls, usually found around native dwellings and their cow-houses, he scrapes off a very thin layer of the surface soil, which proves to be impregnated with nitre, and carries it to his place of manufacture. The nitre thus obtained, when re-crystallized, forms the East Indian saltpetre so well known in commerce. The mounds which cover the sites of ancient villages in Northern Africa, especially in Algeria, are lixiviated for nitre. Other instances of the marked production of nitrates also occur at Saragossa, a province of Spain founded by Augustus more than nineteen hundred years ago. Large quantities

[1] *Chemical Society's Journal*, Vol. VI, 1868, 318.

of nitre are also obtained from the province of Ancient Murcia in Spain, and it is shipped largely from Carthagena. But by far the most enormous formation of sodium nitrate to be found in the world is that on the table-land of Tamaragual in Peru.

The instances which have been cited, and others which might be named, prove that nitrates are widely distributed in nature. But it has been proved by chemical analysis that there is a much more general distribution of nitrates than would be supposed even from the examples which have been mentioned. In truth, nitrates occur in all soils and porous rocks, being, of course, more largely found in rich or well-manured soils.

Efflorescences of nitre on stone and brick are most abundant when these materials form the shelter for animals. The walls and roofs of caves frequented by animals are often covered with saltpetre exudations, which are often not less abundant in stables, especially those that are dark, and in which soft or porous bricks have been employed for constructing the interiors.

The earliest manufacture of nitre was by the lixiviation of old plaster, and of the earthen floors of stables, cottages, etc., wood-ashes being added to convert the nitrate of calcium into nitrate of potassium. Nitrification, in addition to the evil effects of keeping the walls of stables damp, and undermining the health of horses, also hastens the destruction of the fine finish or gloss of carriage varnishes, especially if the carriage-house is not well ventilated, and separated from the quarters of the animals. Many architects and builders plan and erect stables and carriage-houses, as if, at some time, they expected the structures would be converted into nitre factories, and to save the expenses of alterations in the future, they at once construct nitre factories, and use them for stables and carriage-houses. Four walls, with a narrow door leading to the stalls, and two wide doors to the carriage-house, the whole covered with a steep roof, upon the apex of which is secured a weather-vane in the shape of a trotting or running horse, the designs of which are usually unnatural, awkward, and inartistic, do not, from the mere fact that they are brought together in an incongruous whole, make a suitable habitation for a horse any more than they would for a man or other animal. Some of the economical souls who construct nitre factories, for fear that a portion of the nitre which is formed by the decomposition of the animal droppings and urine, will not allow the poor beasts which may be imprisoned in them to have necessary air, so they leave no openings in the shape of windows or breathing holes. Even the key holes are provided with guards, which automatically drop the instant the door is closed, and the key withdrawn. Other slightly more liberal architects and builders leave small orifices in the walls, so that the animal may inhale a small quantity of air; but, for fear that too much might enter, the openings are often built up with bricks in pigeon-hole fashion, or covered with fine gauze netting, either of which soon become clogged up, and thus most of the nitre generated in the factory is confined in it.

But nature is its own avenger, for by undermining the health, crippling with rheumatism, and finally killing the horses or other animals which may have been enclosed in the factory, it thus provides itself with additional animal matter to continue nitrification. In addition to the loss of the value of the horses and other animals which are destroyed in these nitre factories, sometimes nice, new, "shiny" carriages are placed in them; but in a few weeks the gloss and beauty changes to an ugly, yellowish mottled color. Then the owner of the animals which have been destroyed, and the carriage which has been ruined, discharges the man having the care of the nitre factory for killing the horses and pouring ammonia over the new carriage. The man who is discharged is sometimes called a hostler, and sometimes a coachman; but as we have before stated, the nitre factory is often termed a stable and carriage-house.

But let us again return to our subject. It is only after long-continued dry weather, for which the past summer has been so remarkable, that nitrates are found in maximum amount, for it is then that the water of the subsoil is brought to the surface by capillary attraction, and the salts held in solution have accumulated there as the water evaporates. Thus it happens that brick-clays, especially those from shallow banks, are liable to contain the greatest amount of nitrates when dug and used in seasons of drought. Heavy rains wash the nitrates out of the surface soil into the subsoil, and it is after such seasons that they are found in minimum quantity.

Non-efflorescence is not always an indication that a soil or porous rock may not be very rich in nitrates, as efflorescence commonly occurs when the nitric acid is combined with potassium. The nitrate of calcium is the nitrate which is most generally present in soil; but nitrate of calcium is exceedingly deliquescent, and, in fact, so great is its affinity for moisture, that it would not appear as a dry salt, even under the most inviting conditions of climates.

Most of the governments of the countries of Continental Europe, appreciating the necessity of obtaining nitre for the manufacture of gunpowder, early offered large prizes for the best method of obtaining saltpetre. But the processes thus engendered are now superseded by the production of nitre by means of the reaction between Peruvian nitrate of sodium and chloride of potassium. Dehérain[1] in investigating the formation of nitre in the walls of stables, came to the conclusion that its development was due to the simple oxidation of the ammonia vapors in the porous brickwork. But this theory has been modified upon the assumption that the disposing influence of other oxidizing actions induces the oxidation, and by the substitution of the action of ozone for that of the oxygen of the air. P. Thenard, Knop, Haarstick, and Pesci hold a view that further modifies the above theory, and regard ferric oxide as the agent for the conversion of ammonia into nitric acid. It is probable that the opinion most commonly held by modern chemists is that which explains nitrification as due to the oxidation of ammonia.

[1] Würtz, *Dict. Chim. pure et appliquée*, II, 564.

THE HEATING AND VENTILATION OF THE NEW INSTITUTE OF TECHNOLOGY BUILDING.[2]

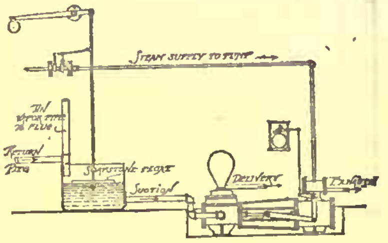


Fig. 1.

Mr. S. H. Woodbridge, Instructor in Heating and Ventilation at the Institute, recently read the following paper on "The Heating and Ventilation of the New Institute Building, and the Special Principles involved," before the Society of Arts. Mr. Woodbridge said: The nature of the subject and the small number of careful measurements which have been made, render exact statements impossible, owing to the variable factors involved and the unknown nature of some of the constants. All my statements are, therefore, made in round numbers. Moreover, the building has not been planned with special reference to any accepted system of ventilation, and only the circumstance of hollow walls has rendered the introduction of such a system possible. Some imperfections therefore exist, which are well understood, but which could not be avoided. The inception of the work was characterized by the very unusual course pursued by the building committee in refusing to commit the planning and the execution of the plans to the lowest bidder. The plans for a generous and complete system of ventilation were first drawn up and adopted, and an engineer was sought whose sympathy with the work would insure its successful completion. He was told: "So much air is required, and these are the plans for the distribution; your work is to furnish the means of heating this air-supply without obstructing its passage."

Some of the more prominent features of the heating and ventilation system adopted are: the reversal of the ordinary custom of subordinating ventilation to economy in heating; basing the quantity and distribution of air on determined requirement rather than on cubic capacity simply; the use of large areas of air-passages and low velocities; making the outlet areas smaller than the inlet areas, with a view to an excess of internal pressure; the method of passing the air through the rooms, with a view to its most efficient and economic use; some peculiar features of the inlet and outlet flues; a modification of the fan, securing increased efficiency; heating by large air volumes at

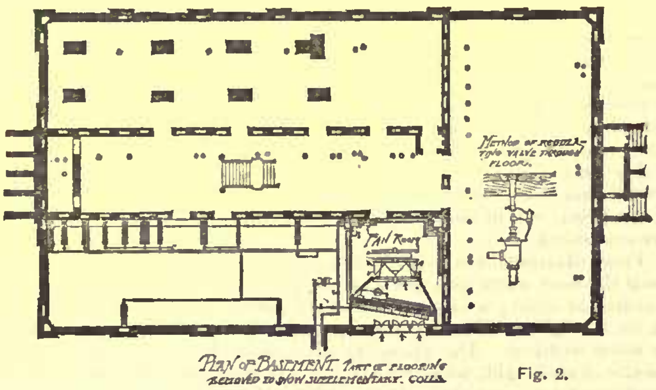


Fig. 2.

low temperature, rather than by small volumes of superheated air; method of controlling temperature of coils and steam-supply; putting the control of the temperature of every room under the direct control of the engineer; method of determining rate of condensation, and daily aggregate condensation, as a means of critical study, and as a means of determining the cost of the heating and ventilation.

The building measures about 90′ x 350′, 75′ high, and contains some 40 rooms, from 3,000 to 60,000 cubic feet in capacity. In determining the requisite air-supply for each, regard was had to the maximum number of occupants, and the character of their work, the cubic capacity being considered only with regard to the distribution of the air. There are five grades of air-supply; ordinary lecture-rooms receive 1,500 cubic feet per hour for each person; physical laboratories, where some gas-flames are used, 2,000; ordinary chemical laboratories (effective hoods being assumed), 3,000; the organic chemical laboratory, 4,500; and libraries, balance-rooms, etc., receive 2,000. The total capacity of the rooms is about 741,000 cubic feet, independent of halls, stairways, etc., and the mean total air-supply about 3,535,000 cubic feet per hour, corresponding with a uniform distribution, to a change of the entire air every twelve minutes. In the

[2] From the *Proceedings* of the Society of Arts (Boston).

chemical laboratories, however, the air is changed every six or seven minutes.

The general arrangement of walls, piers and flues is shown in Figure 2 and Figure 3. The piers, two feet square, run from the stone foundation to the top of the building, and the flues are formed by the shell walls between these piers. There are 79 flues, about 1′ x 3′, with a total area of about 230 square feet. Only 120 square feet being actually required, it will be seen that there is an abundance of flue area. The arrangement of the flues is as follows:

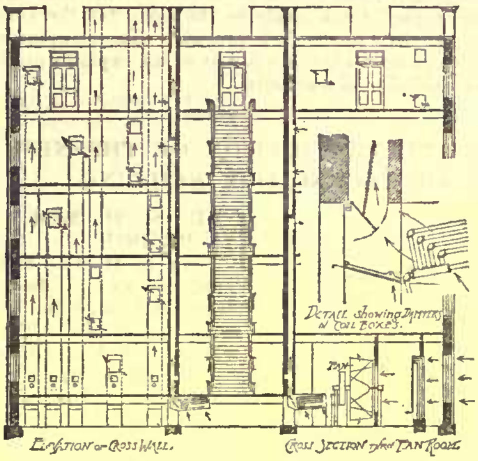


Fig. 3.

In transverse walls;	14 entire,	and	2 partial flues;		
In longitudinal	" 19	"	" 12	"	"
In outside	" 28	"	" 4	"	"

nearly one-half of the entire flues being in the outside walls. Forty-two per cent of the entire air had to be thrown north of the transverse wall (Fig. 2), and as there were only fourteen entire inside flues to do it, all of the outside flues in this part of the building, with one exception, had to be utilized for heating, notwithstanding the objections to such use, viz., that such an arrangement is wasteful of heat, the currents sluggish, that there is often a downward current due to diminished pressure on the lee side of a house, and (most important of all) that they interfere with the complete movement of the air in the rooms.

The conditions essential to good ventilation are that a current of fresh air should move through the room in such a way as to move the whole body of air in the room without mixing the fresh air with the foul, without producing a sensible draught, yet in such quantity as to meet the largest requirements.

These conditions are best fulfilled by placing the inlet above the outlet, and on the warm side. The incoming warm air then rises, traverses the room to the cold outer wall, where it is cooled, and, after falling, moves along the floor to the outlet. Draught is avoided by placing the inlet above the heads of occupants, though at times, when the incoming air is cooler than the air of the room, a draught is felt. Mr. Woodbridge had proposed avoiding this by having the entire inlet flue open up to the ceiling, and covered with a wire gauze painted the color of the wall.

In the original plan a fan was proposed for use as required, but for outside temperatures below 30° Fahrenheit, the flue-space provided was ample without it for the requirements of the various rooms, provided the flues were kept free, and that for their full supply the movement of the air toward them should nowhere be of greater velocity than in the most sluggish of the flues. This plan was defeated by a stricture of the flues at the bottom, and by a change in the position of the fan, which diminished the inlet area considerably.

The finish of the flues is rough brick, smoothed and finished with a trowel and whitewash-brush. Each inlet-flue connects with but a single room, but in some cases the outlet-flues from different rooms are connected.

Three dampers are placed in the outlet flue: one at the top, to keep the flues warm and prevent the escape of warm air from the building at night; a check valve at the bottom, to prevent a reversal of the draught; and one at the top outlet of the room, to be opened in warm weather. The incoming air enters the room at about the middle of its height, while outlets are arranged at top and bottom, the former for use only in hot weather, when the incoming air may be cooler than the air of the room. The inlet flues also have three dampers: the register at the inlet of the room (seldom used); a valve at the bottom, used for enlarging the passage to the flue; and a regulating damper, to govern the volume of air entering the flue. This latter damper is used to shut off air from rooms where it is not wanted, and in short to regulate the amount of air passing to the different rooms. Figure 3, which represents a cross section of the building, shows at one side a detail of the bottom of the flue, showing the swinging damper and the sliding-valve beneath.

In each valve there is an anemometer and a thermometer. The flues all terminate in a sub-basement four feet high, extending under the entire building. The shell walls stop at the basement floor, while the piers run to the stone foundation.

The floor is of concrete, each section sloping to a cesspool, so as to be capable of being washed off with a hose, the water being pumped out of these cesspools. The air enters the basement through enlarged windows, with an area of one hundred square feet, passing next through a stack of steam coils with an open area of about one hundred and twenty square feet, and then through the fan into a room forming part of the sub-basement, but extending up through the next floor above, being open on three sides to the sub-basement.

Figure 2 and Figure 3 show the general arrangement, and need no explanation. Figure 4 is a parted section of one of the walls, showing how the flues are carried up and their lower parts used for inlets, while their upper parts are outlets. The circles represent inlets to the various rooms, and the rectangles outlets.

The fan is of the blower type, twelve feet in diameter, and with twelve floats, four feet broad at the back and two feet at the front. A spider and a set of twelve arms at the back of the fan carry the floats, leaving the mouth entirely free. The floats are braced to the arms, and a cone is attached to the back of the fan, with its apex toward the mouth, to facilitate the change of direction of the current. The peculiar features of the fan are its large mouth, nine feet in diameter, and the fact that it is not housed, but has a free delivery over its entire circumference. The power required to drive it is very small. When delivering 85,000 cubic feet per minute, and at an outside temperature of 60°, at which temperature all the load was on the fan, the indicated power was only 14 H. P.

Fig. 4.

The air is taken from the lawn side of the building, where the earth is clean and there is no decayed matter.

In regard to the heating, it was expected from the beginning that the cost of heating and the expense of operation would be very much greater for the new building than for the old, on account of the greater loss of heat due to thinner walls, greater window area, etc. A calculation showed that for temperatures inside and outside of 65° and 10° Fahrenheit, the loss would be over twice as great in the new building as in the old.

Moreover, the amount of air to be heated in the new building was to be twice as great as that indicated by calculation for the old; hence it had been estimated that as the old building alone had required 275 tons of coal yearly, the new building would require from 500 to 600 tons. The same amount of pipe was required as in the old building, for although twice as much heat was to be used in the new, yet the velocity of the air through the coils was greater; hence the steam would be condensed faster, and about the same area of pipe would answer. Such was found to be the case.

The whole matter of heating was put into the hands of Mr. F. Tudor, and most of the system was of his devising. The air is first heated by the main coils, and passed into the sub-basement heated to 50° or 60° Fahrenheit. This was done, instead of depending on small coils for each flue, for the sake of economy in concentrating the coils, and moreover, in order to have the basement warm, and to protect the water-pipes. On the other hand, the main coils heat the air *only* to 50° or 60°, because that is the mean temperature of the soil, and any greater heat would involve a loss in warming the soil and in evaporating its moisture.

The supplementary coils over which the air passes before entering the flues are located in the sub-basement, for economy of arrangement, to avoid the cutting of floors and walls, to obviate any danger of leakage and consequent staining of walls, and in order to place their manipulation entirely in the hands of the engineer.

The main coil is twelve feet high by twenty-two feet broad, and is in eleven sections, one of which contains only condensed water. It has one hundred and twenty square feet of opening. Its temperature is regulated by varying the pressure on the entire coil, or, when the outer temperature is above 32° Fahrenheit, by shutting off certain sections. Two doors may also be opened above, allowing the air to pass around the coil if necessary. The coil was placed in front of the fan in order to secure a large air-space beyond the fan, and that the heated air might be thoroughly mixed in passing through the fan. On the other hand, the arrangement involves a greater loss by radiation.

There is a supplementary coil at the foot of each flue, seventy-six in all, distributed along seven hundred feet of wall, and over a floor area of twelve thousand square feet. The area through the coil was intended to equal the total flue area. Pipes are used in making them up, so as not to contract the air space, instead of pin or Gill radiators. With them the air may be heated up to 110° Fahrenheit, if necessary. Their arrangement within the limited room available was very difficult, the steam main being below the boiler level, and the return below the tank for condensed water. It was also desirable to control the temperature of each coil by a single valve and to prevent steam pressure in the return, so that steam could not back up into coils which are not used or only partially used. To meet these difficulties, Mr. Tudor's fractional valve[1] was applied.

The theory of the valve action, as applied to this system, is based on the fact that a given coil surface will in a given air temperature and current condense a fixed amount of steam at atmospheric pressure. With a fixed position of this valve, and a fixed steam pressure, each coil will be just filled with steam and no more, none escaping at the open lower end, the rate of supply being just equal to the rate of condensation. In this sub-basement we have very constant conditions, the temperature being never above 60° Fahrenheit, the velocity of the air very constant, while the steam pressure is made constant by reducing valves, and cannot exceed ten pounds.

All the coils drain into an open pipe leading to a tank. The boilers and engines supplying steam and power are all in the old building,

[1] For description of this valve see *The Sanitary Engineer*, November 29, 1883, p. 616.

some one hundred and fifty feet away. The shallowness of the basement renders it necessary to run the valve-stem through the floor (Fig. 1).

Two boilers, of from sixty to eighty horse-power, furnish steam to the new building; but as they do other work also, the measurement of the coal burned under them does not show what is necessary to heat and ventilate the new building. To do this, the best way is to measure the water of condensation. A water-meter was first suggested, but trouble was anticipated on account of the water being hot. It was finally decided to pump the water from the tank into which all the returns lead by a Davidson pump, which serves as a water-meter, the number of strokes being measured. One of Mr. Tudor's employés, Mr. Kenway, had suggested an automatic recording device, giving the rate as well as the aggregate amount of condensation. The arrangement of this apparatus is shown in Figure 1. A cylinder, around which a sheet of paper is wound, is revolved by a twenty-four-hour clock, and a pencil is moved along this cylinder by the strokes of the pump, thus giving a very sensitive automatic record. Indeed, the curve traced (see Fig. 5) shows not only the time of letting the steam on and off, the time of starting the fan and of opening the cold-air windows, but also shows plainly the effect of a change of outside temperature during the day, and the sudden condensation in the cold pipes when steam is first admitted. This is shown by the rounding of the curve in the diagrams, about 6 or 7 A.M. Its most important office, however, is to give the quantity of condensed water, from which the necessary amount of coal may be calculated. By means of this apparatus, the amount of coal required for the new building has been studied and some very interesting results arrived at.

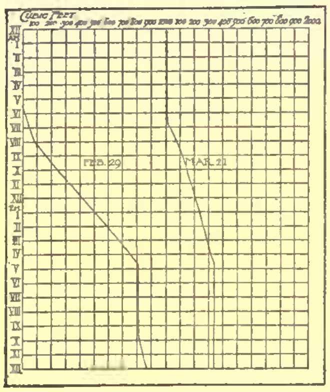


Fig. 5.

Referring to Figure 6, if we represent by horizontal distances the number of degrees the outside temperature is below that required, and by ordinates the number of degrees the outside air must be heated, we shall obtain a line (dotted) running at an angle of 45°. Thus with a required temperature of 65°, and the outside air at 30°, we have the vertical distance to the dotted line at 30, giving the number of degrees the outer air is to be heated, represented by 35. This would be exactly true were it not for losses through walls, windows, etc. Calculation from observed data shows that, whereas, were there no losses, the outer air would have to be heated 35°, the actual effect of the losses will be that the air must be heated half as much again, or 52.5°, to maintain the desired temperature. The upper line on the diagram is therefore plotted with its ordinates $\frac{3}{2}$ of those of the 45° line. In this diagram it happens accidentally that the quantity of air required is such that to heat it one degree requires one cubic foot of water per hour; hence the ordinates to the upper line represent cubic feet of water per hour, corresponding to the outside temperatures on the horizontal line. The circles enclose points plotted from recorded observations, and their agreement with the theoretical line is very close. The few cases of divergence have been satisfactorily explained by local circumstances. This shows the application of the apparatus described to the study of the cost of the heating and ventilation.

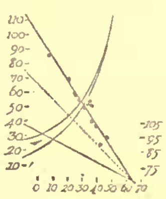


Fig. 6.

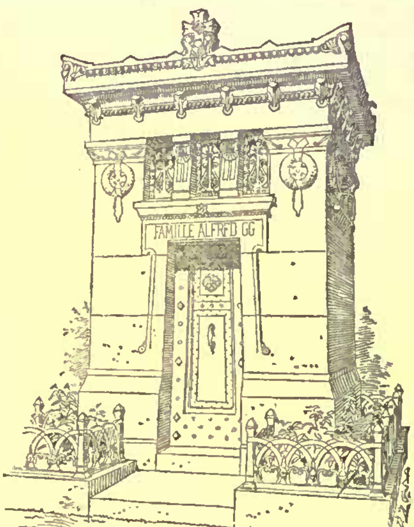
Taking the average temperatures outside and inside as 34° and 65°, Mr. Woodbridge had estimated that for six months (November to April) 373 tons of coal would be required for the new building. Experience had shown that about 275 tons would be needed for the old building, and it was estimated that 108 tons would be used for power and other work than heating, making 756 tons in all. The actual consumption was 950 tons, leaving 194 tons unaccounted for. The source of this loss will be studied into by means of the apparatus which has been explained, and it is hoped it may be discovered.

The actual results of the system are fully as satisfactory as were anticipated, and all difficulties which have appeared have been easy to remedy, with one exception, viz., as the heat is all indirect, and with air at a low temperature, there is not that accumulation of heat in the air and walls and ceiling that is found in rooms warmed by highly-heated air; and as soon as the steam is shut off the rooms are quickly chilled. This tendency is increased by the large window surface and the inevitable escape of warm air from the top stories of the building, and the corresponding indraft of cold air from the lower stories, especially at night, when the basement windows are closed.

In regard to moisture, Mr. Woodbridge thought a relative humidity of forty per cent at a temperature of 65° was sufficient, it being much easier to keep the air sweet when the relative humidity is low. Regarding the chemical composition of the air, Professor Nichols has found for Room 35 (capacity 27,000 cubic feet), after eighty or ninety students had occupied it for an hour, the following results; February 29, 4.3 parts carbonic acid in 10,000; March 5, 6.1, and March 11, 4.5 parts; and in room 38 (capacity 17,000 cubic feet), after thirty students had occupied it for three hours, 5.5 parts, or practically no contamination.

As a whole, the work is highly satisfactory, not because perfect, but because in so many respects it meets the wants it undertook to satisfy.

WORK AND WAGES.



TOMB, CEMETERY ST. BRICE-SOUS-FORÊT. PARIS.—M. VAUDREMER. ARCHT.

THE naming of a day early in the spring of 1886 for a convention of representatives of all the labor organizations in the country, whereat steps shall be taken to make the legal working-day in every part of the country no more and no less than eight hours makes it very desirable to expose the fallacy of the "eight-hour movement." As we have never seen it put in a more simple and understandable form than has lately been employed by the Boston *Herald*, we reproduce its arguments at length: —

WILTON, ME. September 29, 1884.

TO THE EDITOR OF THE HERALD, —

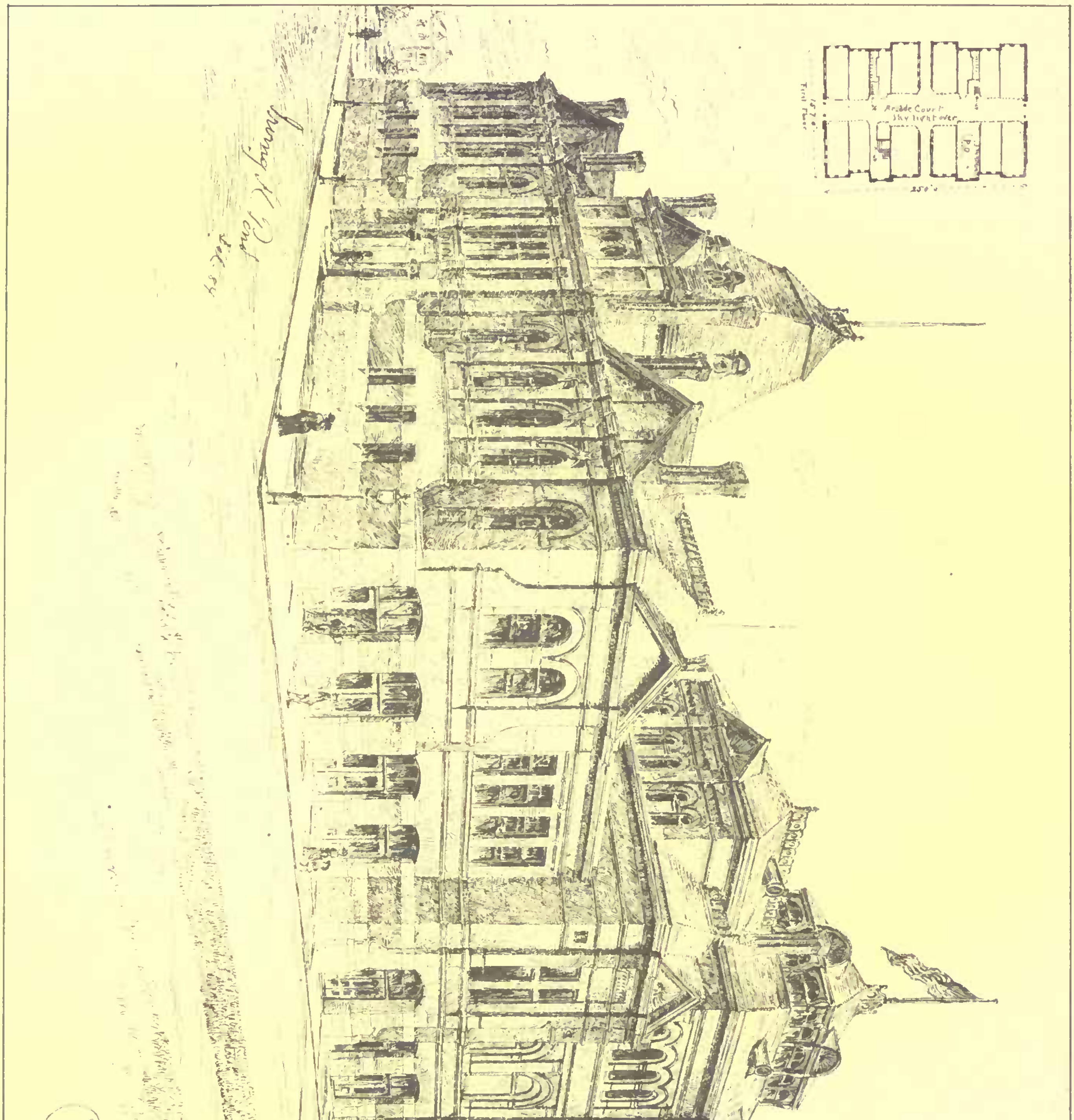
In conversation recently with a gentleman from New York, a contractor and builder, and an ardent disciple of B. F. Butler, he advocated the passage of a law making eight hours constitute a day's work. He urged that its adoption would be immediately followed by a rise in wages, because it would create a demand for twenty per cent more labor.

Now, I am confident this reasoning is incorrect, but I am unable to demonstrate its fallacy to my entire satisfaction, so I appeal to you to set me right.

If it will not trespass too largely upon your time and space, an answer through the columns of the *Herald* will greatly oblige,

F. A. R.

The fallacy conveyed in the above assumption is a common one, and runs through all legislation in this country on industrial subjects. Thus, if the assumption were correct that a rigidly applied eight-hour law would be immediately followed by a rise in wages, on account of the demand for twenty per cent more labor, then if work were restricted to two hours per day, there would be a still greater increase in wages on account of the demand for eighty per cent more labor, that is to say, the less time a laborer worked, the more money he would receive, and hence, with two hours toil out of the twenty-four, he would make very much more money than he now does by the steady strain of ten hours per day. This is a delightful theory, and for the good of humanity it is a great pity that in its practical execution certain obstacles are met with which seriously militate against its efficacy. If it were possible of application, the entire problem of procuring for human beings in this world a happy and contented existence would be at once solved. With plenty of time for study and recreation, even the commonest workingman could be both a student and gentleman of leisure, while the scale of pay would be so high as to place every one far beyond the possibility of want. But, as we have said above, there are one or two slight obstacles in the way. If under an eight-hour law but four-fifths, or under a two-hour law but one-fifth, of the wealth is produced that is now the result of ten hours' labor, then necessarily there would be only four-fifths, or one-fifth, of the amount to divide among the workers and the capitalists. As a man cannot by taking thought add one cubit to his stature, so the people of a country cannot by legislation produce any more wealth than their daily work enables them to produce. Wages are paid from the wealth which labor produces, and if this production is restricted then there must of necessity be a corresponding shrinkage in the rate of wages paid. If men could turn out as much in eight hours as they can in ten, then the rate of wages might be the same in either case; but not unless the results of work correspond. To give a broad example: — According to the census of 1880, there was produced that year in the United States wealth approximately amounting to $7,500,000,000. Of this, fully $6,500,000,000 worth of wealth, or $130 per individual, was used up during the year in supporting the life of the community, leaving a margin of saved or reserved wealth of not quite $1,000,000,000. Now, if the work of the entire community had been cut down twenty per cent in amount, we should have produced in the year $1,500,000,000 less of wealth. If we had continued our consumption at the same rate, not only should we have laid nothing aside, but we should have begun the year 1881 $500,000,000 worse off in wealth than we were when we began the previous year. On the other hand, if the united work of the community had produced wealth to the amount of $15,000,000,000, then there would have been very much more to divide among all classes of the community. The consumption of wealth would have



The Heliotype Printing Co. Boston.

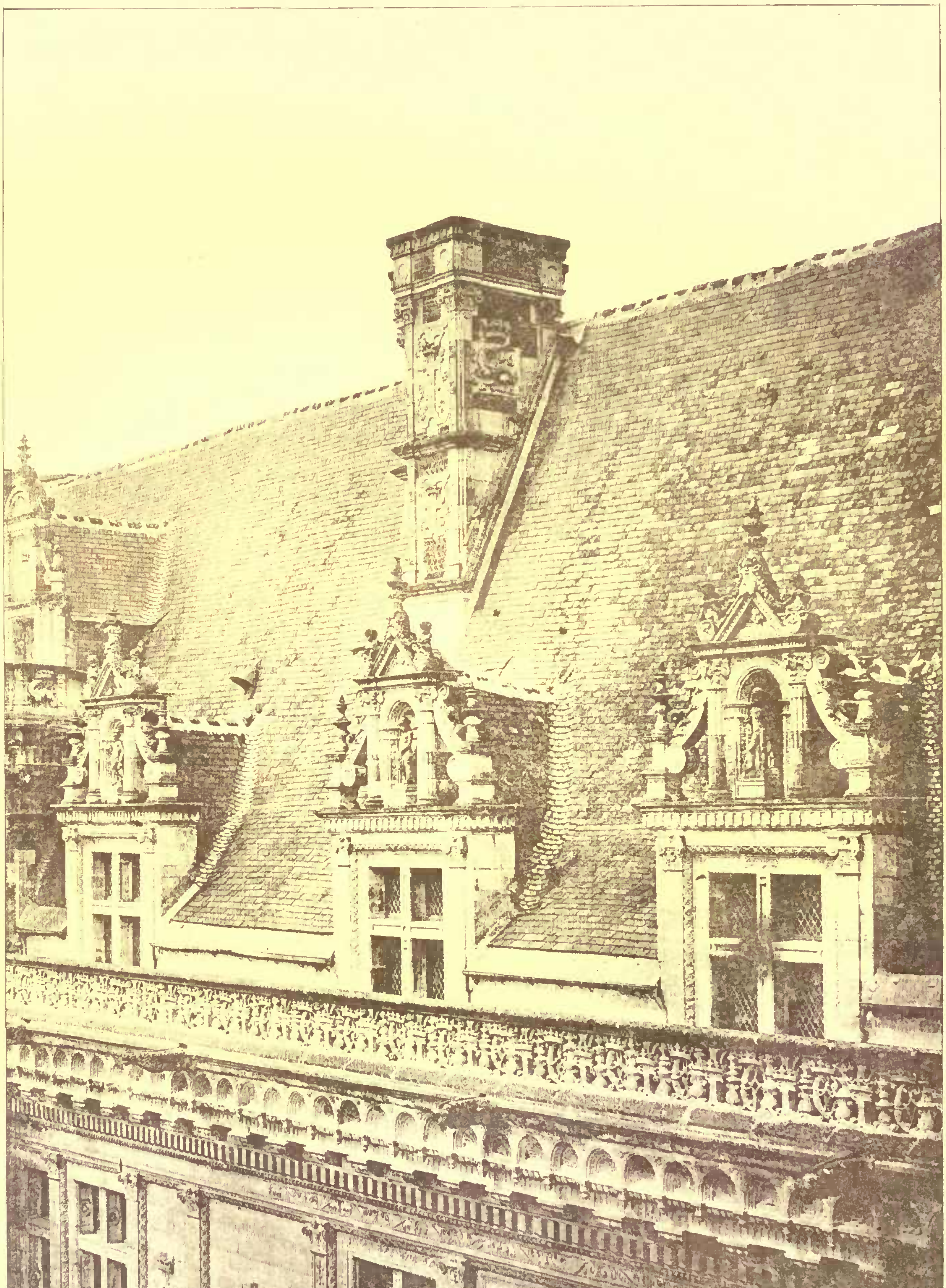


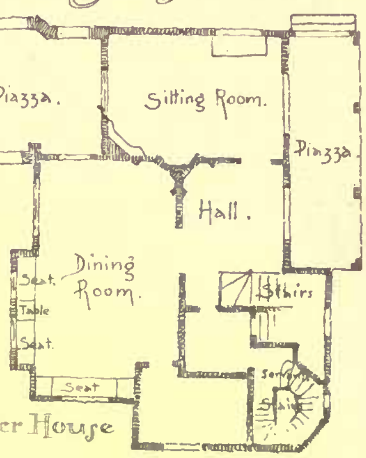
PHOTO CAUSTIC HELIOTYPE PRINTING CO. BOSTON

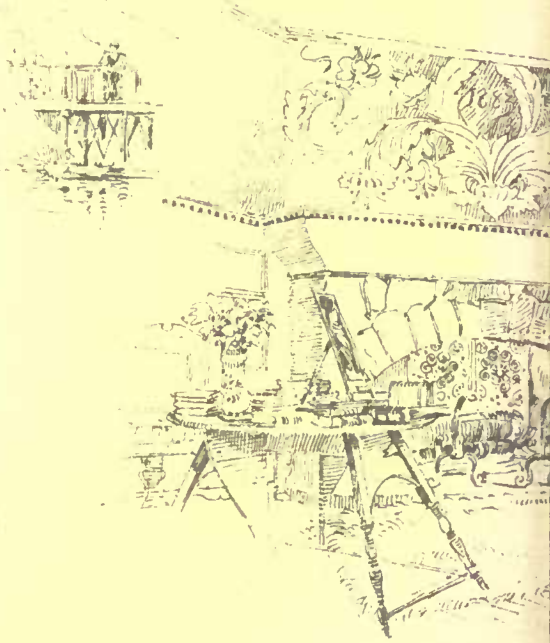
CHATEAU DE BLOIS, FRANCE.

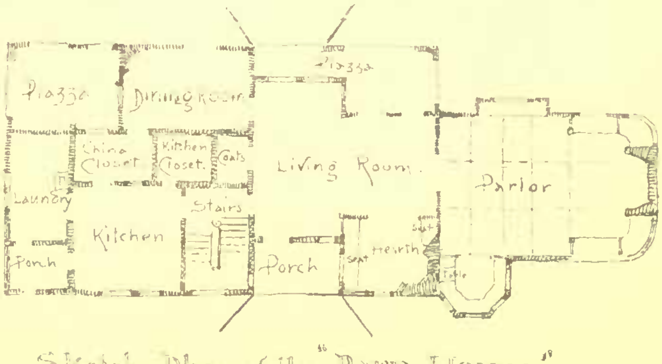
Pencil·Sketches

The River House

Sketch Plan of River House





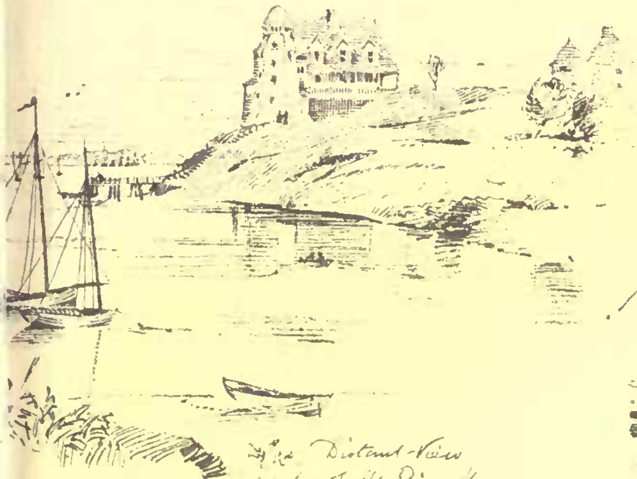


"Sketch · Plan · of the "Barn · House":

The Barn House E.E.D.

R. OSGOOD & CO

at Manchester-by-the-Sea: Mass: by E. Eldon: Deane:
he·River and The·Barn·Houses Mr·Arthur·Little·Archt. Boston:

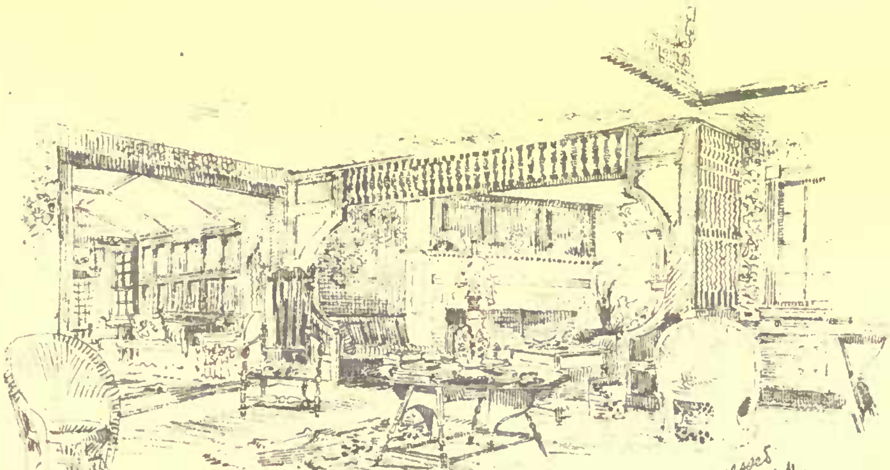


The Distant-View of the River House,

Back Gable & Octagon Turret of the River House.

ll Fireplace River House E.E.D.

E.E.D. Bay Window of Parlor. Barn House.

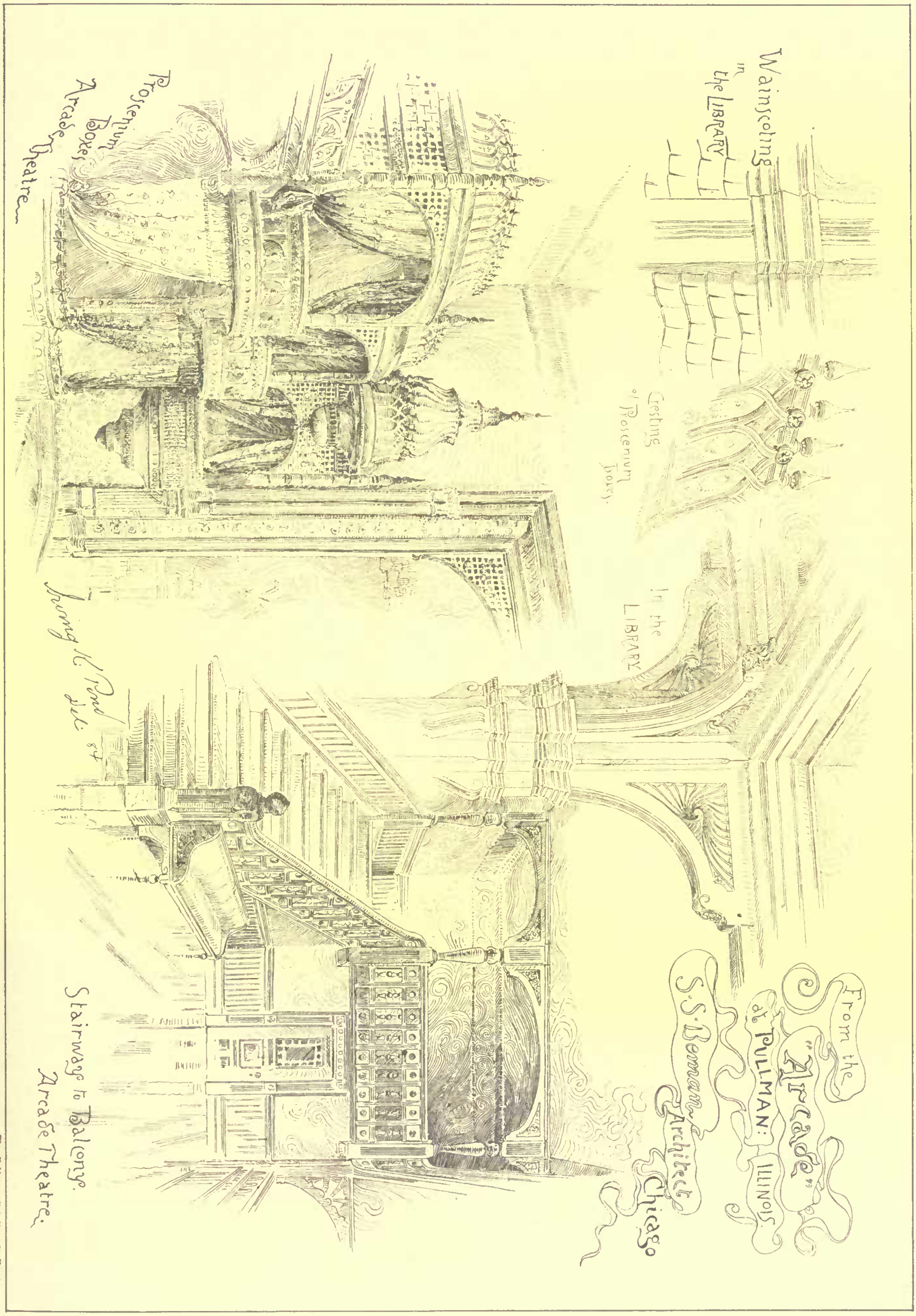


E.E.D. The Barn House Hall & recesses Fireplace - with peep into Parlor.

The Heliotype Printing Co. Boston.

PHOTO CAUSTIC HELIOTYPE PRINTING CO. BOSTON

Town Hall at Louvain, Belgium.



The Heliotype Printing Co. Boston.

been much greater, and yet the surplus revenue left over could have been considerably larger than it was. In short, where there is a large production there is of necessity large wages, where there is small production the wages are correspondingly low. So long as time remains an element in production, the longer that a man works, everything else being equal, the greater will be the amount of wealth he will produce, and the larger the amount of wages that can be paid him. In order that there may be no mistake, we would add that it frequently happens that a man can produce more wealth by the work of ten hours than by the work of twelve, fourteen or sixteen hours per day, for the reason that the strain upon his physical and mental powers by continued application makes it impossible for him to perform careful and effective service during these long periods of time.

In an issue of a later date, the *Herald* recurs to the topic as follows: —

A few days ago we attempted to answer a question, asked by a correspondent, to this effect: —"Would the rigid enforcement of an eight-hour law increase the rate of wages?" Our reply, in substance, was that it would not, and that, unless the same amount of work were done that is now accomplished in ten or more hours per day, the effect would be to reduce the rate of wages. Exception has been taken to this conclusion by certain newspapers that profess to be the special friends of the workingmen. They assert that our reasoning is colored by a desire to uphold the cause of the capitalists, and that we therefore willingly consent to the degradation of the wage-earners. Such assertions are no more correct than it would be to say that Providence was peculiarly favorable to the wealthy inhabitants of Naples in that it permitted the cholera to find the great mass of its victims among the poor and wretched of that city. What we enunciated was a law as inexorable in its workings as any natural law. We would as willingly as any of our critics put an end, if we could, to the old command that man should earn his bread by the sweat of his brow; but thus far neither human thought nor patience has discovered a means of abrogating it. But it is said, you do not say how much wealth goes to the workingmen and how much to the capitalists. Let us put the comparison in this way then: — According to the last census, there were in this country, in round numbers, 15,500,000 workingmen who earned on an average $350 per year, or a round total of $5,300,000,000. Now let us suppose that these all worked one-fifth less time, and that, according to the statement put forth, they then earned one-fifth more than these old wages. According to the census, the gross value of the wealth produced in the census year was less than $7,500,000,000. If one-fifth was subtracted from this it would leave it $6,000,000,000. Now, if one-fifth was added to the wages of the workingmen, it would give them $6,360,000,000, and thus they would get not only all that now goes to the capitalists, but they would not then have sufficient to pay full wages all around. It is sad that this should be so, but the sadness of the situation does not make it any the less inevitable. Because facts run counter to sentiment, no good end can be secured by abusing facts.

It is indeed unfortunate that many of those who are honestly striving to benefit the workingmen do not take into account the limitations under which all reforms must proceed. The social question, if we did but know it, is the great question of the age. He must be blind to the teachings of experience who does not see in the growing strength of Socialism in Europe the first clouds of a storm which will not stop at the Atlantic Ocean. To-day the workingman says: — In what way am I beholden to the capitalists? I get, indeed, by my work, food, clothing, and shelter for myself and my family; but if I were on a lone island or in the wilderness, the same work would bring to me substantially the same results. But if you, Mr. Capitalist, were deprived of my assistance, if you were isolated on a distant island, what would your wealth be worth to you? It is I and my associates who make your easy existence possible. We do everything for you; you do practically nothing for us. It is the feeling conveyed in the above words that is agitating the minds of millions of men in Europe, and that cannot fail later on to agitate millions of minds on this continent; and what is more, a solution, either peaceful or revolutionary, must be found to the problem thus presented. Certainly we cannot continue to go on indefinitely as we have gone, and the sooner the leaders of public opinion realize the perils involved in delay, the easier it will reach a satisfactory adjustment. But as we have said above, nothing can be gained by ignoring the inevitable. The only wealth that can be divided, by any conceivable system, is the wealth which labor creates, and any plan which proposes to do more than this may be set down as visionary, and any man who advocates such a plan is either self-deceived, or is a wilful deceiver of his fellow-men.

THE ILLUSTRATIONS.

THE ARCADE BUILDING, PULLMAN, ILL. MR. S. S. BEMAN, ARCHITECT, CHICAGO, ILL.

THE building might be briefly described as being 250 feet long, and 157 feet wide. Its cost complete was $325,000. Materials, pressed-brick, terra-cotta, and buff Amherst stone. The lower story is trimmed with this stone, disposed in broad masses; the base being six feet high, and quarry faced.

The ground-floor contains all the stores of the town some fifteen in number, each about 60′ x 26′, all fronting on an interior paved thoroughfare or court, well lighted by a skylight 35 feet wide, and 200 feet long. The interior walls on the court are of pressed-brick.

In the second story are the various town offices, and general business offices of the place, besides various small stores. The Public Library, reading-rooms, and general club-rooms, all of which are approached by a gallery running around the entire court; the sides being connected near the centre by bridges. The theatre has sittings for 1000 persons. There are six proscenium-boxes, a large and thoroughly-appointed stage, and five dressing-rooms.

The cost of fitting up the theatre, including decorations, furnishings, scenery, etc., was $42,000.

The third-story portion of the building is used for lodge-rooms of various orders.

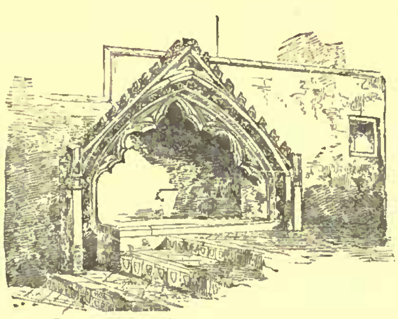
THE HOTEL DE VILLE, LOUVAIN, BELGIUM.

THIS building, which has an evident right to be styled "the most elaborately decorated piece of Gothic architecture in existence," was begun by Matthew de Layens in 1448, and finished after fifteen years' labor. In the course of four centuries the elaborate sculptural detail had suffered greatly, and the building was surrendered, in 1842, to M. Goyers, who restored the entire building with the greatest fidelity to the indications of the original work.

DETAIL FROM THE CHATEAU DE BLOIS.

HOUSES AT MANCHESTER-BY-THE-SEA, MASS. MR. ARTHUR LITTLE, ARCHITECT, BOSTON, MASS.

AN ART YEAR-BOOK.[1]


Monument and Aumbrye: Bredon Ch: Eng.

THE most costly example of co-operative advertising — in disguise, — that we have ever seen, has been issued by the New England Institute, in a form which we cannot describe with exactness, because we cannot fully comprehend its purpose. In the first place it seems to aim at being a *perfect* example of book-making; next, we should guess its object was to exhibit and advertise the various reproductive processes employed in the illustration of books; after this its apparent excuse for being, is that it is a catalogue of some exhibition containing works of art — inferentially the current Exhibition of the New England Institute in Boston; next, it has an air of being a summary, more or less valuable, of various exhibitions of pictures held during the last year; and lastly and overpoweringly a grand glorification and "beslobberation" — to coin a word — of every person or thing which has the fortune to be mentioned within its covers. It strikes us that except in the last particular it does not quite arrive at the pinnacle of perfection that the projectors had in view.

And yet, take it apart, and then consider the sheets as possible components of some other and less pretentious compilation and much will be found worthy of commendation, particularly amongst the illustrations.

As an instance of book-making the work has one merit, and its projectors have had one "happy thought." It was a veritable inspiration to issue the work in a modest cloth-lined paper wrapper, of which the ostensible purpose is to protect the vellum binding of the book itself, but which discharges the more gracious task of concealing this same vellum cover, than which we never saw a more ghastly sacrilege perpetrated in the name of high art. It is merely a minor mistake that one of the things this work was to exhibit was the several kinds and qualities of paper that may be used in fine books. It gives the book a fragmentary air and suggests, more than anything, the back portion of some English magazines, amongst whose advertising pages are bound up all sorts and sizes and colors of trade-circulars. Moreover it gives most acute emphasis to the remark in the Introduction that the chief difficulty in making such a book "is that of bringing heterogeneous material, into cohesive form, unity of effect being a most desirable quality of all well-made books." We take the privilege of remarking here that the only cohesiveness we can discover about the book is due to the binders' stitches. As a matter of book-making, too, we think that, considering the rough, hand-made paper with its rough edges, and the general air of archaism that has been aimed at in the head and tail pieces, title-page, etc., that it is a distinct mistake to have used type of aggressively modern cut. One would have certainly found the old-fashioned "ſ" not amiss, though he has much to be grateful for in that he is spared the offensive use of the much-abused "ye." On the other hand the printing of the brief introductory "History" of the Institute on pages upon which artotypes had previously been printed has an air *tout à fait joli* — it is well to speak of this feature in French, since it is a copy of a well-worn French trick. Another pretty conceit is the adornment of the

[1] *Art Year-Book*, 1884. Prepared and published by the New England Institute, Boston, Mass. U. S. A.

margins of the "Descriptive and Biographic Notes," with pretty little outline sketches after the manner of "re-mark" etchings.

As a scheme to show what the various reproductive processes of illustration are capable of producing, the attempt is more successful, and there are some very excellent examples, as, for instance, Whitney's engraving of Kenyon Cox's drawing of the statue of Robert Richard Randall, by St. Gaudens, which was published a short time ago in the *Century.* But it seems to us that the possibilities in this direction have not been exhausted; even plain lithography and photo-lithography have no representations.

How far it is a satisfactory catalogue of the exhibition of pictures at the Exhibition of the New England Institute we cannot guess, since we have not visited the gallery there; but if the compiler is as inaccurate in his facts as he has been slip-shod in his proof-reading, this part of the text is no unworthy companion for the text of the "Notes." Here it is that our discontent is turned to disgust. One could find excuse for occasional lapses from good-taste, for infrequent inelegancies of expression or sporadic instances of faulty English, and for mistaken punctuation or downright bad spelling, but when we find that twenty pages are taken up with fulsome flattery and gush, ill-expressed, and in imperfect English, when every person or thing mentioned is heralded by laudatory adjectives and superlatives of every degree of intensity one becomes sated with disgust. As but a sample of the style of blundering adulation we will quote a single example, since it concerns an architect, who is, we believe, a most modest and unassuming man, one to whom we will not do the injury of repeating here his name.

"——— ——— ——— The admirably chaste, and thoughtful initial head-band and tail-piece used to adorn the sub-title-page to Examples of Graphic Processes is by this designer, an architect by profession. Among his notable works may be mentioned the design of the bound volume of the Century Magazine. To a highly original style of work Mr. ——— adds the impress of a most refined imagination and skill."

O, most "refined" and skilful designer of "admirably chaste" tail-pieces, does it flatter you to have it proclaimed that your most "notable" work — presumably "thoughtful" too — is a "bound volume" of the *Century?* Have you, too, gone in for the manufacture of *perfect* specimens of book-making? and how does one set about designing a "bound volume?"

For the credit of womankind, we trust that only men were responsible for this mistaken publication — mistaken in conception, in purpose, in execution — and unfortunate beyond expression in being entrusted to the hands that have spent so much money to so little good purpose.

If, as is frequently proclaimed in different parts of the book, the policy of the New England Institute is "generally progressive," we will suggest that it can give no better evidence of its right to be so described, than by making the utmost haste to remove itself from all temptation to repeat next year what it has attempted this.

We note two facts with complacency, the edition is a small one, *and the plates have been destroyed.*

A METHOD OF SINKING THROUGH QUICKSAND BY ARTIFICIAL FREEZING.

Grande Frise du Louvre: Paris

AT the monthly meeting of the South Staffordshire and East Worcestershire Institute of Mining Engineers, held at Dudley, Mr. Henry Johnson, Sr., in the chair, Mr. Herbert W. Hughes, A. R. S. M., read a paper on this subject. He said: Mining engineers are generally interested in the question of traversing very water-bearing ground. It frequently happens that valuable seams are overlain by ground of this kind, and it has to be sunk through before they can be reached. In carrying a sinking through beds of quicksand or loam saturated with water, an enormous pressure develops itself against the timber set to support the sides of the excavation, since the cohesion between the particles of the rock is very small. A necessity for strong timbering therefore arises, but this excessive pressure is not the only difficulty to overcome, when, as in quicksands, the spaces or voids between the particles are filled with water, the cohesion between the grains of sand is destroyed, the film of water surrounding each grain, and the floating action of the fluid present in the interstices preventing friction. Hence it happens that if an opening is given to the fluid, the grains pass out with it, and it then becomes more easy to excavate than to prevent the formation of irregular empty spaces, which would give rise to intense unequally distributed pressures, which are difficult and sometimes impossible to resist. This fluid character of the sand constitutes a very great difficulty in sinking, because the issue of the sand into the excavation occasions the falling in of the sides and surface. When the water among the sand is under great pressure, the difficulty is enormous, and in some cases insurmountable. Thus at a sinking recently undertaken at a Belgian coal field, a quicksand was encountered at a considerable depth from the surface, after passing through the overlying beds without difficulty. As soon as this bed was struck the fluid mass of sand and water rose so rapidly in the shaft that the sinkers had hardly time to escape. After contending with this eruption for a long time without success, the sinking was finally abandoned. Numerous other examples might be given, especially in the North Eastern coal district of England, and in the Ruhr and Mons basins; some were successfully completed, though at enormous cost. Sinking through such strata is the most costly and uncertain among mining operations, and therefore a new method, which has already proved useful in a severe case, is a boon to mining industry, and seems to be applicable in a certain number of special cases.

The result is obtained by artificially freezing the ground in question, and after it is frozen one finds a solid mass, which can easily be cut with the pick, and presents no especial difficulty in its removal. This process, invented by Herr Poetsch, was described in 1883 in the "*Bulletin de l'Union des Ingénieurs des Ecoles de Louvain.*" The author of the note, M. André Dumont, says that the first idea was given some years ago by M. Lambert, in his lectures on mining at Louvain. This might be so, but there is no doubt that the credit of bringing the process into practical use belongs to Herr Poetsch, under whose direction the manner of proceeding has been successively practised in the sinking of the Archibald shaft, near Schneidlinger, in order to work the lignite there. After sinking a little over thirty-seven yards without difficulty, the shaft reached a wet quicksand, which was proved by boring to be eighteen feet thick, the lignite being below this bed. The shaft was a rectangular one, fifteen feet six inches long, and eleven feet six inches wide. Around the circumference of the shaft a series of holes were sunk by means of a sand-pump; being tubed as they go down, and finally one was put down in its centre. There were twenty-three of these pipes of seven-and-three-fourths inches in diameter. When these tubes had penetrated through the quicksand, their lower ends were made water-tight by means of lead stoppers, these latter being covered with several layers of cement and tar poured into the interior. Into the centre of each of these larger pipes a smaller tube of two-and-one-quarter inches diameter was introduced, having its lower end open; and also with side openings pointing towards the bottom. These latter pipes are provided with stop-cocks, and joined to a circular distributing pipe suspended above the bottom of the shaft. Down this a freezing mixture is pumped, and circulates in the annular space between the two tubes; by this means the ground between each pipe, then that within the shaft itself, and also the ground outside the limit of the shaft is frozen hard enough to give it solidity. The freezing mixture used was a concentrated solution of the chlorides of calcium and magnesium, which freezes at a temperature of 45° C. In sinking the Archibald shaft the solution, cooled to a temperature of 25° C., by a manner described farther on, was forced by means of a pump into the pipes of two-and-one-fourth inches diameter, and ascended in the annular space between these pipes and those of seven-and-three-fourths inches diameter, rose to the surface of the quicksand, and was collected in a trough from whence it again returned to the freezing machine at a temperature of 19° C. This low temperature on returning was not expected, and consequently the ground was soon frozen: of course the most intense cold was at the bottom of the pipes. As a result of this, small cones of frozen earth, with their bases downwards, were first formed, the dimensions of which increase progressively; they cross one another and unite, forming ultimately a compact mass, the solidity increasing with the depth.

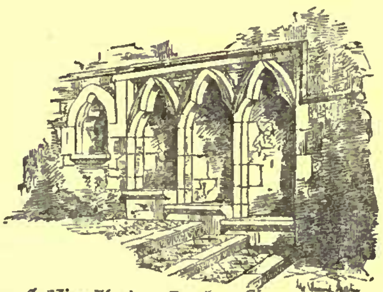
At the Archibald sinking, a mass of ground twenty-four feet wide, twenty-seven feet long, and eighteen feet thick, was frozen into a solid mass in thirty days. In order to determine how the freezing progressed, pipes containing a solution of chloride of calcium were put into the ground and thermometers immersed in them. In this manner it was possible to estimate the reduction in temperature during twenty-four hours. The total reduction was 30° C., viz.: from an initial temperature of + 11° C. to a final temperature of — 19° C. We may, however, presume with certainty that a lower temperature was reached, because these observations could only be made in the upper part of the quicksand. Horizontal measurements proved that the freezing extended outwards from the pipes for a distance of ten feet. After thirty days the workmen could proceed with the sinking; the mass of frozen sand and water possessed a hardness which allowed it to be easily cut with the pick; its fracture, as may be supposed, was conchoidal. During the sinking of the shaft the workmen were protected from an influx of quicksand by the frozen wall of ice around the dimensions of the shaft, this wall being able to withstand enormous pressure.

The manner of freezing the solution at the Archibald sinking was based on Carri's principle, the necessary machinery to carry it out being designed by Herr Kropf, of Nordhausen. It depends on the property of fluids absorbing a large quantity of heat when passing from the liquid into the gaseous state. The fluid used was liquid ammonia, which boils at 0° C., under a pressure of three-and-a-half atmospheres, and at 20° C., under a pressure of 0.84 atmospheres. That is to say, ammonia, in passing from the liquid into the gaseous state, under a pressure of 0.84 atmospheres, reduces the temperature to 20° C. In a large boiler, placed in a convenient position, an aqueous solution of ammonia is boiled. The gas enters a condenser cooled with water, and is there submitted to a pressure of from ten to twelve atmospheres. At this pressure the gas liquefies, and is then conducted into a reservoir fitted with an indicator showing the height of the fluid in it. From this reservoir the liquid ammonia passes by a pipe into a spiral-shaped tube, where it once more volatilizes, and by so doing abstracts heat from the mixture of the chlorides of calcium and magnesium which surround the tube. The construction and working of the machine cannot be entered into here. Designs and full description will be found in the before-mentioned memoir by M. Dumont. The principle only is given. Further trials will no doubt confirm the favorable opinion already obtained by this ingenious process.

When Herr Poetsch first introduced this process he recommended the following arrangement of the pipes in the quicksand: Just before reaching the quicksand the shaft should be widened out for a few feet over its proper dimensions. A row of pipes about three feet apart, should then be placed around the shaft, slightly outside its area, another row should be placed inside the area of the shaft, and finally one should be placed in its centre. This arrangement has never been carried out, as, owing to the prejudice of engineers, every other method of sinking through quicksand has been tried before recourse has been made to this one. This was the case with the Archibald sinking, and if Poetsch's method had failed, the undertaking would have had to be abandoned. It would be useful to know the cost of sinking by this manner, in order to compare it with the methods used till now in this class of undertaking, viz., sinking through quicksand. We, unfortunately, do not know to what extent the workman's health is affected by operations carried on in such a low temperature, but in the above example no evil effects occurred which were perceptible. Such a process at first sight appears incredible, and it would be a bold step to apply it to a sinking where a thick bed had to be pierced, but it cannot be denied that for short distances it has proved eminently satisfactory.

In concluding, I may remark that there is also the question of what material the lining of the shaft should consist of. At such low temperatures brickwork could not be used; if it was it would immediately give way when the normal temperature was again reached. Even with wood tubing, the water in its pores would freeze and reduce its strength in a marked degree. The method adopted at the Archibald shaft was to first case the shaft with well-dried wood, and then, when the temperature of the surrounding strata had reached its natural condition, build up a coating of brickwork inside it.

COPPER ROOFS.


Sedilia & Piscina: Bredon: Ch: Eng:

IN a recent issue of the *Mining Gazette*, an article appears on the subject of new channels for copper, the purpose evidently being to find new demands for that material, which at present is at a very low price. The idea of introducing copper as a roofing material seems to give the writer of the article great satisfaction, and he dwells upon this topic in the following terms: —

No person erecting a building of any value, whether intended for a residence or place of business, if his attention is properly called to the matter, would hesitate to cover it with the best roofing material, provided the cost would not be too great. That copper sheathing excels all other roofing substances in economy, when its duration and absence of expense for keeping it in repair, and value for old metal when it has served its purpose, are considered, admits of no doubt. Buildings can be found in this country the roofs of which were covered with copper over one hundred years ago that are in as good condition to-day as when first put down. After copper sheathing is once in place it requires no repairing or safety covering, like slate, tin, iron or shingles, while no reasonable limit can be placed to its lastingness. In Europe copper roofs can be found that were put on over five hundred years ago. It is not our purpose to amplify this subject; our aim is simply to call attention to the matter for the purpose of invoking a practical discussion of the topic, which, if intelligently carried on, must in time result in the introduction of copper sheathing for roofing purposes. As an aid in this direction we give below a table showing the cost per one hundred square feet for covering a building with copper sheathing, with sheets running from ten ounces to the square foot up to sixteen ounces to the square foot, on a basis of raw copper at fourteen cents a pound, and allowing three cents a pound for rolling it; also a table exhibiting the thickness of the different weights of sheets: —

Ingot copper	$.14	$ .17
Cost of manufacturing	.03	
100 superficial feet of 10-ounce copper, 62½ pounds, cost		10.62
100 superficial feet of 12-ounce copper, 75 pounds, cost		12.75
100 superficial feet of 14-ounce copper, 87½ pounds, cost		14.87
100 superficial feet of 16-ounce copper, 100 pouuds, cost		17.00

THICKNESS OF COPPER.

10-ounce copper,	73 6-10	inches thick	28 wire gauge
12 " "	61 4-12	" "	27 " "
14 " "	52 8-14	" "	26 " "
16 " "	46	" "	25 " "

The *Metal-Worker*, commenting on the above, calls attention to several facts which, it assumes, the writer overlooked. Starting with ingot copper at fourteen cents, with the cost of manufacturing into sheathing at three cents per pound, estimates are made of the cost of copper for roofing purposes without taking into account transportation or the profits demanded by the jobbing trade. Taking these figures, however, as they appear, there is still a wide difference in cost between a copper roof and one made of some of those materials with which copper must inevitably come into competition. Copper of No. 28 wire gauge, weighing ten ounces per square foot, is shown to cost ten dollars and sixty-two cents a square; or, in other words, about four times the price of I. C. terne roofing-plates, at present market rates. We have no argument with the writer on the question of the durability of copper roofs or the appropriateness of copper for roofing purposes. On the other hand, we would be very glad to see copper very generally employed as a roofing material, for the greatest reproach to modern American buildings is that they are inadequately covered. To introduce copper, however, as popular roofing material, something more than an array of misleading figures, as given in the above statement, is necessary. However desirable copper may be for roofing purposes, there is a necessity of still lower prices of the raw material, or else a change of public sentiment with reference to the cost of buildings, in order to very largely increase the consumption in this direction. It is a fact, however, that the consumption of copper for building purposes is gradually on the increase. We have before now directed attention to its use for gutters, finials, crestings, etc., and the demand for it in this direction is growing. It might be still further stimulated to advantage, and we suggest that manufacturers of copper who have surplus stocks will do well to look in this direction. Copper cornices would be far better than galvanized-iron work for the same purpose, and copper can be worked much finer than is possible with even the best galvanized-iron.

THE MANUFACTURE OF LEAD.


Sedilia & Piscina: St. Mary's Ch: North Walsham: Engd

THE firm of Joseph Walker, Parker & Co., has works at Chester, Newcastle, Liverpool, Glasgow, Bagillt, and London, most of which are establishments sufficient in themselves to constitute a fairly important business. The Bagillt works are situated in North Wales, on the estuary of the Dee, and about seventeen miles from Chester, on the Chester and Holyhead Railway. Here the first processes of procuring lead from the ore are carried on by means of smelting in ordinary reverberatory furnaces after the manner usually followed in North Wales. There is at these works a flue of rather larger size than is usually met with. It is somewhat under two miles in length, and is arranged in a continuous spiral on a conveniently elevated plateau at the back of the works. It is built of brick in the ordinary way, and is of oval section, seven feet high, and six feet across in a horizontal direction. Into this flue are led all waste furnace gases which have been brought in contact with metal in process of reduction. The flue-dust which is carried over with the smoke and products of combustion is deposited during its passage through the long winding flue. The latter, at stated intervals, is flushed by water when the flue-dust is carried through, and is collected by allowing it to settle in large ponds made for the purpose. The sediment so obtained contains fifty-five to sixty per cent of lead. This, under the old system, would have been impartially distributed over the adjoining land to the complete destruction of any crops that might have attempted to grow in the immediate neighborhood. At the present time such vegetation as is to be seen is as green and pleasant as it can be expected to be within a short distance of a manufacturing centre. The large flue naturally occupies a great deal of land which is, perhaps, not an object of great importance at Bagillt. The principal difficulty in an arrangement of this nature is to get the dust to settle without at the same time sacrificing the draught required for the furnaces. At these works there is a chimney over 250 feet high, and 12 feet in diameter, and the additional height required to compensate for so long a flue must be considerable. We do not know whether there is any special reason why the necessary space required for the settlement of the flue-dust should not take the form of large chambers. These would occupy far less ground, whilst the rapidity with which the fumes would travel would be far less. Naturally in a flue which has the same sectional area throughout the gases will travel at approximately the same speed, and it is this speed which delays the deposition of the suspended particles of dust. Possibly, too, if chambers were used a better means of abstracting the flue-dust than the somewhat primitive one of flushing by water might be devised.

The furnaces used for smelting lead are generally about 20 feet long and about 10 feet wide. There are doors on each side, and the hearth is made up of slag. About a ton of ore with 2 cwt. of flue-dust is the usual charge of Bagillt. The reduction is by air, the furnaces in which ordinary coal slack is burned, being placed at the sides and delivering the flames above the charge on the hearth. As the metal forms during the process, at which time the charge is well worked by hand, it flows toward the tap-hole, and ultimately runs out and is cast into pigs. About ten per cent of the metal remains in the slags left after the first working. In order to recover as much of this as possible the slag is worked up again, and in this way a hard, inferior description of lead is obtained. There is an exceedingly well-arranged desilverizing plant for the zinc process at Bagillt, which has recently been erected under the superintendence of Mr. W. M. Hutchings, the manager. The melting-pots are six feet five inches in diameter. This plant is capable of producing over 600 tons of lead per week, whilst the annual output of silver at these works is about 13 tons a year. Litharge and red lead are also made in large quantities at these works. Red lead is, as is well-known, an oxide of lead. The first process of manufacture is carried on in "drossing-ovens," of which there is a large number at Bagillt. These are of the ordinary bee-hive form, with a rather high dome in which the smoke and gases from the furnace collect until they pass out at the working door, and are carried off by an uptake conveniently placed. The pigs of lead are melted on the floor of these ovens, the molten metal being kept from running out by a dam composed of the refuse from the last working. Antimony is introduced into the bath, and the whole is kept agitated by hand-rakes. In process of time, — about six hours, — the greater part of the lead has become oxidized, and the remainder is allowed to run away to be recast and used again. The "dross" is left in the oven and kept at a high temperature, and is then ground and levigated, after which it is subjected to further oxidation in other o.ens, in order to improve the color. After a further process of levigation and grinding the material only requires drying in stoves in order to become the red lead of commerce.

Sheet lead is rolled at these works, there being a rolling-mill capable of producing sheets up to 100 inches wide. A pair of cast-iron rollers, 23 inches in diameter, are mounted in cast-iron standards, and have a long bench with loose rollers on each side for working the sheets upon. There are also a couple of live rollers, worked by spur gearing, close to the mill on each side for the purpose of feeding-up the sheets. The rolls are driven by a separate engine, and the reversing is effected by a clutch gearing on to the bottom roller, which is the driven one, the top roller running loose in its bearings. When a sheet has to be rolled a slab of metal is cast, and a piece of the necessary weight, according to the gauge and area of the sheet required, is cut off. This is passed through the rolls whilst quite hot, and is gradually reduced in thickness and extended in area as the operation proceeds, until finally it becomes the familiar sheet-lead which is used for such a large variety of purposes. At each pass the top roll is brought closer to the other, its journals and their bearings being lowered in the framing by suitable hand gearing.

At the Chester Works of this firm white-lead making, pipe-drawing, and shot-making are the principal occupation. The shot are dropped from a tower in the ordinary way. The globule of molten lead assumes its spherical form as soon as it leaves the perforated tray, known technically as a card, through which it is allowed to percolate, and hardens during its descent, when it is finally caught in vats containing water, in order to prevent injury through falling from so great a height on to any hard substance. Larger shots are cast in moulds. At the Chester Works there is a large plant for drawing lead-pipe, consisting of several hydraulic presses, and the necessary gear for working them.

A press for making a solid drawn lead-pipe consists first of an hydraulic ram and cylinder, the former pressing upwards in a vertical line. On the upper part of the press there is a cylindrical vessel with which molten lead is poured and a die of the same diameter as the pipe to be drawn is then firmly wedged into the upper part of this cylinder. An iron core of smaller diameter than the hole in the die is placed concentrically to the latter, and an annular space is thus obtained, through which the lead is forced by means of the head of a ram which fits the bottom of the cylinder containing the lead. It will be manifest that the outer diameter of the pipe is regulated by the diameter of the die, whilst the thickness of metal is dependent on the size of the core. In order that the lead which comes in contact with the walls of the cylinder may not be chilled when it is first poured in, small fires are made up in receptacles provided for the purpose, or, in the case of larger presses, the cylinder is bodily heated by being placed in a gas-heated chamber. Considerable judgment is required on the part of the operator in determining when the lead is at the right temperature for the purpose. Should it be too soft it will run out in a shapeless mass, whilst if allowed to set too hard it will not work at all. A pressure of about 2,200 lbs. is obtained in the hydraulic cylinder for the smaller presses, whilst those used for producing heavier pipe work up to 6,000 lbs. to the square inch. Pure tin pipes are made in the same way, whilst tinned pipe of lead is produced by pouring a small quantity of molten tin into a hollow formed on the upper part of the die, and also by pouring a small quantity into the first few inches of pipe made as it emerges upwards from the die. This tin remains molten for a considerable time, and deposits a thin layer on both the outside and inside of the leaden pipe as it is formed.

Solid round lead is formed in the same way as the leaden pipe, the only alteration in the process being the omission of the core.

Lengths of lead of any required section, such as calm lead for glazing, can be drawn in these presses, dies of various descriptions being provided for the purpose.

Water-pipes of all standard sizes are here made as stock articles, ranging between $\frac{3}{8}$ inch-pipe, from $3\frac{1}{2}$ lbs. to $5\frac{1}{2}$ lbs. per yard, up to 6-inch barrelling up to 84 lbs. per yard. Lead and composition gas-pipe is drawn from $\frac{1}{4}$-inch diameter up to $1\frac{1}{2}$-inch diameter. A special gas-pipe, of $\frac{3}{32}$ inch diameter, is drawn for using in glass chandeliers.

White-lead is made at Chester by the ordinary stack process, in which thin castings or "crates" are subject for several weeks to the corroding influence of the fumes of acetic acid, damp bark being used to generate the required heat. The product is carbonate of lead, which, having been washed and dried in a stove, becomes the dry white-lead of commerce. Messrs. Walker, Parker & Co., also grind large quantities of white-lead in oil, having several mills of the ordinary description, and a roller-mill of ingenious construction for the purpose. The acetic acid used for the production of lead is made on the premises, and there are also appliances for boiling and refining the oil used in grinding the lead into paint. — *The Builder.*

ARCHITECTS' LIENS.

Williamsport, Pa., October 14, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Can an architect collect by "*lien*" compensation for drawings and superintendence for the construction of a dwelling built in the United States? Yours, etc., A. S. Wagner.

[The precedents vary in different States. In New York it has been decided that the lien laws are not intended for the benefit of architects, but in one or two other States, where cases have occurred, a different decision has been given. — Eds. American Architect.]

ADVICE TO A STUDENT.

Lebanon, Pa., October 17, 1884.

To the Editors of the American Architect: —

Gentlemen, — As I see you answer correspondents in the *American Architect*, which I have been getting from our news agent for some time past, I venture to ask a little advice and trust to your kindness for a reply.

I have been working with an architect for more than two years, and have a very good knowledge of construction and detail, and can make drawings very neatly; I have also done some designing with good success; but as this place is small and we get mostly small buildings to make, I would like to find a place where I could advance into a higher sphere, and learn more about the practical parts of architecture, such as stability, harmony, etc. My employer thinks I should get such a place, as he cannot advance me in this place. I have no means by which to go to a school, but think I could study the theory, etc., between times, as I have passed through our common and high schools, and have a good knowledge of mathematics.

What would you advise me to do under the circumstances, and where do you think I could get a good place? Student.

[No place is too small to do good work in, and if "Student" will distinguish himself by the beautiful houses or barns which be builds in his native village, his talents will surely be appreciated in time. As to the probability of his being able at present to secure a good place in a larger town, we can say nothing, not having any knowledge of his qualifications, but it should be remembered by every student and draughtsman that a first-rate assistant, who can be relied upon to draw well, design well, write perfect specifications, and supervise work efficiently is always sure of a position, while those less thoroughly qualified must take their chances. "Student's" idea that he can study architecture "between times" is, we are afraid, somewhat delusive. He can do so, it is true, but it is a long way of learning, and not an economical one. — Eds. American Architect.]

NOTES AND CLIPPINGS.

A Tidal Motor. — Mr. Copeland, of Brockton, Mass., has nearly completed the machinery which is being placed under the Union Fish Company's wharf, Provincetown, Mass., by which the rise and fall of the tide is to be the motive power. The work is only experimental, but everything is successful thus far. The apparatus consists of a float gliding up and down on studding, which turns a wheel, making only four revolutions a tide. This wheel is connected by means of shafts and belts to a series of other wheels, and in such a way that the terminal wheel makes 240 revolutions per minute. — *New York Evening Post.*

An Extinct New Jersey Volcano. — The Orange Mountains have always been considered one of the redeeming features of Eastern New Jersey. But for this fine range of chestnut-clad hills the geographers of Essex County might be excused for believing, with the contemporaries of Columbus, that the earth is flat. The Orange Mountains are their pride and joy, the Jerseyman's picnic-ground, the locality of mysterious robberies and murders, the supposed winter resort of the seaside mosquito, and at last something has actually been found which should give these humble hills a pre-eminent position in the Appalachian system. The crater of an extinct volcano has been discovered in the mountains near Orange, and hundreds of visitors daily crowd around the interesting spot. The genuineness of the discovery is asserted upon the authority of State Geologist Cooke and many other scientific men. The prevailing geological structure of that part of the Blue Ridge range admits, however, of caves and what are commonly called "sink-holes," and if it were not for the corroboration of Professor Cooke, who enjoys a distinguished reputation in his department of science, the report would not be so readily believed as it is. The New England Society, comprising many of the foremost citizens of Orange, are arranging to obtain possession of the property on which this wonder is situated. — *New York Tribune.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

306,710-711. CRANE.—Charles J. Appleby, London, County of Middlesex, England.

306,724. METHOD OF AND APPARATUS FOR COOLING THE AIR IN REFRIGERATING-ROOMS.—Timothy C. Eastman, New York, N. Y.

306,725. METHOD OF AND APPARATUS FOR COOLING THE AIR IN ROOMS.—Timothy C. Eastman, New York, N. Y.

306,753. DOOR.—Henry M. Hopkins, Putnam, Conn.

306,763. PLANE.—Stephen G. Laskey, Chelsea, Mass.

306,795. SAFETY ATTACHMENT FOR ELEVATORS.—Walter N. Willis, Trappe, Md.

306,799. APPARATUS USED IN SINKING WELLS.—William D. Andrews, Brookhaven, N. Y.

306,800. WELL AND PUMP FOR PROCURING WATER FROM THE EARTH.—William D. Andrews, Brookhaven, N. Y.

306,801. WELL AND RESERVOIR FOR PROCURING WATER FROM THE EARTH.—William D. Andrews, Brookhaven, N. Y.

306,802-803. MEANS FOR PROCURING WATER FROM THE EARTH.—William D. Andrews, Brookhaven, N. Y.

306,806. DOOR-PROTECTOR.—Emory Barnes, Mount Pleasant, Mich.

306,816. SHUTTER.—William G. Eckstein, Chicago, Ill.

306,828. MANUFACTURE OF BRICKS.—William B. Heintze, Brooklyn, N. Y.

306,834. ELEVATOR.—Samuel Keim, Altoona, Pa.

306,843. FIRE-ESCAPE.—William E. Lindop, St. Thomas, Ontario, Can.

306,848. FIRE-ESCAPE.—Thos. D. McKinzie, Colorado, Tex.

306,858. BRICK-MACHINE.—Napoleon M. Plante, Verplanck, N. Y.

306,859. CELLAR DRAIN AND VENTILATOR.—Michael Posz, Shelbyville, Ind.

306,862. SCREW-DRIVER.—Jas. M. Rickets, Charleston, Ill.

306,869. COMBINATION DRAWING-INSTRUMENT.—Joseph McMasters Scott, Allegheny City, Pa.

306,871. FIRE-ESCAPE.—Charles F. Shore, Sacramento, Cal.

306,877. BENCH-PLANE.—Justus A. Traut, New Britain, Conn.

306,880. VALVE FOR RADIATORS.—George J. Wallace, New York, N. Y.

306,888. BENCH FOR JOINTING LUMBER.—Clarence A. Williams, Webster City, Io.

306,907. AUGER-BIT.—William M. Dimitt, Martinsville, O.

306,912. FIRE AND WATERPROOF ROOF-PAINT.—Chas. F. Fowler and Robert H. Foss, Lake City, Minn.

306,929. AUTOMATIC SEWER-GAS VALVE.—Frank G. Johnson, New York, N. Y.

306,940. WATER-CLOSET BOWL.—James Milliken, New York, N. Y.

306,942. SECTIONAL HOUSE.—Frank H. Morse, New Orleans, La.

306,960. BRICK-KILN.—Benton Retherford, Bringhurst, Ind.

306,970. DOOR-CLOSING DEVICE.—Nathan M. Stebbins, Wales, Mass.

306,973. DEVICE FOR RAISING BUILDINGS.—Daniel Scott, Wilmington, O.

306,976. LOCK.—Geo. Thumshirn, Branford, Conn.

306,981. GREASE-TRAP.—Nathaniel T. Whiting, San Francisco, Cal.

306,983. WINDOW-SASH PULLEY.—Henry A. Wilbur, Cambridge, Mass.

306,994. ATTACHMENT FOR WINDOW BLINDS.—Andrew J. Avery, Lynn, Mass.

307,019. FIRE-ESCAPE.—Jesse W. Corder, Grand Rapids, Mich.

307,023. FIRE-ESCAPE.—Jos. T. Davis, Newark, O.

307,019. PNEUMATIC ELEVATOR-SIGNAL.—Jno. Hunt, New York, N. Y.

307,055. REMEDY AGAINST DRY-ROT AND DAMPNESS IN WALLS.—August Kothe, Hanover, Prussia, Germany.

307,058. BURGLAR-ALARM.—Charles E. Luburg, Philadelphia, Pa.

307,064. AUTOMATIC MACHINE GOVERNED BY ELECTRICITY FOR CONTROLLING ELEVATORS.—Chas. E. Ongley and Emery W. Sturtevant, Worcester, Mass.

307,065. MORTISING-MACHINE.—James Oppenheimer, Shenandoah, Io.

307,078. GUIDE-TRACK FOR SLIDING DOORS.—Wm. R. R. Tillion, Brooklyn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since our last report forty permits have been granted, the more important of which are the following:—

Bauernschmidt & Marr, 2 two-st'y brick buildings, n s Ridgely St., bet. Bayard and Wooster Sts.

Francis Denmead, seven-st'y storage warehouse, e s West Falls Ave., bet. Block St. and City Dock.

Geo. Bunnecke, 3 two-st'y brick buildings, s s St. Peters St., com. n w cor. Parkin St.

H. C. Smyser, 17 two-st'y brick buildings, n s Christian St., bet. Monroe and Payson Sts.

Alex. Lang, three-st'y brick building, e s Charles St., n e cor. Cross St.

B. F. Bateman, three-st'y brick building (square), w s Light St., bet. West and Ostend Sts.

Otto Goldbach, 5 three-st'y brick buildings, e s Wolfe St., bet. Jefferson and McElderry Sts.

Fred'k Burger, 8 two-st'y brick buildings, e s Cannou St., bet. Lancaster and Aliceanna Sts.; 8 two-st'y brick buildings, w s Rose Alley, bet. Lancaster and Aliceanna Sts., and 2 two-st'y brick buildings, n s Lancaster St., bet. Luzerne St. and Rose Alley.

W. J. E. Diven, 3 two-st'y brick buildings, e s Mount St., bet. Lorman and Presstman Sts., and 4 two-st'y brick buildings, w s Vincent Alley, between Lorman and Presstman Sts.

John Scherer & Son, three-st'y brick building, s s Raborg St., bet. Poppleton and Fremont Sts.

Chas. Wilkins, 8 two-st'y brick buildings, n s Ramsay St., w of Monroe St.

Wm. Gisriel, three-st'y brick building, w s Halliday St., bet. Saratoga and Pleasant Sts.

Wm. H. Perkins, three-st'y brick building, s e cor. Eutaw Pl. and Townsend St.

F. H. Shallus, 2 three-st'y brick buildings, n s Preston St., w of McKim St.

Wm. G. Scarlett, 4 three-st'y brick buildings, e s McCulloh St., n of Laurens St.

Harry Hall, three-st'y brick building, s s Baltimore St., e of Broadway.

Sophia C. Bauer, three-st'y brick building, e s Carlton St., s of Harlem Ave.

Mary M. Wheeden, 2 three-st'y brick buildings, e s Broadway, bet. Eastern Ave and Bank St.

The labor quotations remain unchanged for November.

Boston.

BUILDING PERMITS.—*Border St., No.* 406, Ward 1, for Isaac Pratt, Jr., brick boiler and engine house, 30' x 40', flat; Littlefield & Folsom, builders.

Beacon St., No. 314, Ward 11, for Jas. W. Converse, brick dwell., 46' x 75' 6", hip; J. H. Kelley, builder.

Longwood Ave., near Bumstead Lane, Ward 22, for Jas. McCormick, brick storage, 38' x 100', flat; Jas. Fegan, builder.

Beacon St., cor. Bowdoin St., Ward 10, for American Unitarian Association, brick offices, 35' 6" x 85', flat; Woodbury & Leighton, builders.

Clifton St., Ward 20, for J. Breckenbridge, wooden dwell., 32' x 34', flat; R. Parks, builder.

Paris St., cor. Meridian St., Ward 2, for Edwin Gertz, wooden photograph-gallery, 10' x 22', pitch.

Clifton St., near Batchelder St., for Mrs. A. E. Haley, wooden dwell., 24' x 54', pitch.

Whitney St., No. 22, for Jas. O'Brien, wooden dwell., 20' x 24', pitch; Max Weise, builder.

Tremont St., near Oak Sq., Ward 25, for B. F. Fiske, wooden dwell., 28' x 40', hip; Jas. Keefe, builder.

Tremont St., near Oak Sq., Ward 25, for C. E. Marshall, wooden dwell., 28' x 40', hip; Jas. Keefe, builder.

Rockland St., cor. Washington St., Ward 23, for Fedalia Club, wooden dwell. and hall, 26' x 40', pitch; Jno. String, builder.

St. John St., near Centre St., Ward 23, for Albert Lewis, wooden dwell., 28' x 30', pitch; M. D. Ayers, builder.

Crescent Heights, Ward 1, for M. E. Sprague, wooden dwell., 27' x 34'; mansard; S. E. Sprague, builder.

Greenwich St., near Dorchester Ave., Ward 24, for P. M. Finnegan, 2 wooden dwells., 22' x 30', flat; Jos. C. Reed, builder.

Poplar St., cor. Hilborn St., Ward 23, for Alex. Rogers, wooden dwell., 7' x 18' and 28' x 33', pitch; Alex. Rogers, builder.

Brooklyn.

BUILDING PERMITS.—*First St.*, n s, 115' 10" e Seventh Ave., two-st'y brick and brown-stone dwell., tin roof; cost, $6,000; owners, etc., Martin & Lee, 440 Clermont Ave.

First St., n s, 96' 10" e Seventh Ave., 1 three-st'y and 2 two-st'y and basement brown-stone dwells.; cost, $9,000 and $6,500 each; owners, etc., Martin & Lee, 440 Clermont Ave.

Park Pl., n s, 180' 5" w Sixth Ave., four-st'y brown-stone tenement, tin roof, wooden cornice; cost, $12,000; owner and builder, John Monas, Park Pl.; architect, J. J. Gilligan.

Park Ave., s e cor. Graham St., four-st'y brick store and dwell., tin roof; cost, $8,500; owner, Gustav C. Weidig, n e cor. Park Ave. and Graham St.; architect, Carl A. Eisenach; builders, Donlon & Walton and Wm. Zang.

Meserole St., s s, abt. 200' e Bushwick Ave., one-st'y brick boiler-house, iron roof; cost, $3,000; owner, Otto Huber; architect, Charles Stoll.

Patchen Ave., w s, 37' n Madison St., 2 two-st'y brick dwells., felt and gravel roofs; cost, abt. $3,500 each; owner, Charles Hall, 63 Patchen Ave.; architect, F. F. Thomas.

Fourth Ave., n e cor. Thirteenth St., three-st'y brick tenement, tin roof; cost, $3,500; owner, Thos. Pitbladdo, 213 Seventeenth St.; architect, B. S. Brown; builders, W. & T. Corrigan.

Madison St., s s, 25' w Throop Ave., 10 two-and-a-half-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner, Paul C. Grening, 420 Gates Ave.

Madison St., s w cor. Throop Ave., three-st'y brick flat, tin roof; cost, $10,000; owner, Paul C. Grening, 420 Gates Ave.

Prospect Pl., No. 208, s s, 220' 8" w Vanderbilt Ave., tin roof; cost, $6,000; owner and mason, David H. Hill, 393 Flatbush Ave.; architect, Walter Coots; carpenter, Geo. Scheel.

Locust St. Nos. 15, 17, *and* 19, n s, 150' e Broadway, 3 three-st'y frame tenements, tin roofs; cost, each, $4,500; owner, Valentin Popp, cor. Throop Ave. and Floyd St.; builders, William Maschke and John Rueger.

Lorimer St., e s, 100' s Devoe St., four-st'y frame (brick filled) tenement, tin roof; cost, $5,000; owner, Mary J. Smith, 248 Lorimer St.; architect, E. F. Taylor; mason, Matthew Smith.

Pineapple St., n s, 150' e Hicks St., five-st'y boarding-house, tin and slate roof; cost, $18,000; owner, William Tumbridge, 78 Hicks St.; architect, Augustus Hatfield.

Prospect Ave., s e cor. Fourth Ave., 5 three-st'y brick tenements and store and tenement, tin roofs; cost, each, $5,000; owner and builder, M. A. Wood, 98 Fifteenth St.; architect, C. B. Sheldon.

Thirteenth St., n s, 97' 10" w Sixth Ave., 4 two-st'y brick dwells., tin roofs, wooden cornices; cost, each, $3,500; owner, etc., Edwin C. Squance.

Thirteenth St., Nos. 211 *and* 213, n s, 25' e Fourth Ave., 2 two-st'y brick dwells., tin roofs; cost, each, $2,800; owner, Thomas Pitbladdo, 213 Seventeenth St.; architect, B. S. Brown; builders, W. & T. Corrigan.

Margaretta St., s s, 192' w Bushwick Ave., two-st'y brick dwell., felt and gravel roof; cost, $3,000; owner and builder, J. D. Mason, 37 Hopkinson Ave.

Eighth St., n s, 222' 10" w Seventh Ave., 4 two-st'y brown-stone dwells., tin roofs; cost, each, $4,000; owner and builder, John Hesch, 20 Webster Pl.; architect, Mr. Bremerhoff.

Marion St., n s, 100' e Howard Ave., 4 two-st'y frame (brick-filled) dwells., tin roofs; cost, each, $2,500; owner and architect, Augustus B. Pettit, 283 Chauncey St.; builders, Ernst Sutterlin and William Cunningham.

Lafayette Ave., s s, 60' e Lewis Ave., 2 two-st'y brown-stone dwells., tin roofs; cost, each, $5,300; owner, M. J. McLaughlin, 100 Kosciusko St.; architect, F. D. Van Pelt.

Skillman St., No. 105, e s, 232' n Myrtle Ave., three-st'y frame (brick-filled) tenement, gravel roof; cost, $5,500; owner, Wm. B. Cox, Ryerson St.; architect, J. G. Glover; builder, not selected.

South First St., No. 386, 100' e Eleventh St., two-st'y brick blacksmith shop, and dwell., tin roof; cost, $4,500; owner, John H. Tourte, 388 South First St.; architect, Th. Engelhardt; builders, Jas. Mead & Son and John Rueger.

Floyd St., n s, 150' e Marcy Ave., 2 three-st'y frame (brick-filled) dwells., tin roofs; cost, each, $5,500; owner, Andrew Froelich, 202 Stockton St.; architect, Th. Engelhardt; builders, John Fuchs and H. Eich & Bro.

McKibbin St., No. 183, n s, 175' e Humboldt St., three-st'y frame (brick-filled) tenement; cost, $4,500; owner, George Seitz, 179 McKibbin St.; architect, Th. Engelhardt.

Metropolitan Ave., No. 101, s s, 125' e Bushwick Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $2,500; owners, A. Amann & Son, 258 Devoe St.; architect, H. Vollweiler; builders, John Brendel and A. Amann & Son.

Myrtle Ave., s s, 558' e Evergreen Ave., 2 three-st'y frame (brick-filled) tenements, tin roofs; cost, each, $4,000; owner, etc., John Rueger, 250 Moore St.

Myrtle Ave., s s, 500' e Evergreen Ave., 2 three-st'y frame (brick-filled) stores and tenements, tin roofs; cost, each, $5,000; owner, etc., John Rueger, 250 Moore St.

Bushwick Ave., w s, 25' s Boerum St., three-st'y frame (brick-filled) store and tenement, tin roof; cost, $4,200; owner, Magdal Stutzmann, cor. Seigel and Humboldt Sts.; architect, H. Vollweiler, builder, John Rueger.

Broadway, e s, 40' s Van Buren St., three-st'y frame (brick-filled) flat, tin roof; cost, $4,000; owner, Samuel Post, cor. Broadway and Van Buren St.; architect, H. Vollweiler; builder, S. Post.

Boerum St., s e cor. Bushwick Ave., three-st'y frame (brick-filled) store and tenement, tin roof; cost, $5,500; owner, Magdalena Stutzmann, cor. Seigel and Humboldt Sts.; architect, H. Vollweiler.

Fifth Ave., n e cor. Union St., 5—three three-st'y, and 2 two-st'y—stores and dwells., tin roofs; total cost, $35,000; owner, William Irvine, 395 Ninth St.; architect, J. C. Burne; builder, W. J. Conway.

Humboldt St., s w cor. Siegel St., four-st'y brick warerooms, tin roof; cost, $10,000; owner, Martin Worn, Humboldt and Seigel Sts.; architect, John Platte; builder, Jacob Rauth.

Madison St., n s, 35' e Tompkins Ave., 5 two-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner and builder, Jas. A. Thompson, 405 Monroe St.; architect, M. Walsh.

Willow Pl., w s, 100' n State St., five-st'y apartment-house, tin roof; cost, $20,000; owner, William Tumbridge, 78 Hicks St.; architect, Augs. Hatfield.

Central Ave., n e cor. George St., 2 frame (brick-filled) three-st'y stores and tenements, tin roofs; cost, abt. $7,000; owner, Charles Engert, 182 Montrose Ave.; architect, F. J. Berlenbach.

ALTERATIONS.—*South Fifth St.*, s s, 100' w Second St., add one st'y, flat tin roof; cost, $3,500; owner, George Young, First St., cor. South Fourth St.; architect, E. F. Gaylor; builders, James Rodwell and Sam'l Hough.

Irving St., s e cor. Van Brunt St., repair damage by fire; cost, $3,390; owner, Estate of Chas. Kelsey, 156 Columbia St.; architect, Fred. Hitzelberger; builders, Mr. Gibbons and Wm. Clark.

Prospect Pl., n s, 200' e New York Ave., 2 two-st'y brick extensions; cost, $3,000; owner, H. L. Wardwell; architect, G. Chappel; builders, James Ashfield and M. C. Rush.

Bushwick Ave., n e cor. Nimrod St., three one-st'y frame extensions, tin roof; cost, $4,500; owner, South Bushwick Ref. Church; architects, Parfitt Bros.; builder, E. Henderson.

Meserole St., s s, 200' e Bushwick Ave., five-st'y brick extension, tin roof (brewery); cost, $20,000; owner, Otto Huber, Meserole St.; architect, Chas. Stoll.

Chicago.

CHURCH.—The Third Presbyterian Church which recently was totally destroyed by fire, only outside stone walls left standing, will be rebuilt at once; W. L. B. Jenney is the architect. The total cost of the structure burned was about $140,000.

LIBRARY-BUILDING.—N. S. Patton Architect, planned the $60,000 library-building, to be erected at Oak Park for the Scoville Institute, Lyons limestone and Bedford stone.

HOSPITAL.—Work on the Chicago Hospital for Women and Children, on West Adams Street, is going rapidly forward, four-st'y, 48' x 125', with an ell, 20' x 40′; capacity for 100 patients; cost, $65,000. Laying of corner-stone was celebrated last week.

Building Permits. — J. H. Buffum, two-st'y dwell., 368 Ontario St.; cost, $7,000; architect, S. H. Randolph; builder, W. H. Cameron.

M. Stock, 3 two-st'y dwells., 11-15 Wendell St.; cost, $15,000.

A. F. Stevenson, three-st'y dwell., 417 Lasalle Ave.; cost, $15,000; architects, Bauer & Hill.

C. H. Curtis, 2 two-st'y dwells., 2-4 College Pl.; cost, $10,000; architects and builders, Wm. Price & Son.

H. Goldsmith, three-st'y dwell., 242 Indiana St.; cost, $8,000; architects, Strippelman & Co.

H. Sweet, three-st'y store and flats, 1459 Milwaukee Ave.; cost, $4,000.

M. Ransom, two-st'y flats, 812 Washtenaw Ave.; cost, $2,700.

Late & Ensign, two-st'y dwell., 1063 Halsted St.; cost, $2,500.

J. Robinson, 2 two-st'y dwell., 1055 North Halsted St.; cost, $4,500.

Thos. Hoyne Estate, five-st'y store, 91 Michigan Ave.; cost, $15,000.

Mrs. K. Wagnor, two-st'y brewery, 79 Clyde St.; cost, $5,000; builder, L. Kobell.

P. Ratley, two-st'y dwell., 2962 Bonfield St.; cost, $6,500; architects; Furst & Rudolph.

J. H. Murphy, two-st'y dwell., 54 Goethe St.; cost, $3,500.

Hoffman Bros., two-st'y factory, 43-49 Green St.; cost, $6,000; architect, D. S. Pentecost; builder, J. Miles.

N. F. Merrill, two-st'y dwell., 1401-1403 Washington Boul.; cost, $7,000; architect, J. H. Moore.

J. Doig, two-st'y dwell., 450 Warren Ave.; cost, $3,000.

F. Kamin, 2 two-st'y stores and dwells., 661-666 West North Ave.; cost, $10,000; architects, Schaub & Berlin; builder, Chas. Proeger.

H. McFarlane, two addition st'y, Canal St.; cost, $5,000.

H. D. Rowland, two-st'y dwell., 56 Wisconsin St.; cost, $4,000; architect, H. Starbuck; builder, G. Eberlin.

Mr. C. Zimmerman, three-st'y dwell., 754 North Ashland Ave.; cost, $3,000; builders, M. & N. Zimmerman.

L. P. Hansen, five-st'y store, 116-118 Dearborn Ave.; cost, $40,000; architect, J. Addison; builders, Barney & Rodatz.

Mrs. T. L. Morey, two-st'y dwell., 394 Warren Ave.; cost, $3,000; architect, F. P. Schock; builders, Barney & Rodatz.

J. W. Farlin, two-st'y dwell., 467 North State St.; cost, $12,000; architects, Cobb & Frost; builder, Mountain.

A. Mullen, two-st'y store and dwell., 146 Ambrose St.; cost, $4,000.

M. E. Sands, 6 two-st'y dwells., 727-737 West Harrison St.; cost, $15,000.

N. Lancaster, 8 cottages, 322-348 Thirty-ninth St.; cost, $9,000.

C. A. Sirbon, three-st'y dwell., 113-115 Wesson St.; cost, $8,000.

M. Cremen, three-st'y store and dwell., 275 Douglass Ave.; cost, $8,000.

A. Ferman, three-st'y dwell., 639 North Robey St.; cost, $6,000.

Geo. R. McClellan, two-st'y storehouse, 1620 Butterfield St.; cost, $2,500; architect, L. J. Daegling.

Wm. Gillan, three-st'y store and dwell., 212 Thirty-fifth St.; cost, $12,000; architect, J. W. Ackerman; builder, R. E. McKay.

J. K. Bigelow, two-st'y dwell., 11 Page St.; cost, $3,500; architect, H. R. Wilson.

Bartholomae & Leicht, elevator, 501 Garfield Ave.; cost, $20,000; architect, F. Wolff.

A. Gretzner, two-st'y store and dwell., 773 Thirty-seventh St.; cost, $2,500.

New York.

Flats. — On the n e cor. of Ninth Ave. and Forty-fifth St., 9 five-st'y brick, brown-stone and terra-cotta flats are to be built by Mr. Wm. Rankin, from plans of Mr. M. L. Ungrich, to cost about $180,000.

For Mrs. G. Gossan, a five-st'y brick, stone and terra-cotta flat is to be built, at No. 328 East Seventy-seventh St., at a cost of $18,000, from plans of Mr. Ernest W. Greis.

Safe Deposit Warehouse. — The Lincoln Safe Deposit Co. will have an addition, 50′ x 90′, built, fronting on Forty-first St., from designs of Mr. J. B. Snook.

Skating Rinks. — On Fifty-third St., Broadway and Seventh Ave., a one-st'y brick skating-rink, to cost about $30,000, is to be built from designs of Mr. A. B. Ogden.

On Lexington Ave., cor. Fourth Ave. and One Hundred and Seventh St., a one-st'y brick rink, 335′ deep, is to be built from plans of Messrs. E. D. Howes & Co.

Stable. — Mr. Richard Weber is to have a stable and warehouse, 25′ x 100′, erected on One Hundred and Twentieth St., between Second and Third Aves., from designs of Mr. I. S. Wightman.

Building Permits. — *Lexington Ave.*, e s, 60′ s One Hundred and Twenty-fifth St., one-st'y brick building (roller-skating rink), tin roof; cost, $15,000; owner, Wm. A. Martin, 128 West One Hundred and Twenty-third St.; architect, Jos. M. Dunn.

Monroe St., Nos. 300 *and* 302, six-st'y brick factory, tin roof; cost, $25,000; owner, Henry A. Dinges, 130 East Sixty-first St.; architect, L. H. Broome.

Ninety-second St., n s, 204′ 5″ e Fifth Ave., four-st'y brown-stone dwell., tin roof; cost, $32,000; owners, Samuel and Isaac Untermeyer, 106 East Ninety-second St.; architects, Hugo Kafka & Co.; builder, Alfred Beinhauer.

One Hundred and Sixty-third St., n s, w s Union Ave. and e s Minton Ave., 17 two-st'y frame dwells., tin roofs; cost, each, $1,800; owner and builder, John W. Decker, 841 Forrest Ave.; architect, Adolph Pfeiffer.

Ludlow St., No. 67, six-st'y brick tenement, tin roof; cost, $20,000; owner, Edward J. Burke, 156 East Thirty-eighth St.; architect, John C. Babcock.

Sixty-fourth St., n s, 250′ e Third Ave., three-st'y brick stable and dwell., tin roof; cost, $10,000; lessee and builder, John Bartnett, 121 East Sixty-third St.

West Fifty-seventh St., Nos. 23 *and* 25, seven-st'y brick and stone apartment-house, tin and slate roof; cost, $140,000; owners and architects, Lamb & Rich, 486 Broadway; builder, not selected.

St. Nicholas Pl., e s, opposite One Hundred and Fifty-first St., three-st'y brick dwell., slate roof, owner, James M. Cumings, 125 West One Hundred and Twenty-seventh St.; architect, Henry S. Rapelye; builder, not decided.

Ninety-ninth St., s s, 100′ w Eleventh Ave., five-st'y brick and stone flat, tin roof; cost, $25,000; owner, Lorenzo Power, 612 West Eighty-third St.; architect, Wm. Schickel.

East Seventy-sixth St., No. 456, two-st'y brick dwell., tin roof; cost, $8,000; owner, Louis Spitzer, 452 East Eighty-first St.; architect, Th. De Lemos; builders, Kitchen & Nason.

One Hundred and Fourth St., s s, 250′ e Third Ave., 4 five-st'y brick tenements and stores, tin roofs; cost, each, $16,000; owner, Henry Bornkamp, 306 West One Hundred and Twenty-seventh St.; architects, Cleverdon & Putzel.

West Sixteenth St., No. 240, five-st'y brick, tin roof; cost, $15,000; owner, James Cunningham, 130 Clinton Pl.; architect, Emile Gruwe; builder, H. M. Reynolds.

West Thirty-eighth St., Nos., 355 *and* 357, 2 five-st'y brick tenements, tin roofs; cost, $6,500 and $8,500; owner, Sarah McGrave, 220 West Thirty-ninth St.; architect, John M. Forster.

East Fifty-fourth St., No. 221, two-st'y brick wash-house, tin roof; cost, $3,000; owner, Henry Gunther, 213 East Fifty-fourth St.; architect, Chas. Stoll.

Sixty-third St., n s, 250′ e Tenth Ave., 2 five-st'y brick and stone flats, tin roofs; cost, each, $15,000; owner, Owen Donohue, 505 West Fifty-sixth St.; architect, John Sexton.

One Hundred and Forty-ninth St., n s, 250′ e Courtland Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $5,500; owners and builders, Janson & Jaeger, 551 Courtland Ave.; architect, Adam Janson.

Eighty-first St., s w cor. Ninth Ave., four-st'y brick store and dwell., tin roof; cost, $13,000; owner and builder, Eli Martin, 614 Carroll St., Brooklyn.

Eighty-first St., s s, 30′ and 60′ w Ninth Ave., 2 four-st'y brick and stone dwells., tin roofs; cost, each, $11,000; owner and builder, same as last.

Eighty-first St., s s, 90′ and 112′ w Ninth Ave., 2 four-st'y brick and stone dwells., tin roofs; cost, each, $10,000; owner and builder, same as last.

Morris Ave., s w cor. One Hundred and Thirty-ninth St., three-st'y brick factory, tin roof; cost, $3,030; owner, architect and builder, Edward Gustaveson, 517 East One Hundred and Forty-second St.

Alterations. — *Lexington Ave.*, n e cor. One Hundred and Eighth St., one-st'y brick extension, tin roof, build new chimney in main building, new partition; cost, $5,000; owners, Steers Bros., foot East One Hundred and Twenty-fifth St.; architect, Thos. J. Robinson.

One Hundred and Twenty-ninth St., foot of, and East River, rebuild for factory purposes, building damaged by fire; cost, $5,000; owner, Wm. H. Payne, 98 Park Ave.; architect, J. F. Burrows.

Second Ave., No. 1021, one-st'y brick extension, tin roof, rear of main building taken out in first st'y and iron girder put in; also, internal alterations; cost, $2,500; owner, Minnie Rinaldo, 229 East Thirty-third St.; architect, J. G. Michel; builders, M. Schmeckenbecher's Sons.

West Twenty-second St., Nos. 37, 39 *and* 41, *and Nos. — on Twenty-third St.* (old church-building), internal and external alteration of church into stores and lodgings, and three extensions, tin roofs; cost, done by day's work; owners, James Russell White, 80 Beaver St., and others; architect, W. Wheeler Smith; builders, John Tucker and Alf. C. Hoe & Co.

Broome St., No. 236, raise attic to full story, three-st'y brick extension, tin roof; cost, $4,500; owner, Ludwig Trunk, 240 Broome St.; architect, William Graul.

East Fiftieth St., Nos. 107 *and* 109, first st'y to be altered for stable; cost, $3,000; owner, the F. & M. Schaefer Brewing Co., Fifty-first St. and Fourth Ave.; architect, Julius Kastner.

Philadelphia.

Building Permits.—*Dean St.*, cor. Tasker St., two-st'y dwell., 16′ x 44′; T. B. Twibill, contractor.

Aman St., between Eleventh and Twelfth Sts., 2 three-st'y dwells., 15′ x 40′; C. O'Neill.

Tasker St., between Twelfth and Thirteenth Sts., 2 two-st'y dwells., 14′ x 40′; T. B. Twibill, contractor.

Connarol St., between Pechin and Mitchell St., three-st'y dwell., 18′ x 45′; W. Goodfellow, contractor.

Indiana St., cor. Reese St., three-st'y store and dwell., 18′ x 43′; S. M. Batton, contractor.

Erie Ave., w of Sixth St., 3 two-st'y dwells., 13′ 8″ x 45′; T. Cole, owner.

Frankford St., between Frankford Creek and Melrose St., three-st'y factory, 30′ x 140′; W. Grange, president.

Woodford St., between Manayank Ave. and Richter St., three-st'y dwell., 16′ x 32′; McIlvain & Cunningham.

Oxford St., e of Twenty-eighth St., 8 two-st'y dwells., 14′ 6″ x 42′; Wm. Pole, contractor.

Kensington Ave., between Venango St. and Harrowgate Lane, three-st'y store and dwell., 20′ x 48′; D. C. Shuler, contractor.

Woodvale Ave., near Manayank Ave., 2 two-st'y dwells., 17′ x 35′; Chas. Bartle, contractor.

Bowman St., w of Thirty-fifth St., three-st'y dwell., 13′ 4″ x 32′; Wm. Kindon, owner.

Fifty-first St., cor. Florence St., two-st'y dwell., 14′ x 32′; A. J. Moseley.

Ridge Ave., between Susquehanna Ave. and Diamond St., three-st'y dwell., 19′ x 46′; R. Manly.

North Twenty-second St., No. 227, three-st'y dwell., 17′ x 56′; P. Thompson, contractor.

Edgemont St., between Neff and Clearfield Sts., 2 two-st'y dwells., 16′ x 40′; J. W. Bright, contractor.

Adam St., cor. Duval St., three-st'y dwell., 27′ 6″ x 52′ 6″; W. H. Brunner, contractor.

Neff St., cor. Clifton St., church-building, 34′ x 68′; H. M. Martin, contractor.

North Fifth St., No. 2725, three-st'y dwell., 18′ x 22′; H. M. Martin, contractor.

Norris St., w of Second St., three-st'y dwell., 18′ x 52′; D. J. Dunbar, contractor.

Wayne St., n of Berkley St., 2 two-st'y dwells., 16′ x 45′; Samuel Clawson.

Twenty-seventh St., n of Oxford St., two-st'y dwell., 18′ x 40′; J. Huston, contractor.

South Thirteenth St., No. 1827, three-st'y store and dwell., 16′ x 25′; E. H. Steever, contractor.

Sansom St., w of Eighth St., traction engine-house, 100′ x 107′; S. Hart, contractor.

Edward St., between Hanover and Second Sts., refrigeratory-building, 50′ x 72′; J. B. Doyle, contractor.

Fifty-ninth St., n of Kingsessing Ave., orphanage-building and chapel, 60′ x 100′; A. A. Catanach, contractor.

General Notes.

Albert Lea, Minn.—Cottage, for Chas. Farnsworth; cost, $3,500; C. A. Dunham, architect, Burlington, Iowa.

Kansas City. — F. J. Baird & Milton Welsh, brick business block, 1828-30 Main St.; cost, $8,000.

W. J. Scott, 4 frame dwells., East Tenth St.; cost, $8,000.

W. J. Smith and George J. Keating, brick warehouse, West Tenth St.; cost, $15,000.

J. W. Keifer, brick residence, Penn St.; cost, $6,000.

Henry Sleek is erecting a brick livery-stable at 921 Wyandotte St.; cost, $3,500.

PROPOSALS.

SAFES AND VAULTS.

[At Washington, D. C.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., October 23, 1884.

Sealed proposals will be received at this office **until 2 p. m., on the 25th day of November, 1884,** for supplying the burglar-proof safes and chests, fire and burglar safes combined, fire-proof safes, fire-proof doors, shell safes, and single and double steel-lined vault-work required by the Treasury Department, and as may be ordered during the fiscal year ending June 30, 1885, in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, on and after November 5, 1884.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
461 Supervising Architect.

IRON-WORK.

[At Jackson, Tenn.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., October 18, 1884.

Sealed proposals will be received at this office **until 2 p. m., on the 1st day of November, 1884,** for furnishing and putting in place complete, the iron columns and girders required for the court-house, post-office, etc., at Jackson, Tenn., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening, will not be considered. M. E. BELL,
462 Supervising Architect.

IRON WORKS.

[At St. Louis, Mo.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., October 24, 1884.

Sealed proposals will be received at this office **until 2 p. m., on the 8th day of November, 1884,** for furnishing and fixing in place complete the cast-iron ornamental panels for area railing around the custom-house and post-office building at St. Louis, Mo., in accordance with drawing and specification, copies of which may be seen and any addititional information obtained on application at this office, or the office of the custodian at the building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
464 Supervising Architect.

ARMY BARRACKS.

[At Newport, R. I., and New York, N. Y.]

Office of Chief Quartermaster,
Department of the East,
Governor's Island, N. Y. H., October 15, 1884.

Sealed proposals in triplicate, subject to the usual conditions, will be received at this office, and the Offices of the Quartermaster at the posts mentioned below, **until 12 o'clock, m., Eastern time, on the 15th day of November, 1884,** at which time and places they will be opened in the presence of the bidders, for the construction of one set of barracks of brick, or frame, at each of the posts of Fort Adams, R. I., and Fort Hamilton, N.Y. H., in accordance with plans and specifications, which can be seen at this office, and at the Offices of the Post Quartermaster at Fort Adams, R. I., and Fort Hamilton, N. Y.H.

One copy of this advertisement should be securely attached to each triplicate proposal, and be mentioned therein as comprising part of it.

Blanks for proposals and information as to manner of bidding, etc., can be obtained at this office.

Proposals must be accompanied by a guarantee with two sureties in the sum of two hundred dollars.

A proposal not accompanied by such a guarantee will not be considered.

Envelopes containing proposals should be marked "Proposals for Construction of Barracks."

The Government reserves the right to reject any or all bids. ALEX. J. PERRY,
462 Assistant Quartermaster General, U. S. Army.

The American Architect and Building News.

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NOVEMBER 8, 1884.

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CONTENTS.

A NOVEL competition is offered to architects and engineers of all nations by the city of Königgratz in Bohemia. Königgratz is a very little city, having a population of only about six thousand, and is chiefly remarkable for its ancient fortified walls, and for having been near the scene of the battle between the Austrians and Prussians, called by all except Germans the battle of Sadowa; but it has suddenly determined to throw off its mediæval habits, and become a modern town, and to that end invites designs for levelling the old fortifications, and for laying out the site which they now cover or include, comprising an area of four hundred and sixty-eight Austrian acres, "according to all the modern experience which has been gained in architecture." The new town is to be divided into a "residential quarter and a manufacturing quarter," leaving "sufficient space for public squares and grounds." Besides the topographical plans a chart of the proposed new levels must be submitted, and in addition, a scheme for "a complete system of drainage for the lower parts of the town," and for "means of preventing inundations by the rivers Elbe and Adler." Intending competitors are cautioned that their designs must be "in accordance with the requirements of both town and country," as well as "in all respects, and especially in respect of hygiene, of the most approved modern description," and finally, must be "in accordance with the laws of Austria, and capable of being submitted for approval to the Government authority. A written explanation is to accompany each set of drawings, giving a description of the whole project, as well as "a concise statement of the best means of putting the plans into execution." For the design most approved, a premium of two thousand florins is offered, — about a thousand dollars; and second and third premiums are promised, of seven hundred and fifty and five hundred dollars, the designs in all cases to become the absolute property of the city. The plans must be deposited at the Burgomaster's office in Köneggratz on or before twelve o'clock at noon on the twenty-second of December next. We do not imagine that any of our readers would think of taking part in such a contest, but the spectacle of the old episcopal walled town suddenly casting off its antiquated garments and calling aloud for clothes of the most hygienic cut, with which to frisk into the modern world, is a very curious one.

THE *Hydraulic and Sanitary Plumber* quotes from the *Contract Journal* an account of what is probably the smallest system of town water-supply on this side of the Atlantic. The community which use this system is that of Drewsville, N. H., a village of seventy-nine inhabitants, and the water is obtained from a spring in the side of a hill about half a mile off. The distributing reservoir consists of a wooden box, two feet wide, three feet long, and two feet deep, divided into one large compartment and ten small ones, which communicates with the large one by means of auger holes. The capital stock of the company owning the water-works is divided into ten shares, and each share-holder is allowed to take water from one of the small compartments for the use of his family and of those whom he allows to participate in his privilege. The system of pipes for distributing water in this way would, if the number of shareholders were larger, be somewhat complicated, but there is no great difficulty in laying ten private mains from one reservoir, and the owners obtain, in return for what seems an unnecessarily large outlay for piping, the privilege of dividing up the private supplies to any extent, without running the risk of infringing on their neighbors' rights. In practice this is done, and all the householders of the village, who are not shareholders, obtain water from one or another of the private pipes, paying a suitable rent for it. There is no other water supply available in the town, and the inhabitants must buy of the members of the corporation or go without water altogether. Fortunately, the community seems to be an amiable one, and as the houses all stand together around a little common, the cost of distribution is very moderate. The water corporation has been in existence for eighty years, and some of the pipes, consisting of bored logs, have been constantly in use during that time. Besides its pipes, the company owns a heap of dry stores, built up around the reservoir, and the wooden shed which covers it; the total investment amounting now to about three hundred dollars.

WE are glad to see in the *Builder* for the first time, so far as we can recollect, a strong and sensible protest against the unreasoning fashion, so prevalent in this country, of laying out streets, in places where land is cheap, of an absurd width, increasing in this way the cost of construction and maintenance, without securing any advantage whatever. On the contrary, it is reported on medical authority that the excessive width of the streets in certain towns in Illinois has become a source of nuisance and of positive danger to the health of persons living near them. These streets, on account of the expense of a proper pavement over so large a surface, are usually left with a simple gravel or mud surface, and are soon trodden in wet weather into a filthy paste, which diffuses in warm weather exhalations proportionate to its area, and in a dry time disintegrates into a semi-organic dust, which is blown in clouds over the neighborhood. Even in our large cities the approach to one of those expanses of filthy pavement, which we complacently call "breathing-places," is generally marked by so strong a smell of garbage and street mud as to suggest the idea that their vicinity is not always an advantage, and in less settled places the trouble is increased by the dust. No one is likely to deny that wide streets with fresh air are desirable, but wide streets exhaling the odors of acres of filth are the reverse; and it is strange that no one should have thought before of the propriety of keeping such thoroughfares, so far as the traffic will permit, in grass, restricting the roadway to the smallest practicable limit. If a street one hundred feet wide, in a city whose prosperity is a matter rather of the future, could be laid out with a fourteen foot roadway on each side next the footpath, and fifty feet of well-kept grass and shrubs between it, would be far more beautiful and dignified, as well as much cheaper, than the ordinary "avenue" of suburban towns. A good example of a street of this kind has been set in the Commonwealth Avenue in Boston, where four rows of elm trees, with grass and gravel-walks between, and a narrow roadway on each side, make up a street two hundred feet wide, and, as now planned, more than five miles long; and in the upper part of New York the abuttors on a certain wide street have united in carrying out a somewhat similar plan. There is no art so neglected in this country as that of landscape gardening, although there is perhaps no place where a knowledge of the effects to be obtained by judicious landscape engineering would be so useful as among our growing towns. It is not, we are sure, the popular appreciation of beautiful effects of foliage and line which is wanting, so much as familiarity with good examples of landscape art, even on a small scale; and the public-spirited persons, who, as members of village improvement societies, are doing so much good, would help their cause materially both by procuring and circulating such books as Downing's "Landscape Gardening," or Scott's more modern book on "Suburban Home Grounds," and by offering encouragement, in the shape of honors or small prizes, for successful efforts at carrying out the elementary principles of planning and planting.

LA *Semaine des Constructeurs* quotes from the "Transactions of the English Institute of Civil Engineers" some valuable statistics in regard to the wood pavements of London. As wood has been employed in that city for paving in a great variety of ways, the account of the unsuccessful experiments is perhaps as useful as that of the successful ones. It is hardly necessary to say that, as in other cities, the wood pavement is used in London only for streets in which an unusual amount of travel is to be provided for; and out of the seventeen hundred and eighteen miles of street which the corporation surveyors have to care for, only three hundred and forty-seven are laid with a pavement of the first class, the rest having nothing better than cobblestones or macadam. Of the three hundred and forty-seven miles of well-paved streets, two hundred and eighty have granite blocks, fourteen are finished with asphalt, and fifty-three with wood. The cost of these fifty-three miles of wood pavement has amounted to about three million dollars, so that, supposing the average width of roadway to be thirty feet, the cost per yard seems to have been something over three dollars, which, considering the thoroughness with which pavements of the kind are laid in London, is very moderate.

THE ordinary foundation for the wood pavement is made of concrete, composed of one part Portland cement to five and one-quarter parts river sand, and spread about six inches thick. The grades are made as gentle as circumstances will allow, but the roadway is well drained by catch-basins and gratings at short intervals. Upon the concrete bed is laid the wood, in blocks about six inches square, with the grain vertical. Many preparations have been used for promoting the resistance and durability of the blocks, but the results indicate that the wood in its natural state is rather to be preferred to that treated in any way at present in use. Even wood saturated with creosote lasts no longer than the same without treatment, while the creosote makes the surface of the pavement black and dirty. As with us, the blocks are laid with a joint of a third of an inch or so between, but the interstices are filled with a strong mortar, of one part Portland cement to three parts sand, instead of the dry or tarred gravel filling which is used here; and each block has an iron stud inserted in the lower end before laying, which works its way into the concrete and prevents the blocks from slipping over the surface below them. Over the whole is finally spread a layer of sharp pebbles. The life of such a pavement is found by experience to be from six to eight years, and the blocks, as is shown by certain portions of Oxford Street, will sustain very heavy traffic after they have been worn down to a thickness of one and a half inches. The labor of maintenance consists mainly in sweeping and in replacing defective blocks; and the cost of all necessary work of this kind is found to be only about ten cents a yard per annum, while the average yearly cost of maintenance of a macadam road is about twenty-five cents per yard. Even with the cost of reconstruction every seven or eight years added, with interest, the total annual expense of the wood pavement during a long term amounts only to about forty-seven cents per yard, while the macadamized streets at the West End cost fifty-four cents a year for repairs alone, and Whitehall, which is a wide and short, but much frequented street, costs seventy-eight cents a year.

MR. KEELY deserves credit for his ingenuity in amusing the stockholders in his company, who sustain his experiments, and perhaps also for his success in nearly doubling the quoted price of the stock by a half-day's questionable exhibition. According to the Philadelphia *Press*, the trials made at the Government range with the air-gun have recently been supplemented by a private exhibition, given before about a dozen "gentlemen of scientific attainments" at his workshop in Philadelphia. The first experiment on this occasion was made with the generator, which we suppose is a new machine, since the first, about which so many wonderful stories were told, is said to have been sold for old iron. The generator having been raised on rollers, to show the spectators that it was empty, Mr. Keely charged it by the simple process of squirting water into it with his mouth, and then "adjusting the vibratory chord," and "giving the impulse" with a steel coil, "charged with the interatomic ether." This scientific incantation developed enough "vapor" not only to carry out the intended experiments, but to produce some unexpected effects. On connecting the generator by means of a small copper tube with a cylinder, in which moved a piston with a lever attached to the head, the pressure, as shown by a weight hung upon the lever, was found to be seventy-five hundred pounds to the square inch. On learning this, two of the "scientific gentlemen," instead of running for the nearest door, climbed up on the lever attached to the piston, with the idea that their weight would hold it down, but the great inventor merely tapped the generator, and they were thrown upward with a celerity which convinced them that they would do best not to meddle further.

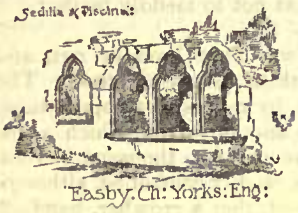
THE celebrated "vapor gun" was next brought out, and bullets fired with it through thick pieces of wood. The generator was next connected, by means of a copper tube, with a small "vibratory lathe" in another room, which a second vivifying tap started off at the rate of a thousand revolutions a minute. The movement was readily controlled, although it was so rapid, at the highest speed, that a crowbar, handled, we suppose, by one of the scientific gentlemen as an instrument of investigation, failed to stop the wheel. While this experiment was in progress, and just at the moment when the motion was reversed, the top of one of the vibrators flew off, and the copper tube leading to the lathe burst with a loud report. This mishap put a sudden end to the trial of the vibrator, and dispersed the audience in all directions, but as no one found himself hurt, the scientific auditory returned, and a new exhibition, the most curious of all, was made, in which a brass ball, enclosed in glass, was made to revolve rapidly by "adjusting the chord of the vibrator," and "intensifying the vibrations" with a "cornucopia-shaped resonator." Further manipulation of the resonator resulted in accelerating or retarding at will the movement of the brass sphere.

THE Metropolitan Railway of Paris is at last in a fair way to be built, and the Minister of Public Works has already signed an agreement for the construction of the first section, extending from Puteaux to Reuilly, with a syndicate formed by the Society of Deposits and Accounts, the Industrial and Commercial Credit, the Central Popular Bank, and Mr. Forbes, the president of the London Metropolitan Railway. To this syndicate will, it is understood, be added the Northern Railway Company, whose station will be directly connected with the new line, and it is possible that other railway companies will take part. The first line is to begin at Puteaux, a popular suburb to the northwest of the city, across the Seine, and extend in a straight line toward the Arc de Triomphe, reaching the line of fortifications at the Porte Maillot, a distance of something more than two miles from the starting point. From the Porte Maillot the line runs two miles to the railway station St. Lazare, where it divides into two branches, one of which forms a loop three miles long, running to the stations of the North and East under the old "exterior boulevards," and returning by the Boulevard Sebastopol, while the other extends directly to the Lyons station, a distance of nearly four miles, and thence to Reuilly, half a mile further, to the southwest of the city. A special branch extends from the main line to Batignolles, a distance of about three-quarters of a mile. This line, although nearly fourteen miles long in all, provides only for the portion of Paris on the north of the Seine, leaving the populous southern portion as badly off as ever, but the city reserves the right to call upon the company for the construction of a second section, upon a guaranty of four per cent interest upon the capital invested in both the lines. The cost of the first section is estimated at twenty-three million dollars, and the capital of the company is fixed at ten millions. On the completion of the road sixteen trains an hour will be run from the St. Lazare station to the Boulevard Sebastopol, and eight trains from the same place to the Porte Maillot, with additional trains on the branch lines.

A NEW sort of gunpowder, known as "miners'" powder is coming into use to some extent in France. The powder differs entirely in composition and qualities from the nitroglycerine compounds, resembling ordinary gunpowder, but with the difference that chlorate of potash is used as the oxidizing agent instead of saltpetre, and carbon is supplied in an organic form. The process of preparation is very simple. A given weight of chlorate of potash is dissolved in water, and a quantity of sawdust or bran, equal in weight to the chlorate of potash, is stirred into the liquid, and the mass allowed to dry. The sawdust powder, though cheap, is less safe to prepare and handle than that made of bran, as resin, which is very likely to be present in small quantities in the sawdust, forms with chlorate of potash a compound which detonates on being suddenly disturbed. However prepared, the powder possesses, weight for weight, about twice the strength of ordinary gunpowder.

AMERICAN INSTITUTE OF ARCHITECTS.

ADDRESS OF THE PRESIDENT, THOMAS U. WALTER, AT THE ALBANY MEETING, October 22, 1884.



I HAVE the pleasure to congratulate you on the recurrence of another annual convention, which I trust will be characterized by the enthusiasm befitting the occasion.

We come together from widely separated portions of our county, bringing with us fresh thoughts in architectural design, and new developments in the sciences which underlie our art, and which naturally grow out of diversified processes of intelligent architectural practice. We are thus prepared to impart interest to our discussions, and to enlarge the sphere of professional knowledge.

Although the past year has not been distinguished in the annals of architecture, as far as it regards projects of unusual grandeur and magnitude, it is nevertheless gratifying to observe that it has been and is one of a successful and intelligent progress in art, affording unmistakable evidence of independent thought, and versatility of genius in designs.

It may also be remarked that the public taste is evidently acquiring juster views of architectural composition, and a higher appreciation of the æsthetic principles which govern art is noticeable even in some of the less pretentious buildings recently erected.

Many grander and more massive structures, dating from beginnings in previous years, have been prosecuted with vigor, developing in a high degree the genius of architecture. In some, a tasteful and noble handling of ornate features impart effects that never cease to command admiration. In others, ornamental sculpture has been made an important feature of the composition, and in most instances it has been marked with decided success.

The idea of illustrating thought and action by emblematic forms and figures, or intimating by symbolic representations the meaning of sentiments conceived in the mind, constitute some of the most important features in architectural decorations, imparting beauty to the grouping and interest to the composition.

This improved and improving condition of architecture, by which its standing as a fine art is developed, its field of design expanded, and its power to elevate and purify the public taste made manifest, is the result directly or indirectly, of the labors and influences of the American Institute of Architects, in a little more than a quarter of a century. The more we consider in connection with art achievements, the astounding progress that has been made in scientific construction, in the manipulation of the hardest materials, in heating and ventilation, in sanitary plumbing, and in a countless multitude of contrivances to promote the convenience, gratify the taste, and satisfy the proclivities of those who know how to appreciate the comforts of their surroundings, the more cause we find for satisfaction.

In architecture, as in all the learned professions, a large portion of the field is occupied by uneducated, unskilled and immature practitioners, whose only passport to the patronage of the people is the assumption of the name of *architect*.

It therefore devolves upon the Institute to prevent, as far as prac-practicable, empiricism in architecture, by a wide dissemination of the principles which constitute it a fine art, by awakening an interest in the sciences which underlie it, and in the cognate arts which bring it into relation with the comforts and conveniences of life and the higher enjoyment of taste and propriety.

He who attempts to practise architecture without a general knowledge of the elements of nature, and of the sciences which develop their properties and their purposes, and who has never had a special training in the office of an experienced practitioner of the art, is not prepared to discharge the onerous duties of an architect, whatever may be his scholastic requirements or his mechanical skill.

Those who purpose to make architecture their life work would do well to prepare themselves for practical office study by first pursuing a course of architectural training in a technical college, embracing mathematics, line drawings to scale, mechanical drawing and linear perspective, with an exhaustive study of the nature and properties of materials.

A foundation thus laid, if well laid, would be a proper preparation for entering an architect's office as a student of the profession. He would there find ample sources of information in art, ample opportunities for practice in drawing, and for devoting himself to the acquirement of an architectural education, which, if thoroughly attained, would eventually put him in the front rank of his profession.

Having spoken of the bright outlook of our art, at the termination of another annual period of the existence of the Institute in a corporate capacity, I feel constrained to refer briefly to a species of building now in vogue that would be more honored "in the breach than in the observance."

I allude to the fact that in many of our large cities hundreds of acres of small buildings, of light and flimsy construction, unfit for residences, are now being built, in violation of the principles that govern strength, permanency, and ventilation, and affording no protection against dampness, defective drainage, and other malarious influences.

Notwithstanding the interior *make-up* of these houses is fragile and unfit for occupancy as dwellings, the exteriors are in most cases rather tastefully designed than otherwise; in many cases they are embellished with pressed and enamelled bricks in profusion, and were it not for their slighted and imperfect interiors, they might be considered as a step onward in the progress of domestic architecture.

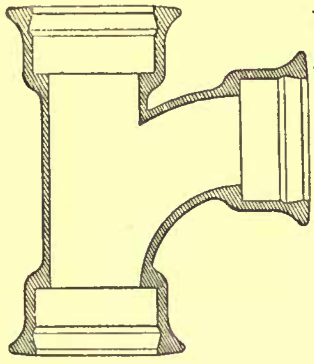
Having limited myself in this opening ceremony to little more than a congratulatory salutation on our eighteenth annual reunion, I have referred but briefly to some of the salient points of our year's work, and will now close with a few remarks on the relations of our art conjointly to ourselves, to our clients, and to the public.

While endeavoring to realize in our works a high ideal of architectural propriety and consistency, it becomes us to seek to educate the public taste to an intelligent appreciation of the beautiful in art, and to awaken juster conceptions of the elevating influences to which it is addressed.

The diffusion of knowledge in this direction would undoubtedly result in a sympathy between the architect and his client, by which a higher level of taste would be attained, and the progress of architectural science be assured.

SANITARY PLUMBING.[1] — XXX.

SIZE AND GENERAL ARRANGEMENT OF THE PIPING.



T Branch with Curved Connection.[2]

HAVING thus described a safe and economical method of jointing our cast-iron pipes, it remains to consider their proportions and general arrangement. We shall, as treating of sanitary plumbing, confine our attention to the piping of the house proper; the consideration of the drainage beyond the house limits belonging more properly to the subject of sanitary engineering.

The Size of Pipes.

The size of soil and drain pipes should not exceed four inches. This is ample to carry off every possible form of discharge or combination of discharges to be met with in plumbing, even in the largest buildings, except for special hotel, laundry or manufacturing purposes. It is a mistake to suppose that because the fixtures are multiplied, the diameter of the soil-pipe must be multiplied correspondingly. It is a rare occurrence, even in a hotel-building, that two or more water-closets are flushed at exactly the same instant, and even if they were, their distance from each other and the capacity of a four-inch pipe would give ample room for the escape of the water. The choking of a pipe is far oftener due to its being too large, or to faulty construction, than to its want of sufficient size. The great perpendicular extension of plumbing pipes also facilitates the discharge, and pipes which for land-drainage would be much too small, will be found ample for plumbing purposes on this account.

When we consider how important it is that the soil and drain pipes should be as thoroughly scoured as possible by the discharges sent through them, and remember that the smaller the pipe the more perfect the flushing, we should be inclined to reduce our soil-pipes to a size even smaller than four inches, were it not for the careless usage slop-hoppers and water-closets are so often subjected to.

The traps of water-closets are very frequently made of pipe as much as four inches in diameter, and large pieces of newspaper are often used where toilet-paper alone is suitable. This, and the carelessness of servants who will throw into a closet anything which is small enough to pass through its trap, would cause a great amount of annoyance and expense, if the soil-pipe were smaller than the trap of the slop-hopper or water-closet. Hence we have fixed upon four inches as both the smallest and the largest size of soil and house-drain pipes, and believe that no other size should be used except for rare and exceptional cases.

The General Arrangement of Soil and Drain Pipes.

All the piping of a house should be in full view. Nothing should be walled in or covered over and rendered inaccessible. One of the first rules of modern sanitary work is to bring everything out of the darkness into light and air, where defects, if they occur, can at once be detected and removed. We are accustomed to running our steam-pipes in plain sight, and rendering them, by gilding or silvering, as ornamental as possible. The same custom is now beginning to apply to our plumbing-pipes. Where they pass through parlors or reception-rooms, they should stand behind movable panels or doors: a little ingenuity on the part of the architect will generally enable this to be done with good effect.

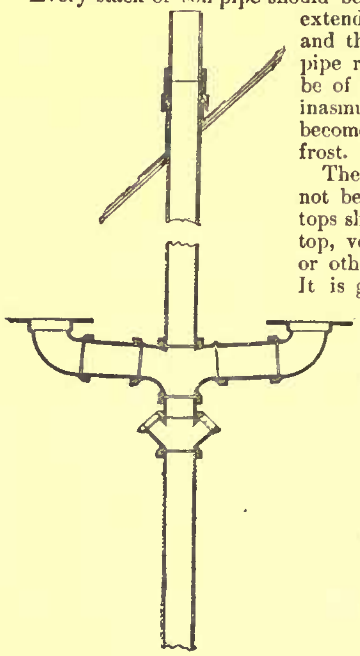
The piping should be arranged to run as direct as possible, and should be concentrated. It will be found very convenient, especially in city houses, to build a broad recess or slot in the masonry of the party-wall, on the line of the bath or toilet rooms, for all the plumbing and ventilating pipes which can be collected together in this

[1] Continued from page 175, No. 459.

[2] These drawings were made for the writer by the Durham House Drainage Company, at his request, to illustrate the points in question.

neighborhood, and, if possible, to run up in this slot the smoke-flue of the furnace, in iron. The heat of the smoke-flue will create a strong circulation in the ventilation-pipe, and at the same time radiate a useful heat into the bath-rooms. The brick recess should be enclosed in masonry on all sides where it passes through the floor, and as high as three or four feet from the ground. This serves to protect the wood-work from danger of overheating. Between this height and the ceiling the recess is open in front, exposing the pipes and admitting the radiant heat from the flue. The various stories are separated from each other by brick platforms, built across the recess on the line of the floors, and made tight around the pipes with cement or mortar. Above the upper bath-room the iron smoke-flue enters a regular brick flue, and the soil-pipe ventilator runs up independently through the roof. The writer has adopted this system in several city houses and found it very satisfactory. The furnace smoke-flue may be constructed of tile instead of iron, if preferred, for greater durability; but if iron be used, it may be made heavy enough to last as long as desired. The recess being, moreover, accessible, the pipe may be renewed at any time without difficulty.

Every stack of soil-pipe should be thoroughly ventilated, by being extended full size from the bottom, to and through the roof. No ventilating-pipe running through the roof should be of less diameter than four inches, inasmuch as smaller pipes are liable to become clogged in winter by snow and frost.



The extensions above the roof should not be less than two feet high, and the tops should never open near a chimney-top, ventilating-shaft, dormer-window, or other opening, for obvious reasons. It is generally sufficient to allow the pipes to remain wide open, without return-bends or ventilating caps, which only serve to obstruct the circulation. Wire nettings may be put over the opening at the top, to prevent objects from falling into the pipe, through accident or malice.

These iron ventilating and soil pipes form the best possible lightning-conductors, because they are always sure to have a good and moist ground-connection, and are composed of a body of metal heavy enough to carry the most powerful charges of electricity without danger of melting; their presence, therefore, in sufficient number, renders the usual form of lightning-rod superfluous.

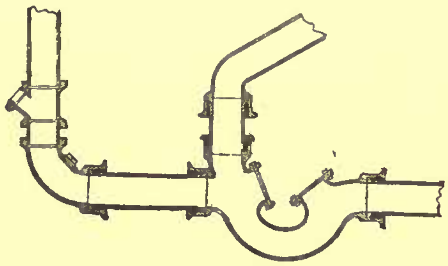


Fig. 234. — System of Piping showing Fresh-Air Inlet within the Main Trap, the upper vent above the roof and desirable, easy curves on the various branches and fittings.

The soil-pipe should be firmly supported at the bottom. The best support consists in the projection of the foundation wall, or in a stone or brick pier built for the purpose. The junction between the soil and drain pipes should be made with an easy bend, of as large radius as possible, to prevent the accumulation of obstructions and the powerful back-pressure on traps caused by the friction of the air in attempting to pass round a sharp bend in front of a descending column of water in the soil-pipe.

The main drain should run along in full view on the foundation-wall, if possible, or supported by piers resting on the concrete, or hung from the joists by strong iron hangers. Clean-out openings should be provided at all places where sediment or obstructions are liable to collect.

Sometimes it is found convenient to rest the drain directly on the concrete. In this case it is customary to form the concrete in a trench whose bottom pitches with the proper grade to accommodate the drain. The drain should have a fall of half an inch to a foot, if possible, or at least a quarter of an inch to a foot; of course, the greater the pitch the better.

The main drain should be trapped with a running-trap of iron just inside the cellar-wall, or, if this is impossible, outside the house, in a man-hole. The trap should always be accessible and should be provided with clean-out caps with air-tight covers. It is a good plan to run a water-conductor into this trap, to ensure its occasional flushing.

To provide for a complete circulation of air through the soil and drain pipes, a fresh-air inlet of the full size of the drain should enter it just inside (on the house side) of the main trap above described. The mouth of this inlet should open outside of the house, at some little distance from any door or window. Figure 234 shows the manner in which proper circulation is provided.

CONNECTION OF IRON PIPING WITH FIXTURES.

Where a fixture is connected with the rigid iron soil-pipe stack, provision must be made for a certain degree of movement or play on the part of the fixture, in such a manner that the movement shall not crack the joint or in any way loosen it. A settlement of the masonry, a jarring or shrinkage of the floors is certain in a new building to alter to a greater or less extent the relative positions of the fixture and its soil-pipe connection. Injury to the joint from this cause may be prevented in two ways. One of these is to use a sufficient length of lead pipe in all cases between the fixture and the iron stack, and the other is to support the fixture directly on the stack itself, and make it entirely independent of the floors and wood-work.

The first method is used with cast-iron piping and with all fixtures having waste-pipes of small calibre. Lead piping has so much flexibility that a section of even moderate length will permit of a considerable movement on the part of the fixture without injury to the joint. Where the fixture is a water-closet, a length of lead pipe having a horizontal extension of two feet, or its equivalent in any inclined direction, will permit of the utmost shrinkage of joists or settlement of walls liable to occur in good plumbing after the plumbing is connected, without injury to the work.

The second method, that of supporting the fixture directly on the stack, has been successfully employed with wrought-iron piping. Figures 235 and 236 show the manner in which this is done. The closet sets on a cast-iron base firmly attached to the piping, so that a shrinkage of the floor may take place without affecting the joint. Still another method of acquiring the required flexibility has been used with wrought-iron screw-joints, where the closet is at considerable distance from the stack. This method is illustrated in Figures 237 and 238. The cast-iron plate here rests upon the floor, but its waste is connected with the soil-pipe by a so-called flexible joint. A slight fall of the closet would simply turn the pipe at the threading through a small fraction of a revolution, as may be understood by examining the drawing.

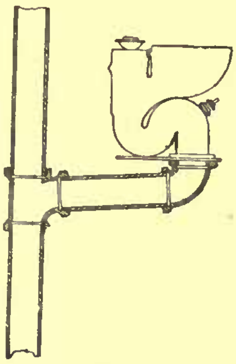


Fig. 235.

Soil-Pipe and short Branch supplying a Water-Closet, with Trap above the floor.

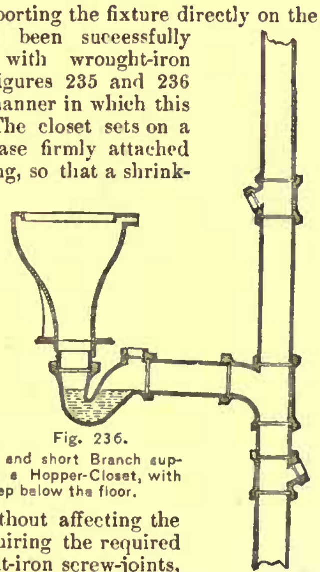
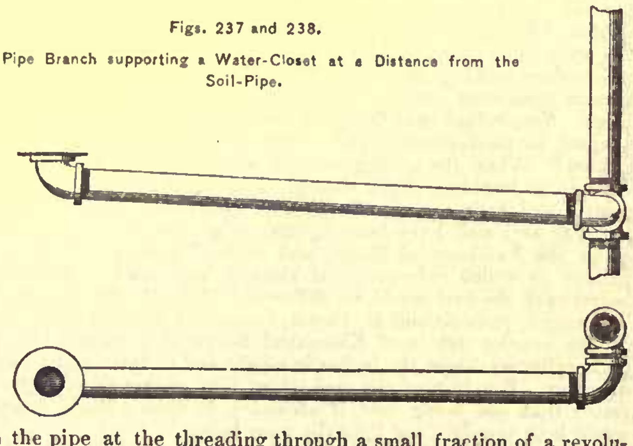


Fig. 236.

Soil-Pipe and short Branch supporting a Hopper-Closet, with Iron Trap below the floor.



Figs. 237 and 238.

Soil-Pipe Branch supporting a Water-Closet at a Distance from the Soil-Pipe.

FORM OF IRON PIPE FITTINGS.

It is important that all angles and bends in our piping should be as smooth and gradual as possible. No sharp angles should be allowed. Thus, if it is ever necessary at any point to use T-connections, they should not be used as commonly cast in common bell-and-spigot fittings, but should have the form shown in the initial cut. But Y-branches are to be preferred to T-branches, and it is very seldom, if ever, that T's are required.

PEPPERMINT AND OTHER TESTS.

The peppermint and smoke tests are useful for application at any time after the house has been occupied, when it is desired to ascertain if the pipe system has remained sound throughout, especially in places where a leakage of water might not occur. To apply the peppermint test, the vent-openings are first to be closed with plugs. A two-ounce bottle of oil-of-peppermint is then carried up to the roof by an assistant, and its contents poured into the soil-pipe at its mouth above the roof. A pail or pitcher of hot water is immediately poured down after it, and the opening is then plugged up. The assistant remains upon the roof until the examination within the house has been completed; otherwise the odor clinging to his clothes will be likely to follow him into the house. The peppermint is volatilized by the hot water, and should any leak occur it will at once be detected and located by its pungent odor, unless the pipes have been improperly embedded in the walls, or are so covered up that access to them is impossible. If they are set as they should be, everywhere in open view, no difficulty will attend the detection and repair of the minutest defect or leak. The smoke test is applied by means of special bellows manufactured for the purpose (Fig. 239). It enables those whose sense of smell is not acute to operate, instead, with the sense of sight.

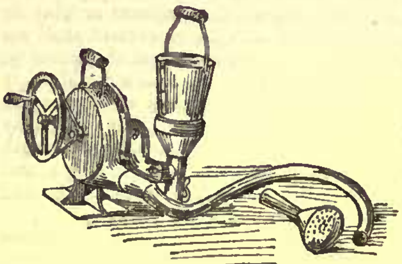


Fig. 239. — Asphyxiator for applying Smoke Test.

ART IN CHALDEA AND ASSYRIA. — III.[1]

IN my last chapter I very briefly indicated the reasons which have led the most recent and profound students of the subject to believe that the vault played a most important part in Mesopotamian construction, that Chaldeans and Assyrians were in the habit of roofing their apartments with barrel-vaults, domes, and semi-domes. Many such students believe that this was the *only* method of roofing that was used, but from this opinion M. Perrot differs. He thinks that wooden ceilings may also have been used. Ancient authors indicate that this was the case, and though M. Place found no traces of wooden ceilings at Khorsabad, such traces were discovered by Layard in the adjacent ruins of Nineveh. Yet M. Perrot does not believe that even in this case columnar supports were used. No stone columns have been found, and no fragments of the wood that else must have been used, and no traces on the pavement of any supports whatever having rested there. M. Chipiez publishes an interesting drawing to show how, by certain simple contrivances, Assyrian carpenters may nevertheless have covered apartments too wide to be spanned by a single beam. The method of framing he adopts is not quite arbitrary since it was suggested by an Etruscan tomb, where the ceiling is built of stone beams in a way very evidently suggested by the properties and the use of wood.

And now we come to a neighboring point that has not yet been touched upon — the way in which these Assyrian palaces were lighted. No windows have been found in their remains, although the walls often stand to a height exceeding ten feet. And the bas-reliefs show nothing that can so be called — only toward the top of certain structures narrow openings that are more properly loop-holes. Nor, indeed, was the great thickness of Assyrian walls well adapted to their construction. How, then, were these structures lighted? When the ceiling was of wood it could not have been difficult to introduce light through a lantern-like opening in the centre, and such a device is common to-day in Armenia. Domes, too, may very well have been lighted by an open eye in the centre, as in the Pantheon at Rome, and in the Parthian and Sassanid palaces to which reference has already been made. But with a barrel-vault the case would be different. Here M. Place adopts the following hypothesis and M. Perrot thinks him justified in so doing. In the interior débris of Khorsabad he found a number of terra-cotta cylinders, about ten inches in height and thirteen and a half in diameter. Penetrating the roof at various points these cylinders (more than one being used, if necessary, to form a single conduit) would both ventilate and light the room below.

Another source of light is found in the immense doorways. The entrances at Khorsabad, even those which admitted to store-rooms, kitchens, and other minor apartments, vary from six to ten feet in width, and are wider still when of more importance. And they appear to have been from fifteen to twenty-two feet in height. "When," says M. Place, "we find architects so reluctant as those of Assyria to cut openings of any kind in their outer walls, using doorways of these extravagant dimensions, we may surely conclude that they were meant to light and ventilate the rooms as well as to facilitate the circulation of the inhabitants."

[1] *A History of Art in Chaldea and Assyria*, from the French of Georges Perrot and Charles Chipiez. Illustrated, translated, and edited by Walter Armstrong, B.A. London: Chapman & Hall, New York: A. C. Armstrong & Son, 1884. Continued from page 198, No. 461.

Of course in such rooms there would never be an excessive illumination. It is probable that, in the best of cases, *we* should have called an Assyrian apartment dark, but we must not forget the difference in climate — the fact that whereas the Northern European builder can hardly secure light and warmth enough, the Mesopotamian may well have been content to exclude both as far as convenience permitted. The habits and customs of the East to-day enforce these ideas, and we must remember, too, that though the Assyrian of old was a very different character from the supine Asiatic of to-day, his home occupations were not of our modern sort, and necessitated no such amount of illumination as we require. The outside world was then the active sphere, and indoors, rest and recreation were the chief things to be considered. But as even these immense doors would not alone have admitted a sufficient degree of light, we must believe in the presence of those top-lights which have already been described. Their existence, and the general Assyrian method of construction agree in convincing us that an upper story was non-existent, and still further proof of this is afforded by the absence of all traces of such interior stairways as would have been required had it existed. Some parts of the palace may well have been elevated above others, but only upon a solid foundation of their own.

Outer stairways and inclines for horses and chariots must, however, have given access to the mounds from the plain below. Such stairs and planes exist in the ruins of Persepolis, and a flight of stone steps still stands at Abou-Shareyn in lower Chaldea. But it is not strange that the ordinary brick stairways should have disappeared long before our day. Mr. Layard believes, however, that he discovered their traces at Nineveh, and in the bas-reliefs they are summarily but unmistakably shown. Steps of very slight inclination formed of basalt or gypsum, give communication at Khorsabad between rooms that lie on a different level.

We have thus explained, to quote M. Perrot's words, "how the nature of his materials and the heat of the climate led the architect practically to suppress windows, while he gave extravagant dimensions to his doors. We have now to give a few details as to the fashion in which these large openings were set in the walls that enframed them. . . . Doorways seem to have been generally crowned with a brick archivolt; round-headed doors occur oftener than any others on the bas-reliefs, but rectangular examples are not wanting." The lintels used in this latter case seem to have been generally of wood or bronze, as but a single stone one has been found (in the palace of Sennacherib) — a block of richly-carved limestone; but the threshold was evidently most often of stone. Three systems of flooring have been discovered — beaten earth, brick pavements, and pavements of limestone glass. Beaten earth is almost the only floor found in Sargon's great palace, except in the harem part, but it must of course always have been covered with mats or rugs. In this harem, and in other palaces, we find a most carefully-executed pavement — two layers of large bricks with a thick layer of sand between them, the lower course of brick being set in a bed of bitumen. In the limestone pavements of certain rooms, and of some of the courts, the blocks are of one shape and of large size, and are set without cement. Where the doorways are two or three yards wide and several yards deep, the sill may be considered a pavement in itself, and it was often richly sculptured; always, however, in merely conventional designs evidently imitated from carpets. It is plain that many of these doorways must have been without doors, closed simply by portières; but in others the traces of stone pivots are clearly seen. Stone sills were sometimes replaced by magnificent ones of solid bronze, and Herodotus speaks of jambs as well as lintels of the same material; but the doors must have been of wood, covered with plates of metal. The splendid repoussé bronze bands, now in London, which were discovered at Balawac in 1878, and bear the name of Shalmaneser III, (895–825 B. C.), were the decoration of a door which must have been nearly twenty-seven feet high, and, to judge from the length of the nails, about three inches thick. Assyrian doorways were not only of great actual importance, but their relative importance was even greater, owing to the lack of other openings in the broad façades. Upon them was concentrated the chief part of the exterior decoration; but as has been said, it was not of an architectural character. Mouldings were absent, except in those rare buildings, or parts of buildings, where stone was employed. At Khorsabad, Botta discovered a small isolated building, probably a temple, built of gray limestone, the wall of which has plinth, die, and a true cornice, composed of a small torus, a scotia, and a fillet, not unlike the Egyptian cornice, but inferior to it in strength, simplicity, and finish. On certain buildings discovered by Layard at Warka, was a decoration composed of semi-columns, built of specially-moulded brick and affixed to the façade, evidently a survival from the days when palm-trunks were similarly employed, for they are simple cylinders, without base, capital, or diminution in the shafts. In the wall of the harem at Khorsabad, a similar decorative device is used, and not without good effect. Long, deeply-cut grooves were also used for external decoration, either alone or in combination with these shafts. On the "observatory" or temple at Khorsabad the grooves are used alone, but further variety was produced by building the wall in alternately recessed and projecting sections. Such simple devices must have been more effective than we might at first imagine, for the strong sunlight of the south would bring out all their possibilities of contrasting light and shadow. M. Place believes that the motive originated in carpentry work; but the crenellated battlements, which were so marked a feature of Assyrian walls, originated naturally from the use of brick. They are simply formed of two or three "steps" of equal width, and between each pair is a space equal to a battlement turned upside down. Of course such rather bald architectural forms were largely dependent for their effect upon color decoration.

Assyrian altars have been found of various shapes, but they need hardly detain us here. Many kinds of *stèles* have also been preserved, but they are more interesting to the archæologist from their inscriptions than to the art-student. Only one seems to have been discovered which has much beauty. It is tall and slender, and fluted after the fashion of an Ionic column, and crowned by a plume of conventionalized palm-leaves, rising from a double scroll. It looks more Greek than Assyrian, and is very different from the stunted obelisk that is a commoner type. Surface decoration played a very important part in Assyrian architecture, since structural ornament was so entirely lacking. It was in its nature perishable, and so we can get a less accurate idea of the true effect of Assyrian buildings than we can of those ancient styles whose beauty was more strictly architectural. All explorers agree that brickwork, whether crude or burned, was never left without some sort of covering. It was always hidden by a coat of stucco, formed (at least at Nineveh) by a mixture of burnt chalk with plaster, in fact a sort of very adhesive white gum. Its thickness was never more than two millimetres, and yet it was an excellent protector, being still often found in good condition. Some exteriors seem to have had no decoration save its shining whiteness, which was far better in accord with the brilliancy of a southern sun and landscape than with the tones of the north, and which had the merit of making even the smallest structure conspicuous in the vast extent of plain; but more often other colors were used to relieve the white. The stages of the observatory found near the palace at Khorsabad were each about twenty feet high, and each was painted in a solid color of its own. The first was white, the second black, the third red, and the fourth white again. There seem to have been seven stages in all, but the upper three have disappeared. Herodotus gives an analogous description in writing of Ecbatana, the capital of those Medes to whom the destruction of Nineveh was due. Seven was a sacred number with the Chaldeans, and their staged towers were probably always thus proportioned. Painted patterns were also used on palace and city walls. Especially in the interior was the decorator's brush employed. A few fragments of such paintings were discovered and copied by M. Place, but the originals quickly perished on exposure to the air. Human figures were mingled with strictly conventional motives in which the palmette and the rosette were prominent, and in some of which we can clearly see the influence of the weaver's patterns. The colors used at Khorsabad were white in the background and black, green, red, and yellow. Similar fragments were also found by Layard at Nineveh, in one of which was seen the white figure of a bull divided by strong black lines from a yellow ground, the decorative borders being of various tints. All colors were used solid, without gradation. Unimportant rooms were entirely decorated in color, while in the more important apartments the lower part of the wall was cased with those sculptured slabs which are the most famous products of Assyrian art, and these reliefs themselves were touched with color.

But the most important element of color decoration was supplied by enamelled brick. The walls of Sargon's town and palace were evidently left white in their main portions, but were decorated with enamelled brick over their principal doors and at the springing of the battlements. Yellow, white, blue, and black were the colors used, blue being predominant. The motives were usually modelled in slight relief upon the clay, and incised lines were filled with color to mark important points. Inscriptions in large letters, white on a blue ground, often accompanied the pictures, a practice which we see perpetuated to this day in Arabic decoration. The figures of winged genii and animals on a very large scale were built up of several units, thus proving great skill on the part of the enameller. The entire decoration of one of the gates at Khorsabad was stripped off, to be set up again in Paris, but it went to the bottom of the Tigris instead. Certain thin glazed tiles have been found, which were evidently part of a coffered ceiling.

Applied metal, as has been said, and even ivory carvings were used in Assyrian decoration. The ivory plaques seem to have been chiselled, enamelled, gilded, and set in frames of wood. "The more we enter into details," says M. Perrot, "the richer and more varied does the decoration of these buildings appear, though in our day they are sad and monotonous enough. . . . Yet when we bring our scanty vestiges together, we find that enough is left to give the taste and invention of the Assyrian ornamentist a high place in our respect. He was richly endowed with the power of inventing happy combinations of lines, and of varying his motives without losing sight for an instant of his original scheme." We cannot here go farther into the subject of Assyrian decoration, but if the reader will consult M. Perrot's colored plates, or, better still, those in M. Place's magnificent folios, which may be obtained in almost every public library, he will have a very clear idea of its qualities, as to both design and color.

It is only of the Assyrian that we have spoken, but the Chaldean decorators must have used similar means, with the important exception that a sculptured covering to their walls was unknown. Painted decoration they must have been familiar with, and the immense mass of broken enamelled brick found on every Chaldean site proves that it was very prominent in their work. Lacking stone, indeed, they must have used it even more freely than their northern neighbors. Even the outer face of their walls was covered with it in the most sumptuous way, showing figure compositions in which the figures, according to ancient writers, were as much as six feet high. The Babylonian enamel was of a finer sort than the Assyrian, as is shown by the more perfect preservation of its fragments; and there is no doubt but that the earlier Chaldean understood the art as well. Indoors, colored decoration must have been very profuse, as sculpture was not used at all for architectural purposes.

Our knowledge is thus sufficient to enable us to imagine pretty well how the Assyrian palaces looked when in their full perfection. We may picture the immense rectangular mound rising from the level plain, a dazzling white mass touched with brilliant colors, in which, as with all Oriental nations, blue was most conspicuous, and crowned with its crenellated battlements. Set back from the edge of the mound were the long lines of the palace itself, similarly colored and similarly crowned, broken at intervals by huge doorways flanked sometimes by enormous sculptured animals, and encircled by a band of enamelled decoration, in which the boldly conventionalized figures and the varying ornaments were relieved against a blue ground. Imposing the mass must have been, and brilliant under the strong sunlight and on its plain of vivid green. But its effect was chiefly that of mere brute mass; beauty in the best sense could only have existed in the applied decoration. Immensity of mass and applied decoration — these were the elements of Assyrian architecture, not the truer excellence that comes from admirable *structure;* and the same may be said of the interior. Doubtless it was very magnificent, but not with the architectural magnificence of the hypostyle halls of Egypt. Structure went for little; color and applied sculpture and metal-work and woven or embroidered hangings — these were the sources of its charm. Truly the Assyrians were mighty builders, yet it is easy to see the immense architectural superiority of the Egyptians, caused, perhaps, not by a truer feeling for art so much as by the inherent qualities of the materials that each employed. And one wonders once again at the way in which the latest popular historian of ancient art — Von Reber — depreciates Egyptian work, deliberately exalting above it the work of these Mesopotamian builders. M. G. VAN RENSSELAER.

THE ILLUSTRATIONS.

ABBEY OF THE HOLY TRINITY AT CAEN.[1]

THE Church of the Abbey of the Trinity fronts the north-west. The architrave of the central doorway is composed of many surfaces of great depth: two-thirds of them are flat and plain, and recede so little, as to afford but small opportunity for light and shade. Its decorations are few and simple, consisting almost wholly of the billet and chevron mouldings, the former occupying the exterior, the latter, the interior circles. In the outermost band, the billets form a single row, and take the curve of the arch; the succeeding circles exhibit them with an unusual arrangement, placed compound, and all pointing to the centre of the door. These, with the addition of quartrefoils, and of some grotesque heads, which serve as key-stones to the mouldings over the windows of the triforium, are the only ornaments which the front can boast.

The capitals throughout it are of the simplest forms, being in general little more than inverted cones, slightly truncated, for the purpose of making them correspond with the columns below. Some few of them have the addition of small projecting knobs immediately below the angles of the impost; while those in the square towers are formed by a short cylinder, whose diameter exceeds that of the shaft surmounted by a square block by way of abacus. The towers and buttresses decrease in size upwards. An architectural peculiarity deserving of notice in this front, lies in the triangular mouldings, observable in the spandrels of the arches of the clerestory. The same are occasionally, though rarely found in other buildings of unquestionably Norman origin, as in the church at Falaire, and in Norwich Cathedral in our own country. They are here more particularly noticed, as serving to illustrate what has been considered an anomaly in architecture of some of the round-towered churches in Norfolk and Suffolk, when the windows are formed with heads of this shape. Antiquaries unwilling to admit that the *flat-sided arch*, as it has been called by a perversion of terms, was introduced into England, prior to the fourteenth century, have labored to prove that such windows were alterations of that period, contrary to the evidence of every part of the building.

The east end of the choir presents a bold termination, pierced with ten spacious windows, that give light to the choir, each of them encircled with a broad band, composed of the same ornaments as are found in the rest of the exterior of the edifice. This part of the church is divided in its elevation into three compartments, the lower containing a row of small blank arches, while in each of the upper two, is a window of unusual size for a Norman building, but with small mullions or tracery. The windows are separated by thick cylindrical pillars, which rise from immediately above a row of windows that give light to the crypt. The heads of these windows are level with the surface of the ground; and the wall, in this subterranean part of the building, is considerably thicker than it is above. The balustrade of quartrefoils above appears coeval with the rest, and may be regarded as tending to establish the originality of the nave of the Abbey Church of St. Stephen.

[1] From Cotman's "*Antiquities of Normandy.*"

Col: Stevenson's: House & Stables: Blue: Hills: Readville: Mass: Mr W: Ralph: Emerson: Archt

Rough Sketch of House & Stables.

General View of Stables Coachman's Cottage

Detail Sketch of Center Gables of the Stables. E.E.D.

Pencil Sketches by E. Eldon Deane.

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W. A. Norris, Archt.

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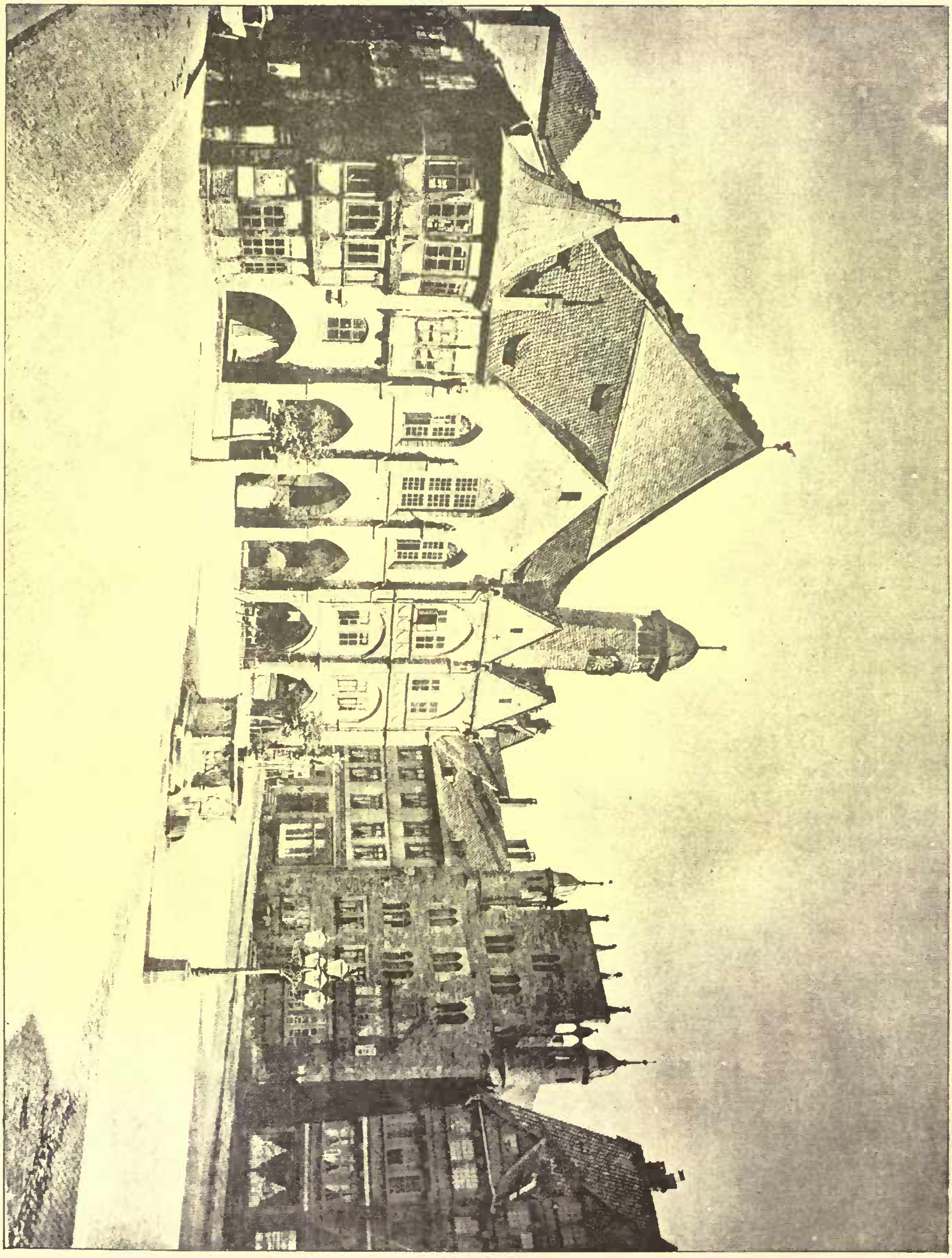

Market Place and Town Hall Hildesheim Germany.

AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 8 1884 No. 463

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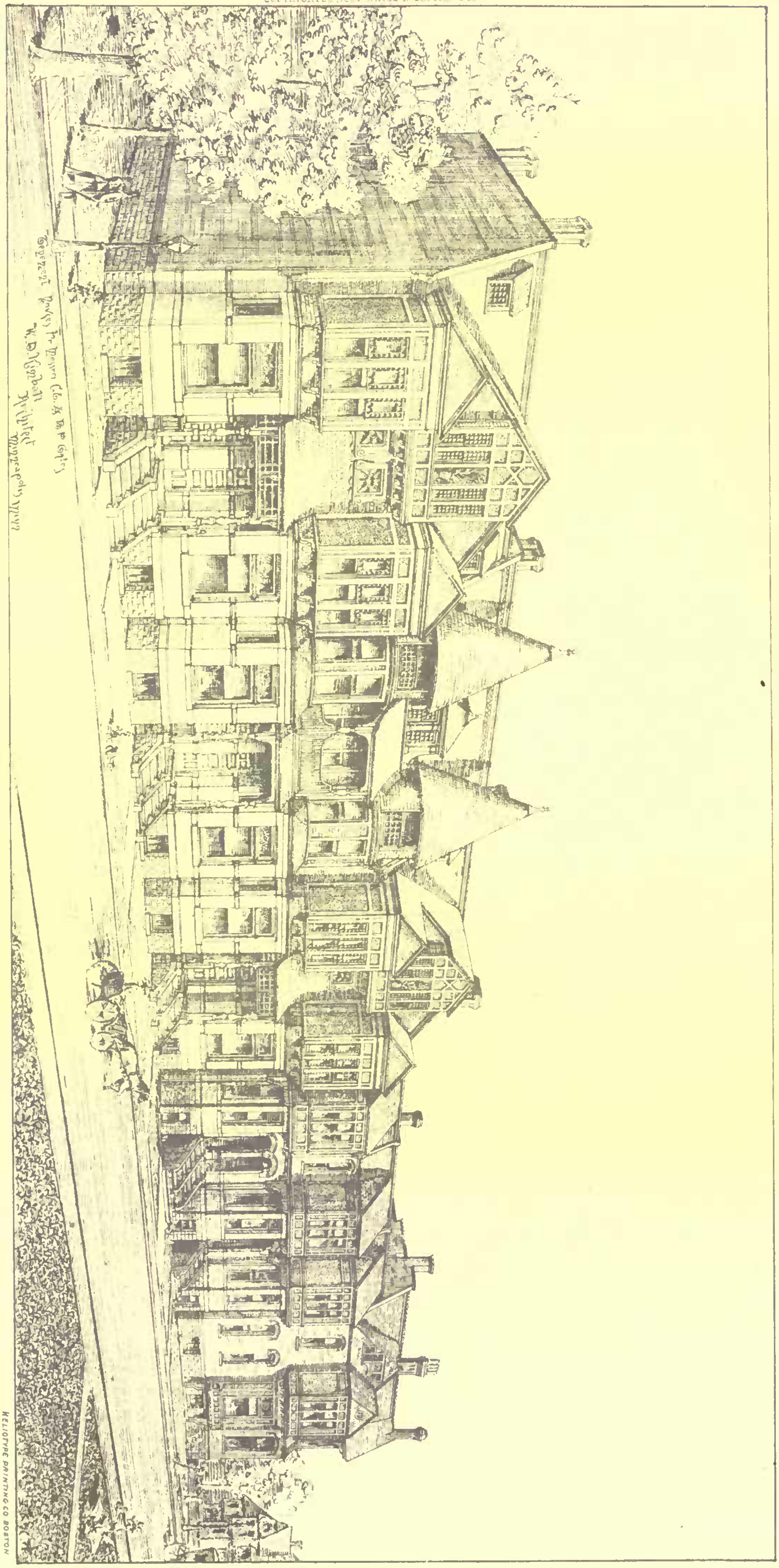
VIEW IN HAMBURG, GERMANY.
(FROM THE BLEACHERY BRIDGE.)



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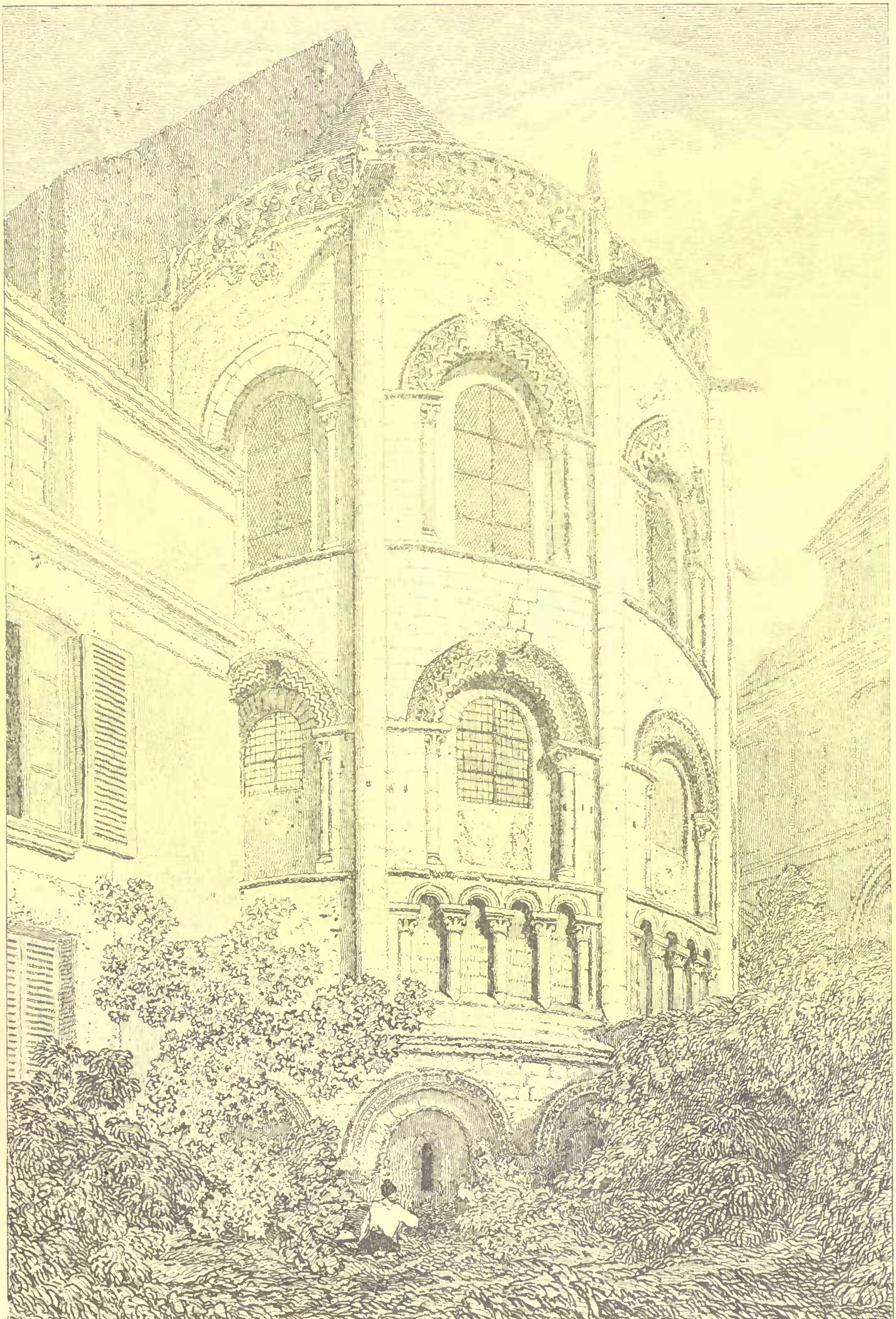

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ABBEY CHURCH OF THE HOLY TRINITY, CAEN.

Finer specimens of the kind can scarcely be seen in Normandy than the two arches which support the central tower; and the decoration of them is very peculiar, consisting altogether of numerous bands of quartrefoils in bas-relief. The sculpture of the capitals is likewise remarkable: that of one of them represents entire rams; while the opposite one has only heads of the same animal at its angles, accompanied with an ornament, which the writer of this article does not remember to have met with elsewhere. The arch that separates the tower from the nave rises higher than any of the rest, and is obtusely pointed; but its decorations correspond with those of the others, and it appears to be of the same date. The string-course in the choir runs immediately below the gallery; but in the transepts, this gallery is upon a different line, being elevated by the interposition of a very beautiful range of small blank arches, between the larger arches below, and the windows of the clerestory; and these latter in conjunction with the small arches, only occupy the same space as the windows of the choir. The northern transept is noted for the curious character of its capitals, many of which taken from Scripture history. But these are, unfortunately, much mutilated.

HOUSE OF E. F. BRADFORD, ESQ., CHELSEA, MASS., MR. W. A. NORRIS, ARCHITECT, BOSTON, MASS.

HOUSE OF WALTER HORTON, ESQ., SHEFFIELD, PA. MR. D. K. DEAN, ARCHITECT, ERIE, PA.

TOWN-HALL, HELDESHEIM, GERMANY.

THIS building, which stands on the Altstädter Mark, dates from 1443. The Roland Fountain, in the middle of the market-place, was erected in 1540.

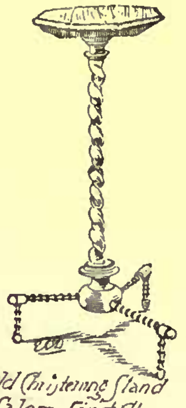
VIEW FROM THE BLEICHENBRUCKE, HAMBURG, GERMANY.

HOUSE AND STABLE OF R. H. STEVENSON, ESQ., MILTON, MASS. MR. W. R. EMERSON, ARCHITECT, BOSTON, MASS.

A BLOCK OF TENEMENT-HOUSES, MINNEAPOLIS, MINN. MR. W. D. KIMBALL, ARCITECT, MINNEAPOLIS, MINN.

THIS drawing shows six houses, part of a block of twenty-four now building, and which will be completed in a month, at a cost, altogether, of $100,000. This block takes up three sides of a square of ground, is finished in part in hardwood, and has all modern conveniences; owned by Messrs. C. E. Gates and B. P. Gates.

AMERICAN ARCHITECT COMPETITIONS. — NEW SERIES.



AS the busy season for this year has nearly passed, the younger men who have in past years evinced an active interest in the little competitions we have held from time to time, may be ready to test once more their skill in design in competition with their fellows. Therefore we take pleasure in inviting their attention to the following

PROGRAMME.

Most people who live in the country, or in the suburbs of a large town, and have sufficient means, usually feel obliged to "set up their carriage," and of course a carriage implies horses, and a building in which the entire establishment can be housed. Therefore we propose as the subject of the present competition a barn such as the dweller in a house that has cost $5,000 would consider an appropriate adjunct of his establishment: but as this may be somewhat ambiguous, seeing that some men think more of their horses than they do of their families, we will say that the proprieties would be best observed if the cost of the barn should range between $1,000 and $1,500.

The barn must furnish accommodation for two horses and a cow; the carriage-room must be large enough for two wheeled-vehicles, and a sleigh, and proper provision must be made for harness, feed, and hay, and the stableman must not be overlooked. Water and ventilation must also be kept in mind.

Required: — A perspective drawing of the barn, elevations of the sides not shown in the perspective, a plan or plans, and a reasonable amount of detail; all to be included on a single sheet 33″ x 21″, within the framing lines. A short description and the result of a *bona fide* estimate must also be furnished. For the best three designs we will pay equal prizes of thirty dollars each.

Conditions:—Drawings must be received at the office of the *American Architect*, on or before Saturday, December 20, 1884.

The three prize drawings are to remain the property of the publishers.

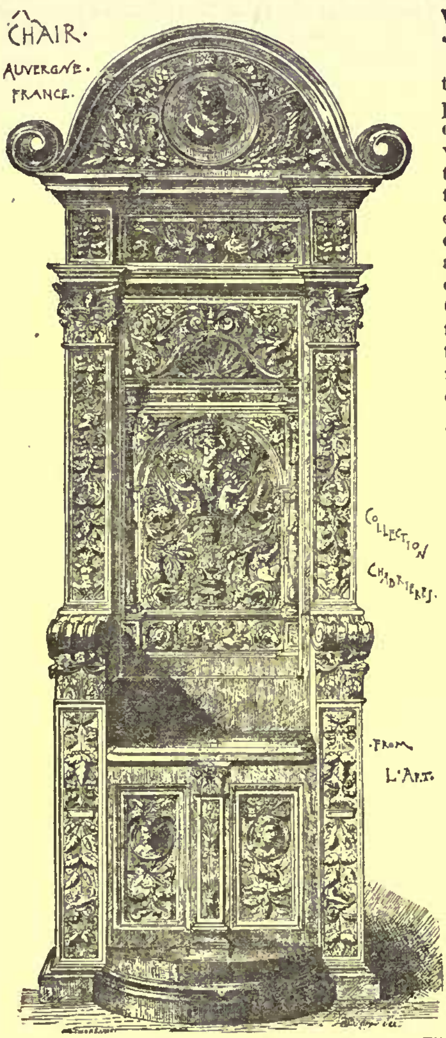
All designs submitted are subject to publication in the *American Architect* at the pleasure of the editors.

All designs must be sent in signed only by a motto — *not a graphic symbol* — the name and address of the author being sent enclosed in a sealed envelope, endorsed with a duplicate motto.

The jury of award will be composed of three architects.

NOTES FROM ABROAD.

PARIS, September 25.



THE eighth annual exhibition of the Society of Industrial Arts is now in progress in the Palais de l'Industrie. In previous years this exhibition has assumed more the character of a Mechanics' Fair, where everything was on view and for sale, from a patent egg-incubator to a Gobelin tapestry; but the persistent efforts of the Society, which, by the way, has had an existence of only a few years, have resulted in a heightening of the character of the contributions, the present exhibit being confined very closely to objects of art manufacture. The committee of reception was apparently of a different opinion from the Illinois farmer whom we once heard stoutly maintaining that agriculture and mining should be classed among the arts. At any rate, machinery, ordinary industries and patent appliances generally have been carefully excluded, whereby the exposition seems to be on a smaller scale than in previous years; but the loss in quantity is more than made up by the gain in quality, and a better opportunity could not be found for studying the art-industries of France. The exhibition has three marked divisions; the first comprising exhibits of manufactures by private firms, the second illustrating the art-industries of the State, and the last including the nucleus of the long hoped-for Musée des Arts Decoratifs, which was inaugurated four or five years ago in the Pavillon de Flore, as a rival of South Kensington Museum, and though considerably enlarged, has not yet found permanent quarters of its own.

In looking over the furniture exhibits one cannot but be struck with the extent to which English ideas have been grafted upon the conventional French designs. It is fashionable in Paris, just at present, to ape the customs and manners of "perfidious Albion;" not quite as much so, perhaps, as it has been in America; still anything English is considered quite correct, and apparently furniture and decorations are beginning to follow the fashion. Many of the tables, chairs and sideboards exposed are of a semi-Jacobean type, with sawn scroll-work and rococo carvings. The greens and yellows and peacock-blues of the draperies, too, suggest the influence of English ideas, though it must be admitted that French taste has the upper hand everywhere, and the greens are not æsthetically dirty nor the rococo carving misplaced. France does not need to borrow much in art from its neighbors.

There is some very good stained glass exhibited by Charles Champigneulle, *ancien maison* Colletier, the establishment which has executed so much work for the old cathedrals, including that in connection with the restorations of Notre Dame. One window shown is designated as being in the style Renaissance Russe — a rather unusual term, by the way — and is exceedingly strong in design and color; red, yellow, a pale blue, and a light-brown shade being used very harmoniously in interlacing bands and fretwork of a Celtic character, with a central figure in glass-mosaic. There is also some finely-painted glass for the hôtel of Mme. Judic, and a large glass-mosaic, blazing in most brilliant primary colors, for one of the northern cathedrals. This exhibit is placed near the centre of the ground-floor, in a structure which has for its façade the remains of the Abbey of St. Amand at Rouen, a fine example of a Gothic street-front. Opposite this is the pavillion of the President, erected by the Union Centrale des Arts Decoratifs, with two large bronze lions by Cain at the entrance, and large decorative faïence panels by Ehrmann on the walls. In one of the adjoining exhibits is shown a very spirited tile-panel by Sandier, representing St. Catharine, a strikingly artistic effect in pink and yellow, with a few dashes of bright colors.

Some twenty-eight of the choicest Gobelin and Beauvais tapestries are exhibited in a room together, the rival manufactories being on opposite sides. It is hard to judge a modern French tapestry impartially. One involuntarily thinks of them as paintings; indeed, the "Diane Selène," after Mochard, which is hung in the Museum, is really better than the original painting. As tapestries, as wall decorations, they do not seem in any way successful. Many of the older works, while being in a measure pictorial, are essentially decorative in character, and as tapestries, are far ahead of any of the laboriously-executed works turned out by the Gobelins or Beauvais. It recalls the much-debated question of wooden vaulting, which is right or wrong æsthetically according to one's own standard. The present generation of French artists call for a wall picture with all the texture of a fabric and none of the gloss of an oil-painting, and the modern tapestries are accordingly evolved. But that Frenchmen thoroughly appreciate the value of the old tapestries has been shown in the decoration of the new Hôtel de Ville, where the walls of the Prefet's apartment are hung with fine old tapestries, rich in dark tones and simply expressed figures, made long before the modern Gobelins were thought of.

Few who visit the National Porcelain Factory at Sèvres ever have any idea of the years of preparation required to fit one to make even the humblest of the pieces there shown. In this, as in many other of the art-industries, the French make haste very slowly, and the way in which the foundations for artistic work are laid is shown by the exhibit from the Sèvres drawing-school. It is interesting to note that in preparing a pupil for decorative work on china, the studies are almost entirely of figures from life and the east, and of details of plant-life and natural arrangement and growth. We remember a leading decorator who used to say that the best study he could find was what he found among the rushes and grasses growing wild beside a little brook in his garden. In the exhibits from the schools of decorative art at Paris and Limoges the same principle is observed. The studies exhibited are nearly all related to porcelain or pottery of some kind, and the hard work, the "grind," is shown to be in the direction of careful, conscientious study of plant forms and of the human body. Nor does such study cease with school work. In an adjoining room is a large collection of sketches and designs by P. V. Galland, and the same kind of study from nature is manifested here as in the work of the beginner at Sèvres, or in the Rue St. André des Arts. In this connection it is interesting to note a contribution to the exhibition by H. D. de Folleville, styled "the history of a branch of clematis," being careful sketches of a growing branch, made successively at short intervals from the time of the first sprout until the full blossom appeared. Together with this the same artist sends in some designs for a ornamental iron-work, intended to show how such a study can be made of practical help.

Several well-known architects have made very interesting contributions to the exposition, contributions such as would probably very seldom be drawn out by a similar exhibition in Boston or London.

M. A. Normand has sixty-four of the drawings made for the Hôtel Pompèien of Prince Bonaparte, mostly studies of interiors and bits of detail, with some full-size details and a few of the cartoons for the decorations. Paul Sedille has a very complete exhibit of studies for the recently-erected Magazin du Printemps, including very explicit plans of the heating and ventilation, elevations, scale-drawings, details, models of the decorative statues, portions of the bronze and iron work, gutters, heads, leaf-work, cartoons for the decoration, and photographs of the work in different stages of progress. They show how thoroughly and conscientiously a good architect can study his work, and how cautiously a Frenchman will feel his way on paper or in plaster, before committing any details to stone or iron. This exhibit did not include any preliminary work; but of a single qay there were shown, first a study of the whole to a small scale, then the same to a larger scale, then a portion, colored, to a scale of .075 = 1000; then a large study, carefully figured, and finally full-sized drawings and models.

Architects who have found so much to draw from in the work by Henry Revoil on the Romanesque architecture of the south of France, will be glad to know that a similar work, entitled "*L'Art Bysantin,*" is in course of preparation by Charles Errard, under the direction of M. Revoil. A number of the sketches and measured drawings for the work are here shown and attract a great deal of attention from those interested in the subject, as aside from their value as documents, they afford many useful hints in drawing, and suggest a wide field for study. The work is to be published under the patronage of the Ministry of the Fine Arts. C. H. B.

IN THE FOOD GALLERY OF THE HEALTH EXHIBITION, LONDON, ENGLAND.

London, September 29, 1884.

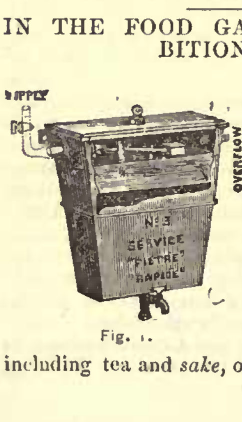


Fig. 1.

As one of the practical illustrations of food, which constitutes the first group of the exhibition, a "*Nippon Rioriya,*" or Japanese restaurant, has been opened by Mr. Matsusawa, of Tokio. With Japanese *chefs,* chopsticks, and the small dinner service peculiar to Japan, there is left little doubt as to the authenticity of the viands; they all possess an aromatic flavor so totally different from that to which one is accustomed. Here is a specimen bill of fare, for which a dollar is charged, including tea and *sake,* or Japanese wine, while paper napkin and a Japanese fan are presented to every diner: *misoshiru,* or soup from a fermented mixture of Soy beans, wheat and a salt; *kuchitori,* a dish composed of fresh eggs and sea-weed, fetched up by divers from a depth of three hundred feet, kept for a long time and boiled twenty hours; *hachimono,* or roast; *choku,* dressed vegetables; *han,* boiled rice; *wanmori,* soup; *sunomo,* salad; and *konomono,* vegetables, salted or preserved in *miso* (the fermented mixture above-mentioned). Be it observed that the courses do not follow one another in regular order, but are served altogether, in little porcelain saucers and lacquered wooden bowls, on a diminutive table, so that the diner can pick from each in turn, according to his own sweet will. The dining-room has been fitted up entirely in Japanese style, and the dinner is under the auspices of the Japanese Commissioners.

The Manchester Vegetarian Society, or, to be more correct, the Society of Diet Reformers, on the basis of the vegetable kingdom, whose headquarters are at Manchester, has been arranging a series of thirty-seven-cent banquets, by way of disseminating its views. The first was presided over by that genial author, chemist and metallurgist, Mattieu Williams, who is theoretically, if not practically, one of their kidney. He looked forward to the time when we should digest our food ourselves, instead of getting it done for us by animals, by proxy, as it were, a happy Arcadian condition which would render it unnecessary to employ a certain section of the community in doing the dirty work of slaughtering.

The food group is divided into twelve classes, devoted to prepared and unprepared alimentary substances from the animal and vegetable kingdoms, beverages of all kinds, new varieties of food, practical demonstrations of cookery, the chemistry and physiology of food and drink, with the detection of adulteration, diseases due to improper food, practical dietetics, and models and diagrams relating to the group, and finally, apparatus and processes, machinery and appliances connected therewith, to which latter classes the following notes will more immediately refer.

It should first be mentioned, however, that the Science and Art Department, South Kensington, and the Parkes Museum of Hygiene have sent valuable collections of food-products, with their flesh-formers, nitrogenous matter, fibrin, etc., shown by the actual fat and other substances which they contain, so that one can see at a glance not only the amount of nutriment, but also the component parts of the mutton-chop or loaf that one charges into the human boiler, to raise steam for the battle of life. Crackers, called "biscuits" on this side, are present in infinite variety in the large food gallery. There are the American "sea-foam" wafers, side by side with the traditional "Bath Ollivers," invented by Dr. Olliver, who flourished whilom in the city of Bath; and the famous "water biscuits," of Tunbridge Wells, that were eaten on the "Pantiles," the fashionable promenade of that inland watering-place, as far back as the time of the Stuarts. Close by, Peek, Frean & Co., of London, give away one of their new "health biscuits" to every visitor, as a big advertisement, and they say they are all the better pleased if the same people go to them three or four times over. Huntley & Palmer, of Reading, Berks, whose names are as "familiar in our mouths as household words," on both sides the herring-pond, have erected a really handsome pavilion, that was designed by Owen Jones, for the display of their three hundred and sixty varieties of biscuits, to which they have now added a new one made with honey, partly with the laudable object of encouraging bee-keeping.

The filter most noticeable at the "healtheries" is, without doubt, the *filtre rapide,* invented by M. P. A. Maignen, which has received many medals and has also been selected by the British Government for the Nile Expedition. M. Maignen is a wine-grower at Bordeaux, and originally invented a filter for clarifying the produce of his vineyard, and it is through thus studying the subject of filtration that he was led to evolve his present filter, which has achieved a remarkable success. In a treatise on "Water, Preventable Disease and Filtration," M. Maignen remarks that the word "filter" is traceable, in almost every language, to the Anglo-Saxon "felt," being *filt* in Swedish, *filtre* in French, *feltro* in Italian, and *feltrum* in Latin. Felt, accordingly, composed of the non-combustible and non-putrescible material, asbestos, is the base, though not the leading principle of the *filtre rapide.* In order to act on the impurities held in solution, M. Maignen employs his "carbo-calcis," a very pure form of animal charcoal prepared with lime, deposited automatically ont he asbestos-cloth, and covered with the same substance in a granular form. In the domestic filter, the framework consists of a hollow, perforated cone, made of earthenware, which can readily be withdrawn and cleansed; while in the cistern variety the filtering-frames are of zinc, and flat, instead of conical, thus presenting a larger surface for filtration. In the annexed drawings, Figure 1 shows the internal portion of the *filtre rapide;* Figure 2, the exterior; and Figure 3, its application to the water-service of a house. In Figure 3, *A* is the house cistern; *B,* the filter; and *C, D, E,* supply-tanks, which may be used to store filtered water, in case the flow from the filter be not sufficiently rapid for requirements. The arrangement may be made in view of affording or

Fig. 2.

not a storage for filtered water, or for filtering the whole or only a part of the supply, at pleasure; but, whatever form and arrangement of the *filtre rapide* be adopted, it is constructed according to M. Maignen's leading principles. That is to say, it contains no mate

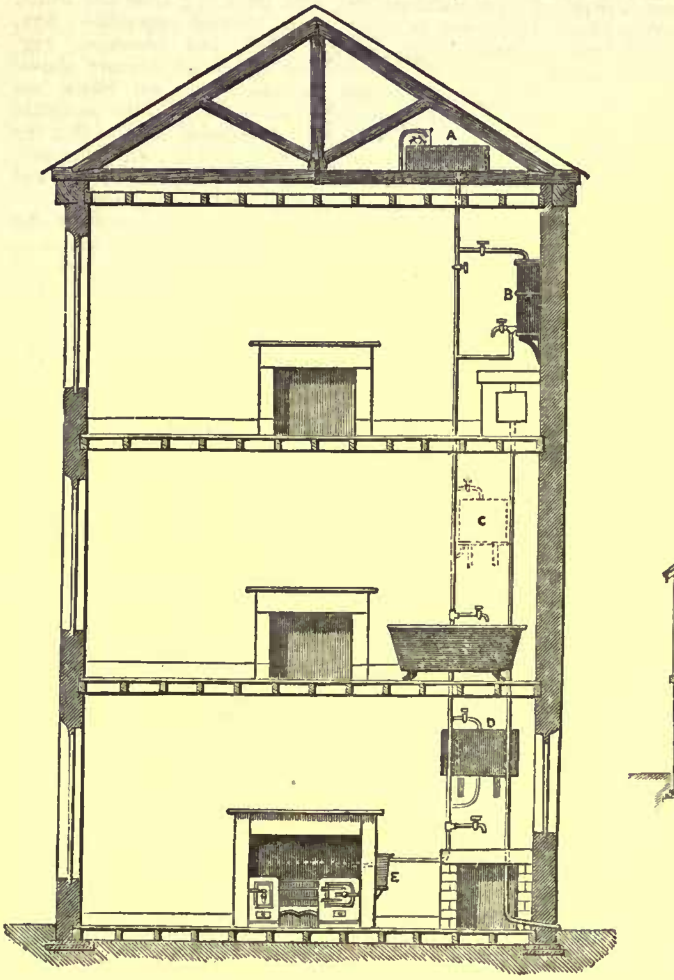


Fig. 3.

rial which can communicate an injurious or offensive quality to the water passing through it. It removes from the water not only all the suspended impurities, but also all the organic and inorganic matter held in solution; it aerates the water, during filtration, by means of a small pipe; finally, the filter is so constructed that the householder can himself take it to pieces, throw away the old filtering medium which has done its work, and replace it with a new charge at slight trouble and expense. To remove hardness in water, M. Maignen has brought out his *anti-calcaire*, in the form of a powder, which may be distributed automatically, and in any desired proportion, by a hopper fitted to the shaft of a small water-wheel, turned by the water entering the supply-tank.

Scarcely less important than pure water are pure milk and undefiled butter. Those essentially domestic engineers, Thomas Bradford & Co., of London, Manchester, Salford and Liverpool, have put up one of their model dairies, for which they received the first prize at the London Dairy show of 1882, and the silver medal of the Royal

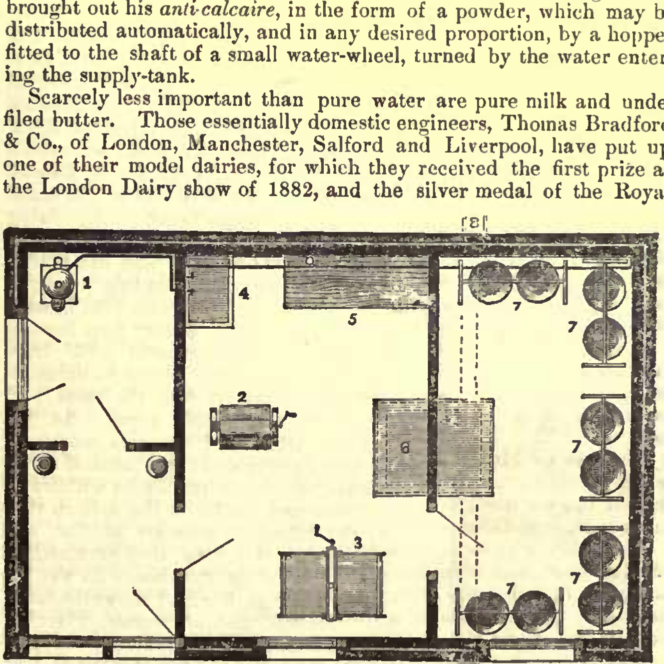


Fig. 4.

Agricultural Society of England, at the York meeting of last year. The accompanying plan and section (Figs. 4 and 5) show the arrangement of the building, which may be adapted to any number of cows, and for which they are prepared to furnish specifications and estimates. The dairy is built of glazed bricks, and consists of four rooms, as under. The vestibule, serving to receive the milk-cans, communicates with the boiler-room, containing the heating-apparatus, marked 1, which also affords sufficient boiling water for scalding the utensils. The milk-setting room, at the other end, contains the shallow, enamelled, cast-iron pans, 7, that turn on vertical axes in iron frames, an arrangement which permits of skimming the milk without disturbing it. The middle is the butter-working room, fitted with the "diaphragm" churn, 2; the new "Albany" butter-worker, 3; a washing-trough, 4; and table, 5. This and the milk-setting room have also a ventilating-chamber, 6, constructed of glazed bricks and having a slate top, which serves as a table. This chamber receives its fresh-air supply from earthenware pipes, 8, communicating with the exterior of the building. The roof is made on the cavity principle, and is surmounted by a "Walness" exhaust ventilator, which, assisted by the hot air led directly from the boiler, rarefies the air in

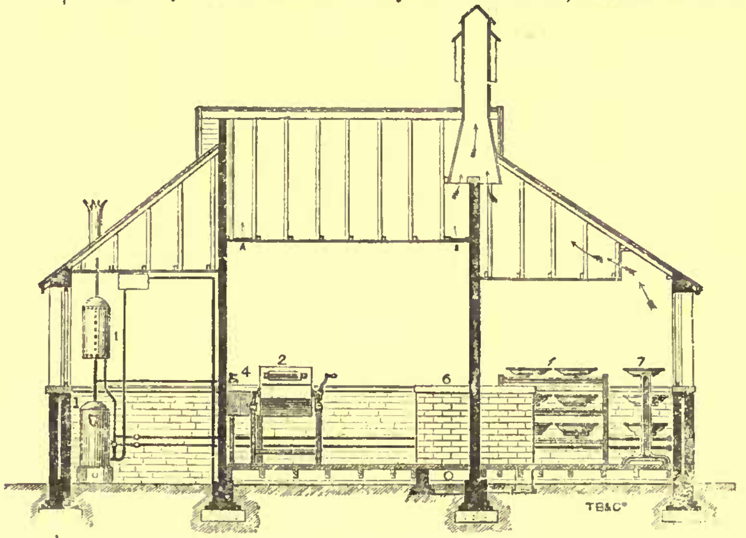


Fig. 5.

the roof-chamber, induces a gentle but continuous current through the dairy, and draws in the fresh air through the channels above mentioned. There is no drain inside the building; but the floor, partly of slate and partly of encaustic tiles, is laid with a slight fall. Along the side is an open earthenware channel, for conveying the drainage into a trapped grid, placed outside the building.

Next door to Bradford's dairy is the stand of Messrs. Joseph Davis & Co., of the Fitzroy Works, London, whose polytechnic barometers, lent to the Commissioners, are distributed about the building. Among a variety of dairy apparatus, they exhibit an ingenious combination of the lactometer with the thermometer, by which the specific gravity of milk or other liquid may be observed at the same reading as the temperature. In the latest form of this combined instrument, the thermometer-tube is carried up above the lactometer scale, for greater ease of observation. In another class, this firm shows a new respirator, for arresting injurious dust that would otherwise find its way into the lungs. The newest form is made of celluloid, which is strong and at the same time very light. It is fitted with valves opening inwards, for the air inhaled (which is filtered through a cotton-wool, easily impregnated with any disinfectant, and renewable at pleasure), and also with separate valves, opening outwards, for the breath exhaled.

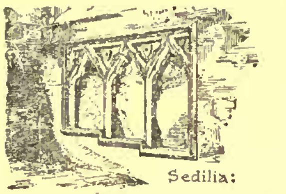
Nearly opposite, the stand of the Anglo-American Tin Stamping Company, with its large collection of culinary utensils stamped out under the press, and some of them enamelled and decorated with patterns that make them look just like earthenware, is another interesting stand. This contains the exhibits of Webster's Patent Aluminium Crown Metal Company, which probably finds a place in the food gallery because it contains tools for eating with; but it also contains a great variety of other articles, ranging from presentation swords to the fittings of dressing-cases and work-baskets. All of them are made of aluminium bronze, which is claimed to possess the brilliancy of silver, with the edge of steel, while at the same time not being liable to oxidation. Hitherto it has not been found possible to produce aluminium at a reasonable price, nor in a pure state, so as to unite with other metals; but Mr. Webster, of Birmingham, has succeeded in producing aluminium economically and without a trace of iron.

In the immediate neighborhood is the counterfeit presentment of the diet, on the different days of the week, given to various classes of prisoners, both on "hard labor" and on "light labor." There are also models, sent by Col. Sir E. F. Du Cane, K. C. B., Surveyor-General of British Prisons, of cells in a prison, showing the method of ventilating and warming, the fittings, furniture, etc. One model, a full-sized model of a convict cell, has proved to be a great attraction. Each prisoner has a cell of not less than eight hundred cubic feet capacity; the window has a ventilator, which can be closed and opened by the prisoner, to admit air from the outside. The cell is further supplied with warmed air through a flue, leading from a hot-air chamber under the corridor floor, and entering the cell through a grating. The flues lead to a horizontal trunk in the roof, whence the air is drawn through the extraction-shaft by the action of a furnace. A gas-light is provided for each cell, accessible only from the corridor, and out of the prisoner's control; while flues are provided for carrying off the vitiated air. A bell communication is fixed in each cell, which sounds a gong in the corridor, while an index label is thrown out at the cell, to show from which cell the signal has proceeded. The cell doors and frames are of wood, lined inside with sheet-iron, and have a glazed hole, with drop-cover on the corridor side for inspection. The cells are made complete for two hundred dollars, or one hundred and twenty-five dollars by convict labor.

J. W. P.

PHOTO-MECHANICAL PRINTING PROCESSES.[1] — I.

NEW DEVELOPMENTS OF THE WOODBURYTYPE PROCESS.



Sedilia: St Cuthbert's Darlington Eng.

THE printing-press has been the main factor in bringing about that interdiffusion of thought, which has resulted in the widespread and complex civilization of to-day; and it is especially of interest to note that the productions of the printing-press have, even from the first, been permanent: that is to say, the ink used has been one made with a basis of lamp-black, the pigment which, of all others, seems best able to resist the continual breaking strain of time, while writings may be, and indeed often are, gone in the course of a few years.

The introduction of block printing into Europe, the discovery of a new world, and the construction of the camera obscura by Leonardo da Vinci, are events which mark the latter end of the 15th century, a period memorable in the history of our civilization of to-day; the beginning, indeed, of that active fermentation of thought which has made the world what it now is.

When Leonardo da Vinci looked upon the wonderful nature-picture in his camera obscura, and dreamed of the possibility of fixing this shadow, it is difficult to imagine that his wildest thoughts could have led him to suppose the possibility of converting that shadow into a printing block, and making copies in the then new printing-press.

The honor of first fixing the camera image belongs to Nicéphore Niépce, who, in or about 1816, first transferred and fixed the image of the camera upon paper, and not only this, but Niépce actually made printing plates by photographic agency before the year 1827. Those pictures and printing plates, which represented landscapes or general views, were very imperfect, it is true, but, some years before 1827, he made true camera pictures, which were fixed in the technical sense, that is to say, would bear subsequent exposure to air without disappearing, and he thus laid the foundation of those more perfect elaborations of his processes developed by Daguerre and by Talbot.

The perfection of united photography and printing is thus to make the shadow into a solid substance, and so to obtain a plate or block from which impressions can be taken on the printing-machine, and in this direction much practical progress has been made since the time when it was my privilege last to address you.

One point to which allusion has just been made may perhaps be again mentioned. The printer, whether he works from type, from an engraved block, or from a printing surface obtained by the aid of photography, can select his pigment, and, as a matter of fact, he generally selects one of which the basis is lamp-black; consequently, exposure to light and air will not cause the print to fade. The photographer, who makes his pictures by a photo-chemical method, has to content himself with such a coloring material as he can get — generally metallic silver or a mixture of this metal with gold. The consequence is that the earlier photographs are now mostly faded, and one may safely say that not a single copy of Fox Talbot's "*Pencil of Nature*" can be said to have altogether survived the forty years or so which has elapsed since its publication. Notice the copy which is lying on the table, and see if you can find a single picture which shows no sign of fading. The first photo-mechanical process, however, which gave really good representations of scenes of nature, is the photoglyphic method of Talbot, and, although the gradations of tone are not represented in quite the same degree of perfection as is the case with Talbot's pictures by his calotype or silver-printing process, we have the enormous advantage of permanency. Here are some examples of Talbot's photoglyphic method, printed in ordinary carbon ink from the intaglio plate, and issued with the *Photographic News* in 1858. Where, indeed, will you find a silver print a quarter of a century old which shows no sign of fading?

To unite the permanency of the press-print and its rapidity of production with the exactness of the camera picture is the aim of the photo-mechanical experimentalist; and let me now pass on to some of the advances made since the date of my last lectures.

During 1878, Dr. Eder, of Vienna, published a most comprehensive monograph upon the "Reactions of the Chromium Acids and the Chromates on Organic Bodies;" and, considering how largely progress in matters of actual practice is dependent upon sound theoretical knowledge, one is not likely to be wrong in attributing much of the recent progress to the labors of Dr. Eder. The series of articles in question will be found in the volume of the *Photographic News* for 1878. One of Dr. Eder's latest discoveries may be mentioned here. He finds that ferricyanide of potassium tends to make gelatine insoluble, and that exposure to light tends to restore solubility. Possibly useful methods of working may be founded upon this observation.

Great progress has been made during the past five years in the application of photography to lithography and type-block printing; indeed, at the time of my last lectures, it was the exception to find a London printer who made use of photo-transfers for litho work, or of photo-etched zinc blocks for type-printing; but now it would be difficult to find a large London printing-house where these are not in regular use.

From the general to the particular, that is to say, to the special subject of this evening's lecture — printing by the Woodburytype method.

The old Woodburytype method, in which the mould is made by the hydraulic press, has not been improved to any notable extent, but new modes of working have been devised, in which the mould is made without the aid of the hydraulic press; indeed, more than this, for Mr. Woodbury has quite recently devised a method of working in which the gelatine relief is itself the printing-surface, this gelatine being covered with a sheet of thin tinfoil, cemented down by means of India-rubber; but before describing this, the newest and most successful modification, let me call your attention to some of the modes of making a printing mould from a relief without the help of the hydraulic press.

What is now going to be demonstrated will illustrate to you a process for moulding the relief, which was devised by M. Gustave Re. A compressible box, placed upon the bed of this small hand-press, is filled with plaster of Paris in a dry form, and a sheet of tinfoil having been laid over this, the gelatine relief is placed on the tinfoil, and pressure is applied. It is easy to understand that under these circumstances the tinfoil will be forced into all the details of the relief; but in order to produce a solid mould suitable for printing from, it is necessary to take means to cause the backing to consolidate itself together, and for this purpose some water is poured into an outer casing which surrounds the moulding box. Soon after the water has penetrated into the compressed powder, setting takes place, and as this is always accompanied by expansion, the metallic foil is still more closely compressed against the gelatine relief. It is scarcely necessary to say that the press is kept closely screwed up until the plaster has thoroughly set. It is my impression that no commercial use has been made of this ingenious method of moulding, but it, like many other processes, rests ready to hand for any person who may wish to make use of it, or to improve it. Methods of making the printing mould by rolling pressure, instead of the direct pressure of the hydraulic press, have only been decidedly successful when extremely thin sheets of metal, such as tinfoil, have been used, as a thick plate of lead, or other soft metal, extends considerably in one direction when under the action of the rolling press. Casting a printing mould from the relief in sulphur, or in what amounts to about the same thing, the so-called Spence-metal, has been suggested, and Mr. Warnerke has carried the method into practice with success. By melting sulphur at a low temperature, and stirring in about one-sixth of its weight of black lead, a very good casting material is obtained, and this can be easily illustrated to you. Here is a relief which has been developed on a piece of thick glass, and warmed up to a temperature of nearly 50° Centigrade, and having placed a metal rim round the relief, the next step is to steadily pour over it the mixture of sulphur and black lead, so as to form a cast about an inch thick. When this is cold, Mr. Barker will separate it from the glass and make a print from it by the usual Woodburytype method, that is to say, by pouring on to the mould a pigmented, gelatinous solution, laying on a sheet of paper, and then pressing out the excess of the colored gelatine solution by bringing down a rigid and truly flat slab of metal on the paper. When the gelatine has set, the cast in pigmented gelatine will prove to be a perfect picture, showing all the gradations of the original photograph by various thicknesses of the tinted gelatine.

It will interest you to see some casts which Mr. Barry has made in brass and iron from the Woodbury relief, and although these do not appear to possess that perfect evenness of surface which is an essential in printing by the Woodburytype process, they are likely to have considerable value for decorative purposes.

Now, as to Mr. Woodbury's new development of his process, which he calls stannotype. There are two stannotype processes — the old and the new; but the former can be summed up in a very few words, especially as it has been altogether eclipsed by the latter.

The gelatine relief is developed on a rigid support, such as a slab of plate glass, and when the relief is dry a sheet of tinfoil is made to adhere to it, and at the same time to take a perfect impression of the details, by pressure under a rolling machine. The next step is to deposit copper by the electrotype method on the tinfoil, the thickness of the copper thus deposited amounting to about three or four times that of the original tinfoil. The copper backing is now washed and dried, after which a warm sheet of glass, covered on one side with a layer of resinous matter, is laid — coated side downwards — on the coppered plate, and, by the application of a steady and prolonged pressure, the softened resinous matter is made to accommodate

[1] Cantor Lecture delivered before the Society of Arts by Thomas Bolas, F.C.S., and published in the *Journal of the Society of Arts.*

itself to all the inequalities of the electrotyped surface. The whole being now allowed to cool, the complex cast is removed from the gelatine relief, and this cast is used as the printing surface. If you have followed my remarks, it is needless to remind you that the cast consists of the tinfoil facing which was moulded directly against the gelatine original, then the backing or stiffening of electro-deposited copper, next the resinous cement, and finally the rigid plate of glass intended to give strength or body to the whole. Mr. Barker will make a print in a mould of this kind.

The new stannotype process necessitates the use of a transparency as the original photograph under which the gelatinous tissue is exposed; and as regards the preparation of the sensitive gelatine, its exposure and development, there is no need for me to say anything, as this matter was fully treated of in my previous lectures. Carbon transparencies made direct from the original negatives are used, and the representative of Messrs. Woodbury, Treadaway & Co., who is about to demonstrate the whole process, has just developed such a transparency in hot water, and he will now proceed to intensify it by means of a solution of permanganate of potassium.

A sheet of gelatinous tissue, which has been exposed under a similar transparency, is now soaked in water until flaccid, and laid face downwards on a slab of glass, perfect contact being established by the use of the "squeegee." The glass to which the tissue now adhere is next placed in hot water, where the paper backing is stripped off, and all that gelatine which has not been rendered insoluble by the action of light is washed away. In this way a negative relief is obtained on the glass, the high portions corresponding to the light shades of the original subject, and the low portions to the deep shadows. When dry, this gelatine relief itself forms the mould in which pictures are cast or moulded by the ordinary Woodbury method; but before the gelatine mould can be used to print from, its surface must be coated with tinfoil. To do this, a thin solution of India-rubber in benzole is run over the plate, and a sheet of tinfoil being laid on, intimate contact is established by passing the whole between rubber-coated rollers — in fact, an ordinary wringing machine.

All is now ready for the printing. Mr. Woodbury's assistant takes the mould, adjusts it on the bed of a small press, oils the face slightly by a pad of oiled flannel, pours on the gelatine solution charged with coloring matter, lays on a sheet of paper, and closes the press, taking care to leave it closed until the gelatine is thoroughly set, when he will strip off the print.

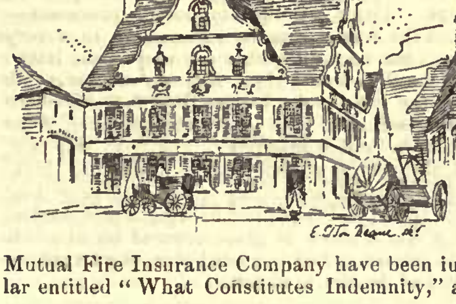
This, then, is the new stannotype process, as adapted to the requirements of the general photographer who may wish to make fifty prints or more from a negative.

Another application of the Woodburytype method is the so-called photo-filigrane process, in which the water-mark of paper is imitated by rolling a Woodbury relief against the paper with a considerable degree of pressure, the paper being rendered more or less transparent according to the degree of pressure, or in other words, according to the thickness of the relief at any one particular point. In this way photographs of all kinds can be reproduced in water-mark form, and Mr. Barker will show you how very rapidly impressions of this kind can be made on the paper. The method in question is worked commercially by Messrs. Brown, Barnes & Bell, of London and Liverpool, this firm having been good enough to send me the interesting specimens which are before you.

The Woodbury process is specially adapted for making transparencies to be exhibited by means of the optical lantern, and Mr. George Smith, who has been exceptionally successful in executing work of this kind, will now demonstrate to you the whole process of making slides by the Woodburytype method. Instead of laying a sheet of paper on the mould after flooding with gelatine, a glass plate is used, and the cast in tinted gelatine is thus made directly on the glass. Mr. Smith will use an hydraulic press of his own construction in making the relief, and those of you who have studied the construction of appliances of this kind will know how to admire the excellence of the design.

The translation of the Woodbury relief into a line or stipple suited for lithographic or typographic printing is a matter of considerable interest and importance, but it must be considered in another lecture.

QUESTIONS OF INSURANCE.



SO many disputes arise between those who are insured and the insurance companies, says the *Metal Worker*, and so much misapprehension exists as to what an insurance company really agrees to do by the terms of its policy, that the Boston Manufacturers' Mutual Fire Insurance Company have been iuduced to issue a circular entitled "What Constitutes Indemnity," and to circulate it very extensively as a reply to many of the questions that are constantly coming up. Some of the points which are discussed in this circular have been raised at different times by correspondents of this journal. Accordingly, in presenting the circular entire, we shall no doubt give our readers what will be both interesting and valuable information. In this connection we may remark that while this circular refers particularly to the policies issued by the company above mentioned, those policies in their general features do not differ from the ones issued by other reputable companies. The advice applicable in all cases to those who carry insurance is to carefully read the policies, and become thereby thoroughly familiar with the nature of the contract. The following circular in some respects is of the character of the popular exposition of an insurance policy, and as such is entitled to very careful attention: —

In view of the fact that the attention of our members is seldom called to the exact nature of the contract of insurance until they have the misfortune to be subjected to a loss, it becomes expedient to ask their attention to the terms of the policy, and to the methods which are customarily taken for the purpose of ascertaining the measure of indemnity which the underwriters may have become liable to pay after a fire.

This treatment is especially called for at the present time, as there may have been a considerable change in the value of property insured by us since the policies now in force were issued; it is therefore important that members should fully comprehend the limit within which claims for loss must be kept, lest they should be misled into paying for a larger sum of insurance than they could collect. The following statement is therefore submitted: The contract of insurance is one under which the underwriters promise indemnity to the assured in case of loss or damage by fire. The terms of this contract which are in our policy, and in the policies of all companies in Massachusetts, whether stock or mutual, are as follows: —

1. At the head of the policy it is specified: "This company shall not be liable beyond the actual value of the insured property at the time any loss or damage happens."

2. In the body of the policy its terms are specified as follows: "The amount of said loss or damage to be estimated according to the actual value of the insured property at the time when such loss or damage happens."

After a provision for the rendering of an account subsequent to a fire, it is provided: —

3. "In case of any loss or damage, the company, within sixty days after the insured shall have submitted a statement as provided in the preceding clause, shall either pay the amount for which it shall be liable, or replace the property with other of the same kind and goodness; or it may, within fifteen days after such statement is submitted notify the insured of its intention to rebuild or repair the premises. . . . It is moreover understood that there can be no abandonment of the property insured to the company."

Under these provisions we insure substantially four kinds of property.

First — buildings. Each building differs from every other building. If a building is burned, it is incumbent upon the parties in interest to ascertain what was the value of that building at the time of the fire. Let us assume that it was an old building, the floors of which had become saturated with oil, and in which the timbers may or may not have been sound; in other words, a building, which had become depreciated in the progress of time. Or, on the other hand, it may have been a new building, so lately constructed that in the short progress of time since its construction the timber had been seasoned, and it had become actually worth more than at the time it was built, because it had ceased to require the adjustment of shafting to the shrinkage of timber or to the consolidation of the walls.

In order to determine what constitutes indemnity on buildings, appraisers are appointed, and they decide what it would cost to replace that building; not another sort of building as good as that building for the same purpose, which might cost less, but that particular building. If these appraisers make a deduction for the alleged depreciation of the building, which is not accepted, and the assured refuse to received the award, the remedy provided in the policy is that the underwriters may proceed to rebuild that building.

The practical conclusion of the whole matter, therefore, is, in respect to buildings, that the underwriters may be called upon to substitute another building in the place of the old building burned. The new building may be safer, because not saturated with oil; it may be likely to serve the purpose for a longer period than the old building would have served; but, for the immediate purpose of the assured, it may serve no better purpose than the building burned had served. It follows that by such reconstruction of a building the underwriters have only granted indemnity to the assured for his present loss; that is to say, they have, with as little cost, and as nearly as possible, replaced a building for his use, to serve the exact purpose which the old building served at the time of the fire. In point of fact, no demand for replacement has ever been made upon us. The appraisers' estimates have always been accepted, even when the award has been much less than the original cost of the building.

Let us now consider another, or second, kind of property which we insure: Stock — raw, wrought and in process — confining the present treatment to stock in process, such as cotton or wool upon the cards, spinning frames, slashers, and looms. Under the terms of our policy, we have promised to indemnify the assured for loss or damage incurred upon this property at its value at the time of the fire. What was its value? Before the fire a large part of such property had no outside market value except as waste; and after the fire it has no market value, if not destroyed, but only damaged, except as damaged waste. Our usual course is to appoint appraisers, who ascertain what indemnity is due to the assured, by computing the cost of the material, allowing for the waste in manufacturing, and adding thereto the proportion of labor which had been expended to bring the stock into the condition in which it was just before the fire. If a part of this stock has been saved in a damaged condition, its value as waste is computed and deducted from its sound value as stock.

The property itself can neither be repaired nor replaced; nor if replaced could it be used, for the reason that a part or the whole of the machinery has been destroyed, and such stock cannot be worked into the same condition it was in before the fire, even by the assured, in any other mill, or even assuming that he should in some way become possessed of a new mill or of new machinery, exactly like the old. In other words, stock in process must either be valued as waste, or else its value must be computed according to our present practice, and under our customary practice an award is made in money which corresponds as nearly as possible to the value of the property to the assured at the time of the fire.

Let us now consider a third class of property: Finished goods consumed by fire or damaged in a storehouse. We have agreed to give indemnity to the assured, with the provision that we may repair or replace the property. We cannot repair the goods, and make them as good as they were before the fire; we cannot replace the goods, because they cannot be made in any other mill so as to be of exactly the same kind and quality. Even if they are printing cloths or standard sheetings, we cannot offer other goods made in another mill in replacement, because the owner cannot put his stamp on them. Our usual course is to ascertain what was the value of the property injured or destroyed at the time of the fire, and this fact is determined by the market value of the goods in cash. The market value may have been more than the cost or less than the cost. By receiving the market value the assured may save commissions and charges which he would otherwise have paid. He may be better off, or he may be worse off, than he would have been had not the fire occurred; but these circumstances and conditions are such that we cannot take cognizance of them, and the method which has been adopted is the only one open to either party for the purpose of determining what constitutes the measure of indemnity to be paid in money.

Having thus treated three subjects of insurance which are likely to change least in their value from one year to another, we now take up the fourth, which is the principal and most difficult class of property to deal with, to wit.: Fixed and movable machinery, apparatus, tools, and furniture. In comparing one period with another during the last twenty-five years, we find a variation in the price of new machinery of over fifty per cent. We are now insuring factories in which the machinery has actually cost twice or more what it would now cost. Moreover, machinery now purchased at the reduced cost would be better and more effective than the old. The next great variation is in the manner in which the machinery has been treated or kept in repair, or maintained by the substitution of new parts for old, and there is as much variation in these matters as there has been in the price of machinery.

A fire occurs, and machinery of one kind or another is injured or destroyed. We have the right to repair or replace. If it has been destroyed, we cannot repair. Can we replace that specific machinery with other machinery precisely like it — that is to say, of the same make, or of the same kind made by the same maker which has been worn or depreciated in the same measure? Obviously such replacement is impracticable in the majority of, if not in all, cases; and even if practicable only in the judgment of the underwriters, such replacement could not be forced upon the assured, except under the order of a court of competent jurisdiction. What would be the chances of such an order be given? Now, then, if repair and replacement are alike impracticable, what was the value of that machinery at the time of the fire? and how is it to be ascertained?

The usual course is for the appraisers to ascertain what was the value of new machinery at the time of the fire, as near like that which has been injured as it is possible to find; then, to learn what had been the method of repair, how well the machinery had been kept up, and thereafter to make a due and sufficient allowance for necessary depreciation, the remainder being considered the value of such machinery to the assured, and, therefore, the measure of the indemnity due to the assured by the underwriters. This mode of determining the measure of indemnity to be paid in money has occasionally been questioned. It may happen that, under certain extraordinary circumstances, like those now prevailing, the payment of such a sum will work a profitable sale of the property, but the rule by which both parties in a mutual contract may yet be governed in this; that, so long as machinery is kept in operation, it is to be assumed that it is so kept in operation because it is profitable to that particular person insured to maintain it as a part of his productive instrumentalities. The indemnity has been promised to him, and the object of the appraisement is to determine what constitutes indemnity to him; that is to say, what sum of money will suffice to place him in the condition in which he was before the fire.

Conclusion. — Under the foregoing conditions — which are substantially the conditions presented to the underwriters by every fire — it is held that the present method of appointing appraisers of approved judgment, who may themselves call in an umpire in case of need, is the only practicable way of giving a just measure of indemnity and of protecting the assured against such loss or damage as a fire may cause to them. In our judgment, even such measure of indemnity as is awarded under the present method of adjustment very rarely compensates the assured for the loss or damage incurred, as we do not insure or attempt to cover the loss of time, and the loss from the interruption of business, which are usually among the most injurious consequences of a fire. A case where the fire has probably worked a sale of a property for a larger sum than could have been obtained for it in any other way is one of the rarest occurrences. In looking over the record of the payments of our losses, I can find but two such cases; there has been one other wherein it was assumed by outsiders that the fire was profitable to the assured, when, in fact, it was very far from being so. In both the cases in which the measure of the indemnity paid may have been more than the property would have brought at public sale there have been circumstances that prevented rebuilding, of which the appraisers could not rightly take any cognizance; and in each case, had the indemnity which was paid been applied to reconstruction without the addition thereto of more capital, the new mill would have been of much less nominal capacity than the one destroyed, although it might have been a more effective mill in itself.

The greater part of our members are corporations, represented by treasurers or agents, who feel it to be their duty to keep the property in their charge fully insured; and the purpose of the mutual underwriters, who act as their agents, is to issue their policies in such form as will give them an absolutely just measure of indemnity for the losses which they may incur; that is to say, such a sum as will enable the assured to put themselves in the same condition as before the fire, so far as an award in money will suffice for such purpose. It should be remembered that attention is given to the character of the members proposed for mutual insurance, as well as to the quality of the risk. There has been but one suspicion of an intentional fire in the whole history of the company, and even in that case it was proved conclusively that there was no ground for such suspicion.

NOTES AND CLIPPINGS.

The Eads' Ship-Railway. — A $10,000 model of Captain Eads' proposed ship-railway over the Mexican Isthmus is on exhibition at Pittsburgh, Pa.

The Church at Stratford-on-Avon. — At a dinner at Stratford-upon-Avon, recently, Sir Francis Cunliffe-Owen promised, with the assistance of Mr. G. W. Childs, of Philadelphia, to organize a fund in America for the restoration of the church where Shakespeare is buried. The amount required for the purpose is £20,000.

The Early Use of India-Rubber. — We have noticed what is probably one of the earliest references to the use of India-rubber for the removal of pencil-marks from paper in a note to the introduction of a treatise on perspective by Dr. Priestley, published in 1770. The author remarks, at the conclusion of the preface, "Since this work was printed off, I have seen a substance excellently adapted to the purpose of wiping from paper the marks of a black lead-pencil. It must, therefore, be of singular use to those who practise drawing. It is sold by Mr. Nairne, mathematical instrument maker, opposite the Royal Exchange. He sells a cubical piece of about half an inch for 3*s.*, and he says it will last several years." — *The Builder.*

The Mean Temperature of the World. — The Royal Meteorological Society indicates the mean temperature of the months of January and July in London for one hundred years. The lowest mean for January occurred in 1795, and was 25.5° Fahrenheit. The highest mean for January, 47°, in 1796. The lowest mean temperature for July was 55 5° in 1816, and the highest 68°, in 1778 and 1859. The Society also marks in a similar way the mean annual temperatures, and the lowest and highest temperatures for several important and well-known places. The mean annual temperatures in this interesting series of records most worthy of note are for Ferozepore, in the Punjaub, 95°; Calcutta, 81°; Hongkong, 75°; Cairo, 71°; Rome, 60°; Constantinople, 58°; Pekin, 53°; St. Petersburg, 40°; Hammerfest, 35°; Fort Enterprise, 14°; Boothia Felix, which upon this ground should surely be rather marked as "infelix," 5°; and Melville Island, zero. The highest temperatures recorded for the several stations are for Murzouk, in Fezzan, 135°; Bagdad, 120°; Cairo, 116°; Jerusalem, 102°; Greenwich, 97°; Moscow, 90°; Falkland Isles, 75°. The lowest recorded are, for Barbadoes, 72°; Singapore, 66°; Bombay, 53°; Jerusalem, 25°; Constantinople, 17°; Greenwich, —10°; Chicago, —30°; Moscow, 53°; Melville Island, —65°; Fort Reliance, — 70°; and Werschjansk, —81°, which outlandishly named, and hard to identify, place, so far seems to possess the unenviable distinction of being the coldest spot upon the earth, unless a station nearer home may be inclined to contest with it the frozen supremacy, upon the ground of an observation that has been made since these comparative records were drawn up. On the evening of the 13th of June last, in the Lecture Theatre of the Royal Institution of Great Britain, in Albemarle Street, a temperature of —252° Fahrenheit, with alcohol turned into a kind of viscid ice, and with oxygen gas congealed into a liquid, was recorded. In this instance, however, it must in meteorological fairness be said the result was brought about by human as well as by natural agency; the spell of boiling solid carbonic acid having been used in the final depression of the temperature. The event is, nevertheless, worthy f a passing mention in this place, as it is probably a record of the greatest cold that has ever yet been brought under the rigid examination of science. — *Journal of the Society of Arts.*

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CONTENTS.

THE *Scientific American* gives a description of a large ice-machine, in use in a brewery at Savigny-sur-Orge, in France, which is so simple in construction and in regard to the materials used that it may be worth while for architects to remember the principle on which it is operated. The apparatus consists, in substance, of three parts, the air-pump, which is of the least complicated description; the absorber, which is merely a cylindrical tank, twenty-five feet long and four feet in diameter; hung from the underside of a raised platform, and the ice-cylinders, which are really truncated cones, having their larger end turned downwards, and closed with a tightly-fitting door, and communicating at their upper ends with the top of the absorbing cylinder. At the commencement of the day's work the absorber is filled a little more than half full of concentrated sulphuric acid. The air-pump is then set in motion, and a partial vacuum produced in the absorber. When the barometer shows that the pressure has been sufficiently reduced, water is admitted from large reservoirs to the ice-cylinders. As these are in communication with the absorber, in which a vacuum exists, an active evaporation immediately takes place from the surface of the water, reducing its temperature rapidly; while the strong sulphuric acid, which has a great affinity for water, absorbs the vapor as fast as it is given off, so that the process of evaporation, instead of being checked by the filling of the vacuum with watery vapor in place of air, goes on until the temperature in the cylinders is reduced below the freezing point, and the water congeals into a solid mass. The valves at the bottom of the cylinders are then opened, and a jet of steam is turned for a moment into the space between the double walls of each. This loosens the blocks of ice, which immediately drop into tubs set on the floor to receive them. The whole process is nothing more than an ingenious application of the familiar experiment of freezing a watch-glass full of water by setting it under the receiver of an air-pump with a saucer of sulphuric acid, but there is something imposing about the scale at which it is carried on. The blocks of ice, as they drop from the cylinders, weigh nearly seven hundred pounds each, and six of them are produced at every operation. The whole process of charging, freezing, and removing the ice, occupies from three to four hours, so that a product of fifteen tons of ice every twenty-four hours would be quite within the capacity of the apparatus. After the acid which is used for absorbing the watery vapor has served its purpose a few times, it becomes too much weakened for efficiency, and is drawn off, and again concentrated by heating in a suitable tank with coils of steam-pipe, until water enough has been evaporated from it to restore its strength.

NOT long ago some rubber factories in New England were burned, and the insurance companies, finding that the rates charged for that class of property did not cover the risk, raised them. The manufacturers who were not burned out, finding that their expenses would be thus materially increased, and knowing something of the extraordinarily low cost at which cotton-factories are now insured under the mutual system, formed a project for a mutual insurance company among themselves, and consulted the officers of the Boston Manufacturers' Mutual Insurance Company on the subject. They were at once encouraged and cast down by the information that it would be perfectly practicable to form and carry on a rubber manufacturers' mutual insurance company, provided each manufacturer would begin by spending a sum on protective appliances for his own mill, proportionate to that which woolen manufacturers are obliged to lay out in the same way before they are allowed admission to their own mutual insurance companies. As the adoption of adequate precautions in rubber factories would cost the owners from ten to twenty thousand dollars for each, the enthusiasm of the manufacturers, according to the *Spectator*, disappeared, and the stock companies are likely to collect premiums of them for some time longer.

ON the face of it this result of the manufacturers' inquiries seems an illogical one. Nothing is more certain than that the premiums paid for insurance must in the long run equal the losses, or underwriting would cease; and as stock insurance companies are reputed to pay out as much money for agency and expenses as they do for fire losses, it would appear that the rubber manufacturers, by keeping their premiums to themselves, and saving the cost of maintaining agencies, might find it profitable to insure each other even without the investment of any more money in precautionary appliances than the stock companies would require them to spend. After the practice of insuring themselves had been fairly introduced among the manufacturers, they would soon begin to notice any carelessness on each other's part which might lead to an unnecessary increase of the risk which all shared in sustaining, and from this they would probably be led in time to the establishment of rules like those which the cotton and woolen manufacturers find it so profitable to impose upon themselves; and the whole rubber trade would receive great and permanent advantage. All this seems so obvious that one is inclined to wonder at the short-sightedness of manufacturers in continuing to insure their buildings and goods in stock companies when the mutual plan would, in theory, be so much more economical for them. The explanation of the matter is not, however, to be sought in the incapacity of the manufacturers, but in the insurance system, which consistently accepts such risks at rates far too low to cover the losses, lower, in fact, than the manufacturers themselves could afford to take them, and makes up for its annual deficit on account of these by enormous overcharges on property which is little liable to destruction by fire. As an illustration, we will suppose that in New York, between Twenty-third and Fifty-seventh Streets, and Third and Sixth Avenues, there are six thousand dwelling-houses, worth, on an average, with their contents, seventeen thousand dollars apiece, or one hundred million dollars in all. This, it will be understood, includes dwelling-houses only, tenement-houses and buildings with stores in them belonging to a totally different class. Supposing the rate of premium on this dwelling-house property to be six-tenths of one per cent for five years, which we take to be below, rather than above the average, its owners, to keep it covered, are obliged to pay every year to the insurance companies one hundred and twenty thousand dollars, a sum large enough to build from the foundations, and completely furnish, seven such houses annually, or a whole block every nine years. It is needless to say that the actual losses by fire in this district, among such buildings, amount in value only to a small fraction of the premiums paid, and the difference goes to swell the income of the insurance companies, and enable them to expend money in insuring bad risks at less than they are worth. The effect of this is inevitably to discourage the owners of flimsy, cheap, inflammable sheds from doing anything to make them better, and until some change in insurance methods is made, the "art of combustible architecture" is likely to continue to flourish. Fortunately, the indications point to the probability of such a change. For some years the rates on good risks have been diminishing, while those on dangerous buildings have been spasmodically raised; and although a wide space still intervenes between the underwriters' scale and the actual proportion of risk, every new approximation induces a corresponding change in building methods, to the advantage of the whole community.

MR. A. F. BANDELIER, the courageous and enterprising agent of the Archæological Institute of America, after recovering from the effects of his terrible journey into the mountains of Northern Mexico, two years ago, was sent southward, to the country about the City of Mexico, and still further south as far as Mitla, not far from the borders of Yucatan, to make what he calls "an archæological reconnoissance" in the skilful and judicious way characteristic of this admirable explorer. The story of his "reconnoissance," illustrated with photographs and sketches by the author, has just been published by the Archæological Institute, as the second volume of its American series of reports. Although a strictly scientific work, the author of the book carefully omitting from it everything foreign to his archæological studies, Mr. Bandelier's report has much of the interest of a book of travels, heightened, moreover, by the excellent illustrations, which have not merely the charm of being in great part photographs of the interesting objects described in the text, but are, when of this sort, well taken, and from favorable points of view, while the sketches, although not particularly picturesque, have a business-like, truthful air which makes them attractive. Although much space is occupied with discussions upon the ethnological connections of the present and past Indian tribes of Central Mexico, the author's efforts to obtain facts in aid of his impressions, by living familiarly among the modern Indians, have a singular attraction.

THE *Scientific American* quotes from the San Francisco *Chronicle* an account of some experiments made near San Francisco with dynamite, to learn its applicability to military purposes, especially for loading shells to be fired from cannon. It is generally supposed that a shell charged with dynamite cannot be fired from a gun, for the reason that the shock imparted by the explosion of the powder instantly explodes also the dynamite, bursting the gun; but these tests show that with care this may be avoided. The experiments were made with a wrought-iron rifled cannon of three inches bore, which had been condemned on account of its age and rusty condition, but was still perfectly sound. Shells of the ordinary shape, suited to the gun, were obtained and loaded with seven ounces of dynamite in each. The first was fired with a charge of a quarter of a pound of cannon-powder, at a high rock. The shell exploded on striking the rock, bursting into innumerable fragments. The second shell was fired from the gun with half a pound of powder, and, as before, reached the rock before exploding. The third shell was placed in the gun with the regular service charge of a pound of powder, and this time the concussion of the exploding gunpowder set off the dynamite before the shell left the gun, tearing the gun into fragments. Although the charge of dynamite was so small, the force of the explosion was sufficient to throw the rear portion of the cannon, weighing two hundred pounds, about twenty feet away, while the middle portion, which was much heavier, was thrown ninety feet into the air, landing on top of the neighboring cliff. As General Kelton, who conducted the experiments, says, the seven ounces of dynamite tore the gun as a hundred pounds of gunpowder could not have done. The principal use of such shells in warfare would probably be in the destruction of iron-clad ships, few of which could resist the explosion of a heavy charge of dynamite on deck, or even in contact with their sides, and the demonstration that they can be used for such purposes, without danger to the artillerists who employ them, is of much importance.

LA Semaine des Constructeurs contains a short notice of the manufacture of plate-glass mirrors at Saint-Gobain, which presents some curious details. The first Company of Mirrors was founded in 1665, with an authorization from King Louis XIV, and with the encouragement of the great minister Colbert. Twenty-six years later, Lucas de Néhou invented the process of casting glass plates, and established a factory in the old château of Saint-Gobain, and soon afterwards the Company of Saint-Gobain was reconstituted, and took the manufacture into its own hands. For a hundred and twenty-eight years the business was carried on by the successors of the original associates, but in 1830 a stock company was formed, under the same name, to which the manufacture was transferred. Like all great business corporations, the Company of Saint-Gobain has had to meet the competition of rivals, which has in many cases been overcome by the absorption or purchase of the weaker by the stronger establishment. The Company, which once found the Castle of Saint-Gobain large enough for its work, has thus now acquired or built factories at St. Quirin and Chauny, in the neighborhood of its own works, at Cirey in Eastern France, at Montluçon in the west, and at Mannheim and Stolberg in Germany. Within the time since the foundation of the plate-glass manufacture, a period of one hundred and eighty-two years, the processes have been improved, while the prices of the products have fallen to a remarkable degree. In 1802, for example, a hundred years after Néhou set up his casting-table, a finished mirror containing forty square feet of surface cost thirty-six hundred and forty-four francs, or nearly eight hundred dollars. Now the same can be bought, of much better quality, for forty-six dollars; and small mirrors, of ten square feet area, cost in 1802 forty-one dollars each, instead of eight dollars, which is the present price. The greatest variation in price is naturally found in the largest plates, since the size of the glass-sheet which could be handled with the old machinery was limited. Forty square feet was, in fact, about the maximum of regular sizes eighty years ago, while mirrors of one hundred square feet area can be had now without difficulty, and at a cost of only about a hundred and sixty dollars.

THERE seems to be no doubt that the approaching season is to be one of dullness in building operations, or, at least, that the building done will be of a modest class, as distinguished from the great and costly works which were in progress a few years ago. Some one has said that extensive strikes always indicate an approaching decline in business, and it is very probable that they do so, for two reasons, the first being that an incipient reduction in the volume of business throws a few men out of employment, and these, before packing their trunks to seek work elsewhere, naturally try first what effect loud talking will have in bettering their condition, and their companions, made apprehensive for the same reasons, are easily led into the violent measures which they are told will cure their troubles. The second and obvious reason why strikes go before a dull season is that they produce dullness. Every strike is immediately followed by the abandonment of a certain number of building projects, and the capital which would have found investment in that way is diverted elsewhere. The great strikes of 1883 undoubtedly destroyed the prospects of hundreds of builders, architects, and workingmen in New York for many years, and the nine hour movement of the bricklayers this summer, with the foolish plumbers' quarrel, postponed or killed many new enterprises. The bricklayers' strike, as was to be expected, failed completely, but it is interesting to know that the claim of the men, that they could do as much work in nine hours as in ten, was to a certain extent verified. We were told by the superintendent of an important building, who was discreet enough to be one of the first to yield to the bricklayers' demand, that his men actually laid more bricks in nine hours than they had previously laid in ten. Whether they would have done so if there had been no competition is an unsettled question, but in his case there were, of course, scores of unemployed bricklayers always near at hand, and anxious for a job, and the knowledge that their places would be filled at ten minutes notice acted as a very lively stimulus to the powers of the men on the building.

A CORRESPONDENT of the *Sanitary Engineer* describes a curious experiment made at the aquarium of the National Fish Culture Association, in London, not long ago. It had been reported to the Association, on the authority of some American, that brandy would revive fish on the point of death from remaining too long out of water, and the secretary resolved to test the truth of the assertion. Two Prussian carp were therefore taken from the tank at the aquarium, and kept in the air for four hours. At the end of that time a little brandy and water was administered to one of them with a feather, and both were then put back into the tank. The fish which had been dosed with brandy quickly revived, but the other floated about on its side, as if quite dead; and, to avoid contaminating the water, as we suppose, it was taken out and thrown aside. The secretary, however, taking up the lifeless fish, opened its mouth and poured brandy and water down its throat, and placed it again in the tank, but with little expectation of seeing it revive. For five minutes it floated motionless, but some slight evidences of life appeared, and the fish soon began to move its fins feebly, and regained by degrees its usual strength. Neither of the fishes suffered, apparently, any permanent injury from their experience.

RECENT IMPROVEMENTS IN BUILDING.[1] — I.

Folding: Screen: exhibited at The Boston: Mechanic's Fair: by Messrs Keeler & Co "embossed leather rendered in metallic colors."

IT is not always easy for persons engaged in professional work to note clearly the advances which are made from year to year in the practice of their own profession. They see that changes come, but they take place insensibly, and become so soon a part of the regular technical routine, that their novelty is easily forgotten, and improvements dating back only a year or two are classed with those of twenty or thirty years' standing. In the art of building alone, among the practical sciences, are frequent opportunities given for comparing the new with the old method by the necessity, which falls to most architects and builders, of repairing, restoring or demolishing the work of their predecessors. In this way a sort of chronological table of building practice forms itself in the minds of architects, who find it important to understand the details of the construction, drainage and planning of ten, twenty, thirty and forty years ago, in order to be able to form a ready diagnosis, from the few symptoms presented to them, of the diseases of old buildings which they are called upon to mitigate or cure. Practice in this sort of professional work does not advance very far without disturbing some prejudices in the minds of most architects, the most common of which is the idea that our grandfathers, and even our elderly uncles, built more thoroughly and substantially than we do. Nothing could be more erroneous than this notion. It is desirable to speak with respect of our ancestors, but if their renowned intelligence and honesty were satisfied with the device of supporting the brick wall over a window on the wooden window-frame, without arch or lintel, as we see done in hundreds of houses on Beacon Hill, or with fireplaces built on the floor-beams, like those which have recently caused the destruction of so many noble houses in England, we may at least congratulate ourselves that something has been learned about safe building since their time.

The most important changes in regard to habits of construction that have been introduced within the last twenty years relate to protection from fire. Outside walls, which were once rarely more than twelve inches thick, and sometimes only eight inches, are now, in mercantile buildings, often twenty inches thick, and sometimes twenty-four inches in the first story and basement. There are few cases where twelve-inch bearing-walls, of good brick, laid, as usual, in mortar containing a portion of cement, would not safely support the weight of six floors loaded with heavy goods, and the additional thickness now required by the building laws of all our large cities serves no purpose except to give some extra steadiness, which is not needed, and to resist the communication of fire through the wall from one building to the next. Whether it is effectual for this purpose is doubted by architects, who observe that wooden floor-beams are often laid so far into very thick party-walls, to save the trouble of cutting them off, that no more brickwork intervenes between them, to prevent the transmission of fire, than if they had been set in the usual way in a twelve-inch wall; but this view of the matter does not seem to have occurred to the rest of the world, and the construction of an ordinary six-story store in any of our principal towns involves the use of at least one-half more rough brickwork than was thought necessary twenty years ago. By the side, however, of the rather crude legislative attempts at securing fire-resisting construction, a great deal of quiet but fruitful work has been going on in the same direction among private individuals, and the sum of knowledge upon the subject, available to all who wish to use it, has increased very greatly within a few years. Among those who have contributed to develop the art of building in this direction, the officers of a mutual fire insurance company in Boston unquestionably hold the highest place. Using, as every one must, the experience of others in addition to the results of their own investigations, they have analyzed these with so clear a judgment, and have fortified their conclusions with such thorough tests, as to give to the methods which they advocate an influence in the building world such as they themselves hardly suspect. It ought not to be necessary here to describe the details of construction which, thanks to their efforts, have already become common among the mill-owners of New England. Every one who has any acquaintance with mill-building knows now, in theory at least, the advantages of plank floors supported on wooden girders, of wire-lathing, of automatic sprinklers; but every one may not know that plank floors on heavy girders are already in use in scores of mercantile, as well as manufacturing buildings all over the country, and that the fashion is rapidly spreading; that, in the same way, the demand for wire-lath, since the days of its successful and economical use in the Mason & Hamlin factory and other mill-buildings, has so much increased that, as I am told, the principal makers in this part of the country run their works night and day, although a dozen rivals, at least, compete with them for their market; while automatic sprinklers, which only a few years ago were cautiously introduced into cotton-factories, have been placed over the stage in most of the new theatres since built, and in many old ones, giving probably better protection against fatal fires than all the other precautions put together.

Next to the officers of this company, those of the New York Board of Fire Underwriters have perhaps done most of late years toward improving the security of buildings. Although their efforts have been made with less intelligence and zeal than those of the others, they have shown a real interest in the subject, and a good deal of discrimination in dealing with it, and being armed with the tremendous power of controlling, in accordance with their ideas of suitable construction, the rates on perhaps a thousand million dollars of insurance, they are able, in many important points, to dictate absolutely the mode in which the better class of stores shall be built. No matter how penurious the owner of a new mercantile building in New York may be, or how ignorant or indifferent his architect or builder may show himself, he cannot now go very far astray from the path of solid and good construction. Unless his walls are intended to be thick, and the floor-timbers substantial, he cannot possibly get his plans passed by the Building Bureau, and it is not easy to vary in execution from the approved plans of such a building without detection and severe punishment; while, unless iron shutters are provided for all exposed openings, stairways and hatchways cut off in each story, and high parapet-walls built above the roof, both to prevent the communication of fire and to protect firemen at work there, the addition of five, ten, fifteen or twenty cents to the insurance rates will prevent him from getting tenants until these wholesome regulations are complied with.

This insurance control, which, it must be remembered, only dates back in New York, in any efficient form, about three or four years, has already had the effect of making general many precautions which were formerly introduced only as a matter of personal fancy. Thus, the automatic fire-alarm, once used as a curiosity, is now, through the allowance made for it in insurance premiums, becoming common throughout the "dry-goods district," and many other details are coming into use in the same way. As an illustration of the power which underwriters have over construction, if they only choose to exercise it, an application was made not long ago to the New York Board to fix a rate on a building in which a passenger-elevator was to be placed. The elevator ran in a brick shaft, and in order to prevent the shaft from acting as a conductor of fire from one story to another, it had been proposed, instead of the usual wire or glazed doors, to fit all the openings with self-closing solid doors, covered with sheet-brass, and furnished with small bull's-eyes, to enable persons waiting to see when the elevator reached them. The owners, like prudent men, hesitated to adopt this more expensive mode of construction, unless they could be sure that some advantage would result from it, sufficient to pay at least interest on the extra cost; but the underwriters, on having the character of the doors explained to them, offered at once to remit altogether the usual passenger-elevator charge, if they were used, and as this charge is now, in the dry-goods district, twenty cents per hundred, or one-fifth of one per cent a year on the whole insurable value of the building and its contents, the owners accepted forthwith an improvement which will save them its cost five or six times over every year in cash, while its value to the insurance companies, in lessening the risk of a destructive fire in that building, is probably at least equal to the allowance they make for it. It is to be regretted that underwriters in other places do not emulate the example of the New York Board. It is safe to say that in nine cases out of ten the architect of a store or warehouse building who suggests to the owners the adoption of any unusual precaution against fire is asked in reply, whether the insurance companies will make an allowance for it in their rates sufficient to pay interest on the cost. If they will do so, the improved construction is adopted; if not, the utmost eloquence of the architect generally fails to secure a trial of the new method; and it is for this reason that New York, where improvements of the kind are appreciated by those who have the largest interest in their adoption, is now far in advance of other towns in mercantile building.

Among other things, it is worth noticing that the importance of securing the plaster strongly to the ceilings, as a protection both against fire from below and water from above, has been understood there for many years, and before wire lathing came into any general use, the ceilings of dry-goods stores there were often strengthened by a device shown in this model, and still very popular. In applying this, the ceilings are plastered two coats, and as soon as the second coat is on, while the mortar is still soft, galvanized nails are driven into the laths and furring all over the ceiling, five inches apart each way, with the heads projecting half an inch or so from the plaster, and light brass wire is then stretched diagonally across the room, taking a turn around each nail. After wiring in one direction,

[1] A paper read before the Society of Arts, Boston, October, 1884, by Mr. T. M. Clark.

another set of wires is put on in the other direction, and after all are on the workmen go over the ceiling with hammers and drive in the nails until the heads are buried in the mortar. When the mortar is dry, the hard-finish coat is put on in the usual manner. The wires are thus embedded in the plastering, and hold it to the furrings with so much tenacity that in repeated instances, where fires have occurred in buildings so protected, the water from the engines has run through the floors, and collected above the plastering to a depth of several inches, and has remained there until it could be drained away, sometimes a week or more afterward, without any injury to the ceiling beyond a yellow stain. By the same means the mortar is prevented from being thrown from the laths by the heat of the fire below, and the wooden floors thus protected with an efficiency approaching that of wire lathing, and at a cost which was until recently much less than that of wire lathing. The latter is now, however, superseding it, and the next improvements of the kind will probably be modifications of the wire lath. A very promising one has already been introduced in the form of a corrugated wire netting, which can be applied either to beams or to the under side of plank floors, and around heavy girders, without the use of furring. Every one who employs wire lathing as a fire-resisting material must have regretted the necessity for covering the work to which it is applied with thin splinters of wood, usually six inches apart, for holding the wire netting far enough away from the surfaces to give a clinch to the mortar, and the corrugation, which fulfils the same purpose much more simply, and without adding combustible material, seems likely to prove very useful.

In the construction of buildings intended to be thoroughly fire-proof, New York stands in advance of the whole world. London, Paris, Berlin and Vienna contain some really fire-proof buildings, with floors vaulted in brick, heavy walls and small windows, and many others ostensibly fire-proof, with plaster floors held up by a light frame of iron, everywhere exposed, and constantly liable, if attacked by the heat of a pile of burning goods, to a disastrous collapse, like that which destroyed in a few minutes one of the largest stores in Paris a year or so ago; but New York alone can show many buildings thoroughly light and airy, in which it is impossible for a destructive fire to occur. The essence of these buildings is, as it must be with our present materials, a structure of protected iron-work in which the whole framework is cased with terra-cotta. The details of this sort of fire-proof work have undergone a good deal of modification within a few years, although the principles have not been changed. Not long ago a concrete of cinders and plaster was in high repute for filling between floor-beams, for partitions, for furring outside walls, and even for protecting iron, and various other concretes were much employed. These have proved, however, to be liable to crumbling from fire and water, and burnt clay is fast taking their place for all purposes. For furring, or lining outside walls, to keep the dampness of the brickwork from the rooms, the porous terra-cotta, or terra-cotta lumber, made by mixing saw-dust with fire-clay and baking it at a heat high enough to burn out the saw-dust, leaving a hard, spongy mass, is much preferred to the old-fashioned concretes, and the same form of burnt clay is used in thin blocks for forming partitions, which are so light as not to burden the floors, and at the same time strong and absolutely fire-proof, alternate heating to redness and saturating with water, many times repeated, having almost no effect upon it. For floors, burnt clay is now universally used in the shape of blocks, made hollow, to save weight, and tapered so as to form a flat arch, which has all the strength required and has the great advantage of presenting a level surface beneath, which is corrugated, to receive directly the plaster of the ceiling. The old-fashioned brick arches, turned upon the lower flanges of iron beams, have now entirely disappeared from ordinary work, except for carrying sidewalks over coal vaults. To say nothing of the unpleasant appearance presented by a ceiling broken up into long, parallel ridges, this construction, as usually seen, leaves the lower flanges of the iron beams exposed to heat from burning material in the room, thus violating the first principle of fire-proof construction as now practised, and the attempts made in former times to support a flat ceiling below the arches, by means of iron lath, have always been very costly and unsatisfactory.

In the matter of protecting the lower flange of the beams, even the construction of flat arches of hollow blocks was not at first very successful. As will be seen from the upper diagram, in plastering on the under side of the blocks a space equal to the width of the lower flange of the beam, often four or five inches, had to be spanned by the mortar, with nothing to hold it against the iron. In this position it was likely to break away, especially in case of fire, leaving the iron exposed, and the later blocks are made to hang a little below the beam, forming by their shape a dovetailed channel, in which a slip of terra-cotta is laid, when the pieces are put together, and is thus held securely. This gives perfect protection, but is a little troublesome, and the very latest blocks are made with projections wide enough to meet beneath the flange of the beam without the insertion of a slip. These blocks are as readily put in place as the primitive sort, and cover the beams securely from fire as soon as they are set. Common as these blocks now are in New York, being the universal material for flooring in all new banks and office-buildings, together with all the first-class apartment-houses, and many private dwellings, they are as yet hardly known elsewhere, unless in Chicago, where fire-proof building is practised with great success. Even in New York their use dates from very recent times, and it is said that in the construction of a building on Broadway, finished about four years ago, in which the architect required the floors to be laid with them, the masons employed by one of the best contractors in the city set them alternately upside down, so that they fell out when the staging was taken away from beneath them.

In England, the idea of the best architects is still to obtain the effects they wish in fire-proof construction by the use of concrete. They have an excellent material in their Portland cement, and, by adding sulphur to it, the concrete made with it is rendered partially fire-resisting, by the lessening of its tendency to crack and crumble under the action of fire and water; but no concrete construction yet invented approaches, in the facility with which the materials are handled, the quickness with which the work is completed and the staging shifted to another place, or in the perfect security which it gives, that with the terra-cotta hollow blocks. By the help of these, and of the porous terra-cotta partition and furring-blocks, a house with wide openings, floors ten inches thick from the level ceiling to the top of finished flooring, and partitions occupying different positions in the various stories, can be made just as secure against fire as a French or German storehouse, with its ponderous division-walls extending from cellar to roof, and its vaulted ceilings two or three feet high from the spring to the crown.

In describing a floor of a New York fire-proof building, we describe also the roof, which is made in exactly the same way as a floor, with iron beams, filled in and protected by hollow terra-cotta blocks, which are then levelled up with concrete, two, three or four thicknesses of asphalted felt laid on the top, and the whole then covered nearly or quite an inch thick with rock asphalt, precisely like that used for paving the streets of Paris, and put on in the same way. Once put down, on a sufficiently rigid framework of beams, such a roof is as permanent as the building itself. The heat of the sun does not affect it; water runs off it as from a granite slab, and the movement upon it, even of horses and carriages, would deteriorate it very slowly, if at all. With these roofs the flashings, even though of copper, are the weakest part, and in the latest of the great fire-proof office-buildings the flashings themselves are replaced by great slabs of rubbed slate, set vertically around the parapet walls, the lower edge of which is embedded in the concrete, while the wall itself is built out over the upper edge, holding it like a panel. It is difficult to see where the deterioration of a structure like this could begin. Centuries must elapse before either the asphalt roof-covering or the slate flashings would decay far enough to admit water to the interior, and extravagantly costly as the construction appears, it will probably be economical in the end.

It is usual in all these fire-proof buildings to lay a wooden floor, for comfort in walking, and this is now universally put on wooden sleepers, which lie on top of the terra-cotta blocks, and are held in place by having their ends so shaped that they can be wedged under the upper flanges of the iron beams. After these are in place, the space between them is entirely filled with cinders, and the wooden flooring is then nailed down. By filling the intervals between the sleepers with cinders, the circulation of air under the floor is prevented, and although it would perhaps be possible to burn a hole in the wooden floor by building a fire upon it, the fire could not spread, and experience shows that the currents of air around a fire draw so strongly upward that there would be no danger of heating the iron beams in this way sufficiently to do any harm; while the cinder-filled space, three or four inches in depth, affords an opportunity for carrying steam and water pipes under the floors from one part of a room to another, as is generally necessary in apartment-houses and office-buildings.

PHOTO-MECHANICAL PRINTING PROCESSES.[1]—II.

TYPE BLOCKS FROM LINE DRAWINGS, OR HALF-TONE SUBJECTS.

Any impression in a fatty ink, of the nature of printers' ink, which may be transferred to stone or zinc for printing after the lithographic method, may be considered as the germ of a typographic printing block, as, if such an impression is transferred to a zinc plate, the uncovered parts may be etched away so as to leave the covered parts standing in high relief. The details of the method of this etching a zinc plate were given in one of the lectures of my previous series, and, therefore, it is needless to repeat them here. Let us take the reverse case. One has a typographic block, and it is more convenient to print impressions by the lithographic machine than from the block; it is only necessary to make a print from the block, and transfer it to the stone. Thus it will be seen that lithographic printing and typographic printing are very closely connected, so closely that when a subject is prepared for one it may be printed by either, as convenience may indicate. The *Official Gazette* of the American Patent Office is set up in type, but the printing of all, excepting the index sheets and the covers is done on a lithographic machine.

These remarks bring us to the point where photo-lithography and photo-typography may be considered together,

[1] Cantor Lecture delivered before the Society of Arts by Thomas Bolas, F.C.S., and published in the *Journal of the Society of Arts*. Continued from No. 463, p. 227.

and that the making of a fatty transfer is equivalent to the production of a printing surface suitable for printing by either method. Still it seems to me that there is a large future before the litho-machine for commercial work, and that English printers are only beginning to see the real importance of Senefelder's discovery, for the production of commercial one-color work.

Now, as to the making a photo-litho transfer from plain black and white work, some progress has been made of late by the introduction of the velvet roller as a means of inking the exposed gelatine paper; the application of the velvet roller to this purpose being due to Mr. F. Butter, of Woolwich Arsenal. The ordinary litho-roller sticks to the paper, and drags off the coating; so much is this the case, that until the introduction of the velvet roller, but few persons attempted to ink up the image on the exposed gelatine paper with the roller; the usual practice being to follow the plan demonstrated in my last lecture — that is to say, to lay a ground of ink all over the paper, and after softening the gelatinous film by soaking in water, to remove the excess of ink by dabbing, or some such process.

Mr. Newland will now assist in the demonstration of the mode at present adopted for making a transfer by the velvet roller method.

The sensitive paper was prepared by floating thin bank-post paper on the following solution — the solution being of course, warm: —

Gelatine	3	ounces.
Water	50	"
Bichromate of potash	2	"

An exposure of five or six minutes in the shade is sufficient, after which the paper is soaked for some minutes in cold water, and the excess of water is blotted off. All is now ready for the inking of the image, and Mr. Newland has clamped down one side of the paper to the front edge of a kind of table, formed out of a slab of thick plate-glass, after which he will apply the velvet roller; always rolling it away from himself, so as to keep the paper level and stretched. The exposed parts now take the ink, and a transfer of surprising fineness is obtained. The velvet roller is charged with an ink made by mixing commercial transfer ink with about one-eighth of its weight of olive oil, a little turpentine being added to thin the mixture, if required;[1] but it is well to avoid the free use of turpentine.

Mr. Frewing has been good enough to bring here some specimens of his line work, not only in the transfer but also put down upon zinc; moreover, he has brought some wood blocks upon which the fatty transfer has been impressed, as a guide to the engraver.

Wood engraving has long held its own, but it is now very hardly pressed by the various processes, some of which are photographic and others not. Some years ago, the "graphotype" process made a little stir, but it did not compete with wood engraving to any extent worth mentioning, while, apart from the photographic methods, there are many others. Among the latest may be mentioned the glass etching process introduced by Mr. S. H. Crocker, of Sydney, and before you there are specimens of the *Australian Gazette* illustrated by this means. The resisting lines being obtained on the surface of the glass, hydrofluoric acid is used as an etching fluid, and, curiously enough, there seems to be scarcely any tendency to undercut under these circumstances.

So far we have only considered the use and production of transfers from such negatives as consist of only one gradation, clear white and intense black; and before passing on to the consideration of the means of obtaining transfers and blocks from ordinary negatives, in which every tint is reproduced more or less perfectly after the gradations met with in nature, let me point out to you some circumstances which will make it clear to you that we cannot, by simple photographic agency, produce representations from nature having quite the boldness of outline ordinarily met with in the most common kind of wood engravings; but there is now a movement among wood engravers to produce something better than was accepted twenty or thirty years ago — in fact, something more resembling a photograph.

Here is an engraving taken from the *Illustrated London News* of the year 1851 — the year of the Great Exhibition — and here, on the other hand, is a quite corresponding subject from the number published last Saturday. In the older engraving the figures are outlined by bold black lines, and the attempts at reproducing the exact shades or gradations of lighting, which we may suppose were visible in the case of the originals, are crude in the extreme. To sum up, the outline is the essence of the engraving, and but little effort is made to reproduce the shades of the original. Now, look at the engraving taken from the last number of the *Illustrated London News*. We certainly have outlines of a similar character, but very much less clearly marked, and everywhere an attempt has been made to represent the light and shades of the original by a corresponding closely packed collection of lines or dots. Now, look at a photograph of a strictly analogous subject. You see that the artificial outlines which the wood engraver uses to plot out his subject are altogether absent, and we only find that of shading which is altogether omitted in the less perfect example of wood engraving. To put the matter shortly, the second-rate wood engraver uses an outline as an index or pointer to his subject, and he often contents himself with this index or pointer alone, making no effort whatever to represent the true shades of the subject; and the public often prefer this index to the representation of the actual object, because it is easier to follow and to understand. Hence one of the main reasons why a typographic block made from an ordinary negative does not give satisfaction to those who have become accustomed to the mode of treatment adopted by wood engravers. In the photographic block there is no artificial outline, but only the shading. In addition to this, when any part of a figure has the same tone value as an adjacent part of the background, the photographic block makes no distinction between them — they merge into one another; while, in such a case, the wood engraver can make a distinction between the two parts, by making the shading lines incline in a different direction. The effect of photography in bringing about a more perfect system of wood engraving is to be observed in studying the wonderful specimens issued with the Transatlantic monthlies, *Harper* and *Scribner*. Here we often find the artificial outline or index lines either reduced to a minimum or altogether absent, and a fine shading introduced, which, when viewed from a little distance, almost strikes the eye like the gradated tints of a photograph. Side by side with the wood engravings in *Harper*, one often sees phototypic blocks made by the method of Ives; and in noting the great similarity of the effect to the eye, one hardly knows whether to congratulate the phototypist for his near approach to the most perfect examples of wood engraving, or to give praise to the wood engraver for his skill in so closely realizing the gradated lights and shades of the photograph.

In making a type block from a photograph, the first step is to translate the evenly gradated tints of the latter into a line system, or a stipple corresponding intensities. When a photograph is transferred to a wood block, this is done by the personal skill of the individual who engraves the block; but this is by no means to be regarded as photo-engraving proper, so my remarks will be confined to processes in which the translation is effected automatically.

There are so many methods of so translating the tints into points, line, or dots, that even to mention all would be impracticable. In now talking to you, there is no alternative but for me to assume considerable knowledge of the subject on your part, this course of lectures being of the nature of a supplement or appendix to my previous course.

In my last lectures the method of Asser was illustrated, a photo-lithographic transfer being made on a sheet of starched or pasted paper, made sensitive by means of potassium bichromate; and by putting down such a transfer on zinc, and etching into relief, excellent results may be obtained. It may also be mentioned that, as long ago as 1866, Messrs. E. and J. Bullock, of Leamington, obtained a patent for a mode of photo-lithography in half-tone, and a print, issued during the year in question with the *Photographic News*, shows that their work was equal to anything that has been done since. The print is before you, and you can judge for yourselves. Why, then, you may ask, did not the process become a great thing commercially, and make its mark? The answer is simply this — the invention came before its time, neither good litho-machining nor zinc-etching being practised at the time. The expired patent of Bullock Brothers, No. 2,954, 1866, will be read with interest, and its value is well illustrated by the fact that the essential points of it have been claimed by very many subsequent patentees. Bullock claims the production of reticulated transparencies, by copying a negative over which a grained surface is laid; this transparency affords the means of making a grained negative; but the method by which their best work was made is a second process included in the same patent. Ordinary or photographic paper is coated with a glutinous substance, and printed with a reticulated pattern. Let me now quote from the specification: — "In this case the specks of ink themselves form a medium, and by their aid excessive contrasts are avoided, and half-tones secured. Such picture, when so obtained, is passed to a lithographic stone or zinc plate, and a printed proof produced therefrom; by the aid of chromo-lithography, colored proofs may be produced." The coating of the paper with a glutinous substance may "be conducted in connection with bichromate of potash, or bichromate of ammonia." The said transfer paper may be used, "whether the impression be a lithograph, a zincograph, an impression from an electrotype, or from an engraved or etched plate."

Mr. Dallas' work you have seen before, and there are some specimens before you. He tells me that he supplied tint blocks for journalistic work (*The Garden*) as long ago as 1872.

By transferring a coarsely-grained collotype to stone or zinc, a very good grain image is obtained, and the coarse reticulation of the

[1] The following sketches and description, extracted from the *Photographic News*, will enable those who did not attend the lecture to sufficiently understand the construction of the velvet roller: — "Here is a sketch showing it complete and in section. The measurements specified are those to be recommended, and in the section we show the materials of which the roller is made. After considerable experience, it is found that the best silk velvet is most suitable for the purpose. The body of the roller is of pear-wood, a light material most favorable to the purpose, while the handles are of box-wood. Over the pear-tree block are sewn two layers of thick serge, and over the latter one thickness of velvet, the price of which is about 12*s.* a yard. A nice brisk nap is required in the velvet, and this cannot be obtained unless a good price is given. The serge, before it is sewn on, should be scalded in hot water, so that it will not ruck afterwards, and the velvet must be fitted by a skilled seamstress. The so-called carpet stitch is best adapted to the purpose, the ends of the velvet not overlapping, but drawn together so as to meet. In this way the seam is not a ridge, but perfectly flat, and the roller does not set-off at this spot. It need scarcely be said that this can only be attained with very fine stitches. The velvet is cut out exactly to size, and sewn on the block. The velvet roller is ready for use as soon as it is made. Unlike the leather roller, there is no need to get it into condition. In the same way, it may be put away in its linen bag as soon as done with, though, perhaps, it is best to clean first; the bag keeps away dust, and the grease in the ink will keep the velvet from becoming hard. Of course you can't scrape a velvet roller, to get the ink off, as you do a leather one; you can only free the velvet of its ink by rolling. The roller is passed over a clean slab, and this is scraped from time to time. The slab gradually pulls the ink off, and this is then removed from the slab by scraping. If you are not able to get off all the ink in this way, pass the roller over a thin sheet of soft paper, and apply a little turpentine. After a little practice, you will soon know when the roller is free from ink."

gelatine is very much facilitated by adding chloride of calcium to the sensitive mixture. The following answers very well: —

Gelatine	6 parts.
Water	60 "
Bichromate of ammonia	1 "
Chloride of calcium	2 "

Printing surfaces thus obtained, whether lithographic or typographic, resemble those of Pretsch or of Dallas on the one hand, and those of Sprague on the other hand.

In speaking of the work done by Messrs. Sprague & Co., in which the gradations of the original photograph are translated into a vermicular grain, suited for printing by means of the litho-machine, one must fully recognize the fact that this firm was the first to put photo-mechanical printing from the ordinary gradated negative on a large commercial basis in this country; while the great extent and variety of work executed by them during the last two years abundantly proves that there is a large and rapidly extending field for work of this kind. Before you are numerous examples of their work, and in the extensive commercial application of this method we have a very decided advance since the date of my previous lecture.

In order to obtain a transparency in which the tints are translated into points, lines, or dots, Algeyer and Bolhoevener have recently suggested a method in which a collotype plate is exposed under a negative; and after this plate has been soaked and inked up in the usual way, the fatty image is reinforced by dusting with an opaque powder. This method is of course dependent on the reticulation of the gelatine for the production of a grain. From such a transparency a negative may be made by contact printing, and from this a photo-litho transfer by any one of the well-known methods.

Meisenbach, of Munich, has recently obtained a patent, in which he claims some details as to well-known methods of breaking up the grain of a photograph by means of a network, and he more especially claims the shifting of the network during the time of exposure. As regards this point, something similar was described by Bertschold in the volume of the *Photographic News* for 1859. Notwithstanding the fact that one cannot find any very striking features in the patent of Mr. Meisenbach, this gentlemen has produced some typographic blocks of surprising excellence, examples of which are now before you.

Having now touched on a few stray points, we come to an important feature in connection with the subject, that is to say, the direct translation, by mechanical means, of the gradations of depth existing in the Woodbury relief into corresponding shades of stipple or granulation; but before entering into these, let me call your attention to a method of granulating the relief itself, which Mr. Woodbury has made the basis of a method by which excellent printing blocks have been made.

Mr. Woodbury exposes his ordinary relief tissue under a transparency with a piece of network interposed, the effect of this being to produce a decided grain all over the high portions of the resulting relief, and no grain over the deep parts, intermediate portions being grained to an intermediate extent. A reverse cast from the grained relief thus obtained is the printing block. This mode of procedure is subject to one disadvantage in actual practice, as the various printing parts of the resulting block do not lie accurately on one plane, as is the case with a block made by etching a plate of zinc into relief. Mr. Woodbury, however, informs me that he has recently overcome this objection, by a modification of the process in which a transfer is obtained directly from the relief. The specimen before you will show what good work this method is capable of yielding.[1]

Mr. Fred. E. Ives, of Philadelphia, published in 1878, a method of translating the smooth photo-relief into stipple, and this method may be regarded as a new departure. According to the method of Ives, as described by him in 1878,[2] and patented in the United States, the essential features of his method consist in inking the Woodbury relief, and pressing against paper which has been grained or embossed, somewhat after the fashion of bookbinders' cloth. Under these circumstances the projections on the paper become completely crushed down by the inked relief where the gelatine is thickest, and a solid black results, while the more shallow parts of the relief only tip the projection on the paper with ink. Intermediate thicknesses of relief produced a medium effect. You will now please note the effect of pressing this sheet of grained paper against the inked Woodbury relief, a picture in black and white resulting, the shades of the original being represented by the varying extent of the closely packed dots which constitute the picture. The translation into stipple thus obtained may be used as a transfer for putting down on stone or zinc, but if preferred, it may be re-photographed. Ives also made printing blocks by casting from the grained surface which had been compressed by the gelatine relief, although these were not found to be quite equal in quality with those obtained by the first mentioned method. A subsequent modification of Mr. Ives's method gives results much more easily and economically, as he has succeeded in substituting a "swelled gelatine" relief for the more expensively produced Woodbury relief. In a letter to me, Mr. Ives says: — "The relief which I now employ is a plaster cast from swelled gelatine, which is secured so easily that an apprentice seventeen years of age makes them acceptably for Crosscup and West. On the relief the lines and stipple are impressed by means of a printing film of elastic V-shaped stippled lines, in a manner which gives the operator considerable control of the effect. The line and stipple picture on the plaster relief is then stripped off for lithographic transfer or etching, by a method so simple and perfect that it astonishes all who see it done. Formerly, I had to reproduce the impression by photography in the camera, and by this operation could not avoid losing much of the delicacy of the original, which is wonderfully delicate, sharp, and clear in line. I have to secure ruled plates for moulding closer lined printing films before I can apply the transfer method of reproduction for fine work; so it may be months before I shall show you what fine results I can secure in this way."

The broad principle of the Ives method, which consists in pressure of the relief against a grained or stippled surface, has been the subject of several subsequent patents and inventions. We find that in 1879, Petit, of Paris, took out an English patent for a method nearly identical with that of Ives, and soon after another patent by Dredge followed; this latter, however, indicating novel methods of working. A process of quite a similar character is the "Crayontype" of Ad. T. Eggis, which was published in the *Photographic News*, a short time ago. Mr. Eggis, instead of inking the relief, takes an inked film, such as manifold copying paper, and lays this on the relief. The grained paper is now placed over and pressure is applied. If the grained paper sold for producing crayon effects in lithography is used, very excellent transfers are obtained. Mr. Barker will illustrate the process to you.[3]

Other modes of effecting the translation of the relief by pressure on grained surfaces have been patented by Mr. Zuccato, and some of these will be demonstrated to you by Mr. Barker.

The first method consists in first planing a piece of type metal or similar surface in a series of ridges, or a series of pyramids, as the case may be. The plate is then inked, and instead of pressing the relief directly on the inked plate, a piece of very thin paper is interposed; the relief crushes down the pyramids in proportion to its depth. The pyramid of type metal is spread out, and forms a sharply cut outline on the paper, and in this way a transfer is obtained which has a remarkable clearness of outline, almost like the cleanest cuts of the graver.

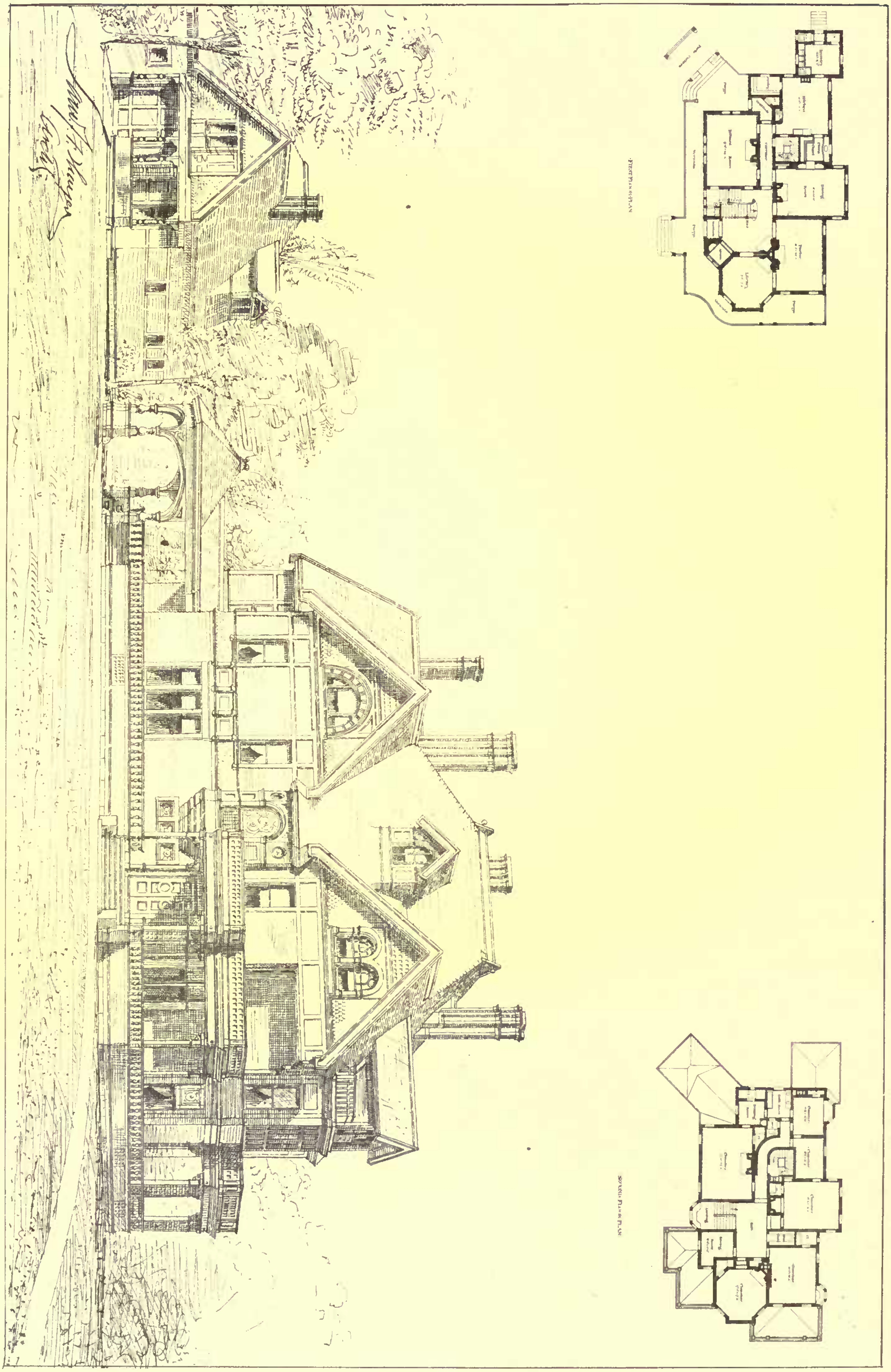
It will illustrate the matter better if, instead of inking the plate first, the relief is pressed directly against it, and you will then be able to see the flattening of the lines or pyramids.

Two other modes of working have also been patented by Mr. Zuccato. In one he interposes between the relief and a sheet a transfer

[1] The following quotation from Woodbury's specification of 1873 will serve to fully elucidate the nature of the process referred to: — "I prepare sheets of bichromatized gelatine such as is used in the process called 'Woodburytype,' and expose these under a photographic positive to the action of light, but interposing between the positive and the gelatine film a transparency on collodion or mica, of what is known as mosquito netting, Brussels net, tulle, and so forth, which has the effect of breaking up the resulting relief into a multitude of fine square hexagonal lines; or for some subjects I interpose a transparency on mica or collodion of any design of a similar nature that will have the same effect, such as an impression from a grained stone, or the same from a number of fine ruled lines. The sheet of gelatine, when washed, will give a relief having the positive photograph represented by a number of lines, instead of the simple half-tone it originally possessed; I then take an impression from this by means of hydraulic or other pressure in any soft metal, and use the block so obtained for printing at a type press where only a few copies are wanted; but where large numbers are required, I electrotype the same in the ordinary way. I prefer to use diffused daylight or sunshine through ground glass or tissue paper to produce the relief, as in that case the light in the parts that represent the white creeps round the lines, thus partially obliterating them in that part, and leaving them strongest only in the parts printing dark. I sometimes adopt another method. I take a negative of the network by transmitted light, and copy this together with the negative to be reproduced, thus producing a positive with the lines already thereon, from which I proceed to make a relief and blocks, as stated."

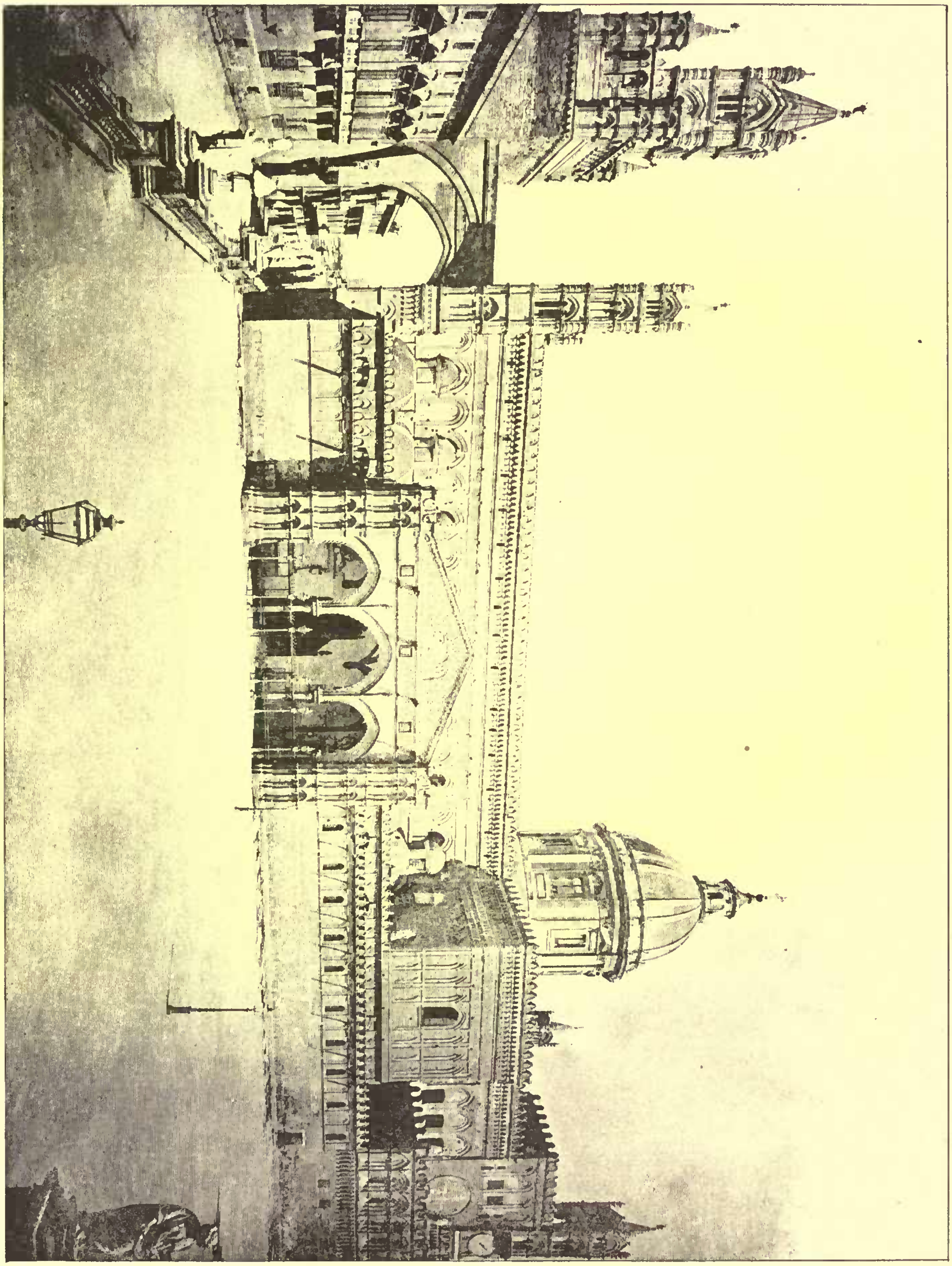
[2] The following reprint of Ives' original declaration will be of interest: — Ithaca, N. Y., Aug. 12, 1878. I, the undersigned, have, to-day, invented a method of obtaining relief plates for the typographic printing press, from ordinary photographic negatives, which may be described as follows: — 1st. From an ordinary photographic negative, a relief in gelatine, similar to that used in the Woodburytype process, but perhaps in lower relief, is obtained. 2d. This relief is carefully and uniformly inked with fine printers' ink, and pressed between two flat surfaces (or between rollers), against paper or other material, upon which is stamped, or otherwise produced, a fine grain, or other suitable surface. The inked relief being highest in the black parts, presses down the grain of the paper on the corresponding parts, and the removal of the ink by the paper from those parts of the relief produces a black impression, while upon those parts where the relief of the gelatine is lower, the grained surface is pressed less, and the ink taken up in spots, the size of which depends upon the grain of the paper, and the amount of pressure, and producing an effect similar to that of crayon sketches made upon such a surface. 3d. Relief plates may be made from this impression, either by the usual photo-typographic processes, or, perhaps, by obtaining a cast or electrotype of the impressed surface of the paper or other material used to receive the impression from the gelatine relief. — FRED. E. IVES.

[3] Mr. Eggis, writing in the *Photographic News*, thus describes the method: — "This process gives results good enough to have allowed the taking of a patent, but I find it preferable to describe it for the public benefit. I call it crayontype, for the images it produces are much like those obtained by the artist with a lead pencil (crayon in French). This is how I proceed. I procure or produce, to begin with, a gelatine positive on best plate glass (*glacé*) obtained by the known ways, in relief. The highest point, when dry, should not have more than one millimetre. The other necessary implements are — 1st, grained (or lined) paper, of same kind as is used by the artists for their drawings destined to be etched; and a few sheets of blue or black transferring paper (*papier à calquer*, thin paper coated with a greasy substance and colored); 3d, a small press. Having these at hand, I take the gelatine positive, lay it on the stone or metal table of the press; on the relievo I place a sheet of transferring paper, the prepared face turned upwards. On this I lay the stippled or grained autographic paper, face downwards, touching the greased sheet. Over all this, I place a fine polished steel sheet, well planed. I put the whole under the press, and slowly pull down the lever in such a manner as to give a smooth and graduated impression. Afterwards separating the whole, I find on the grained paper a good and often a perfect stippled reproduction of the gelatine relief. This reproduction being formed by a greasy substance, I am able to transfer it at once directly on stone, for lithographic purposes, or on metal, to be etched in the usual manner. The production of such an image will be easily understood; it is much the same as the direct drawing with a pencil on the paper. Instead of the artist pressing more or less his graphite on the paper, the gelatine relief (which corresponds more or less to the lights or shadows of the photo) presses more or less on the paper, and gives the true gradation of the original. The work of the hand is mechanically imitated very closely indeed. The crayontypes present a different grain, which may be chosen according to the work to be done. It is at least more artistic than the usual regular stippling."



House and Stable at Newton Mass. for Mrs Lizzie Brooks.

Heliotype Printing Co. Boston



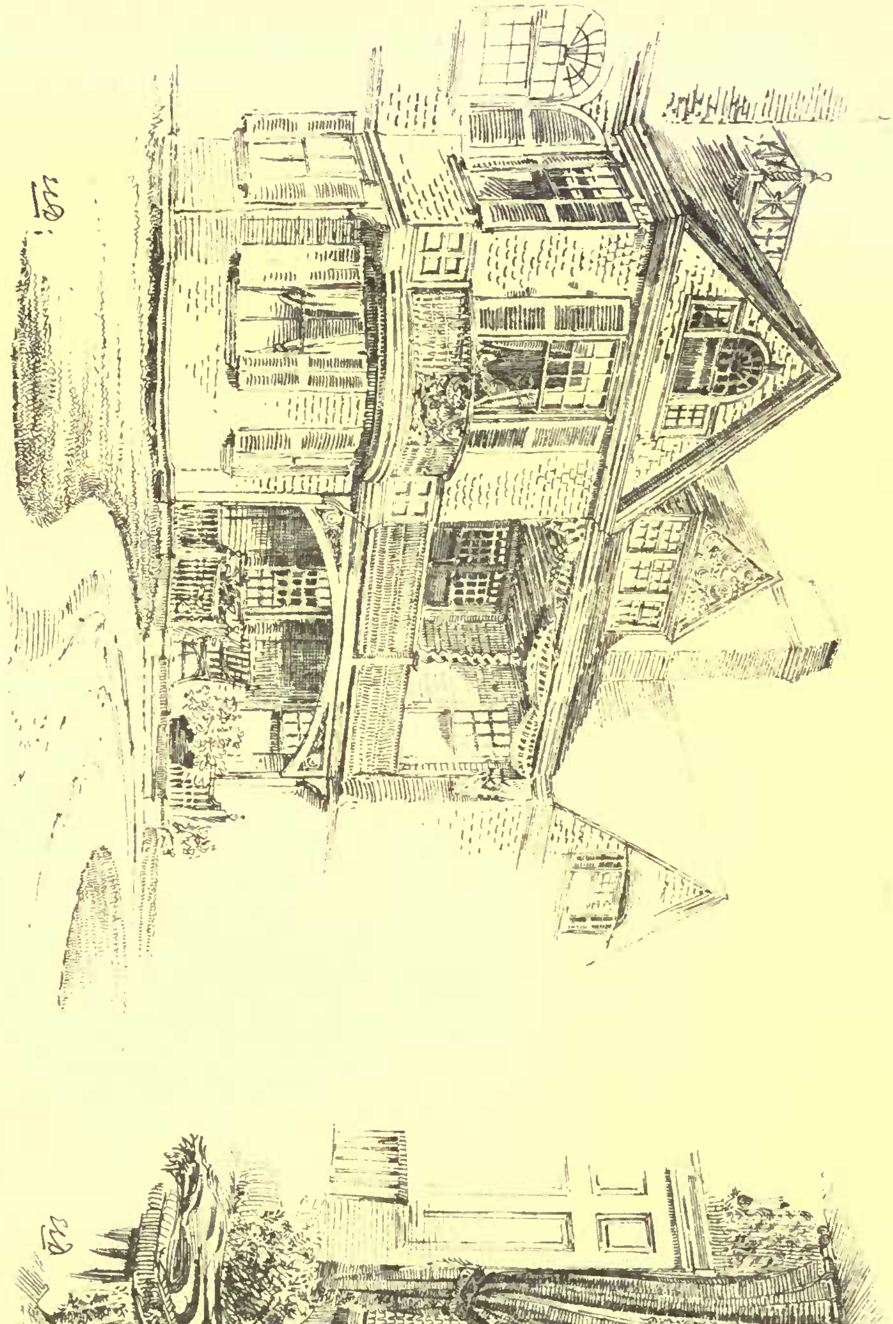
Cathedral, Palermo, Sicily.

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

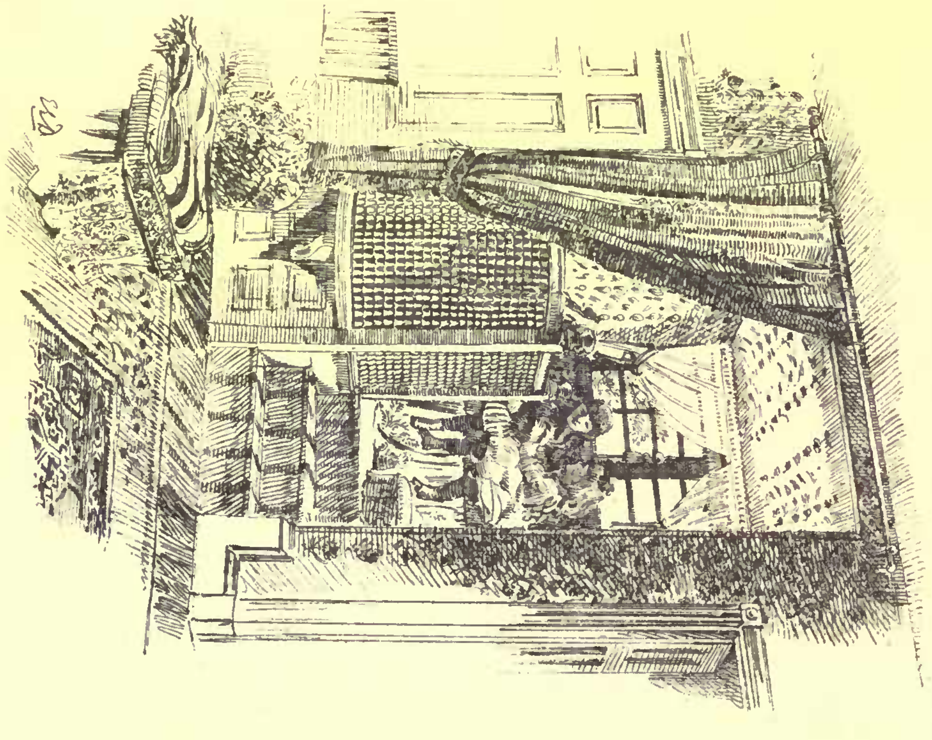
House of Col. Stevenson, Blue-Hill, Readville, Mass.

Mr. W. Ralph Emerson, Archt.

Pencil Sketches by E. Eldon Deane.

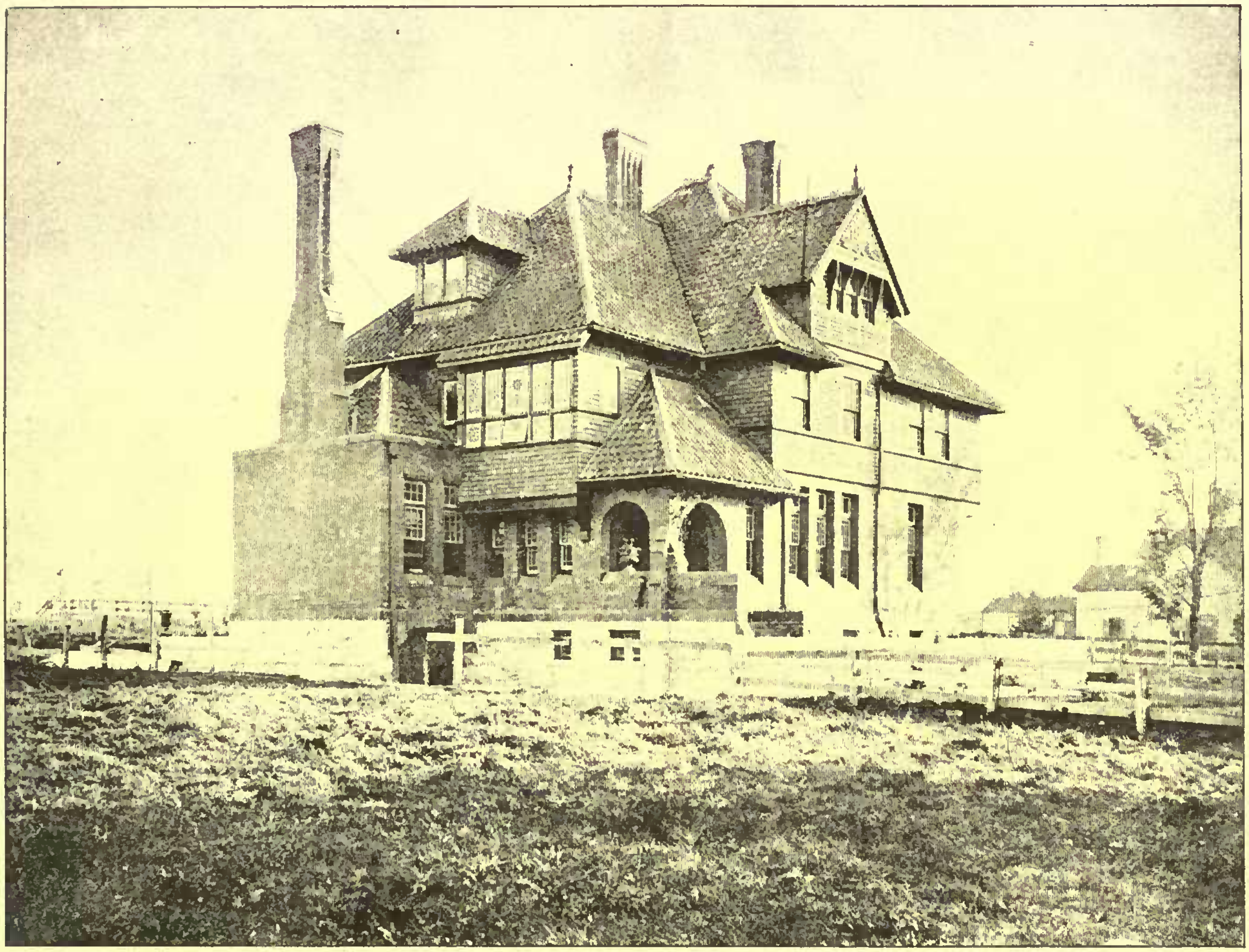


Principal Entrance.

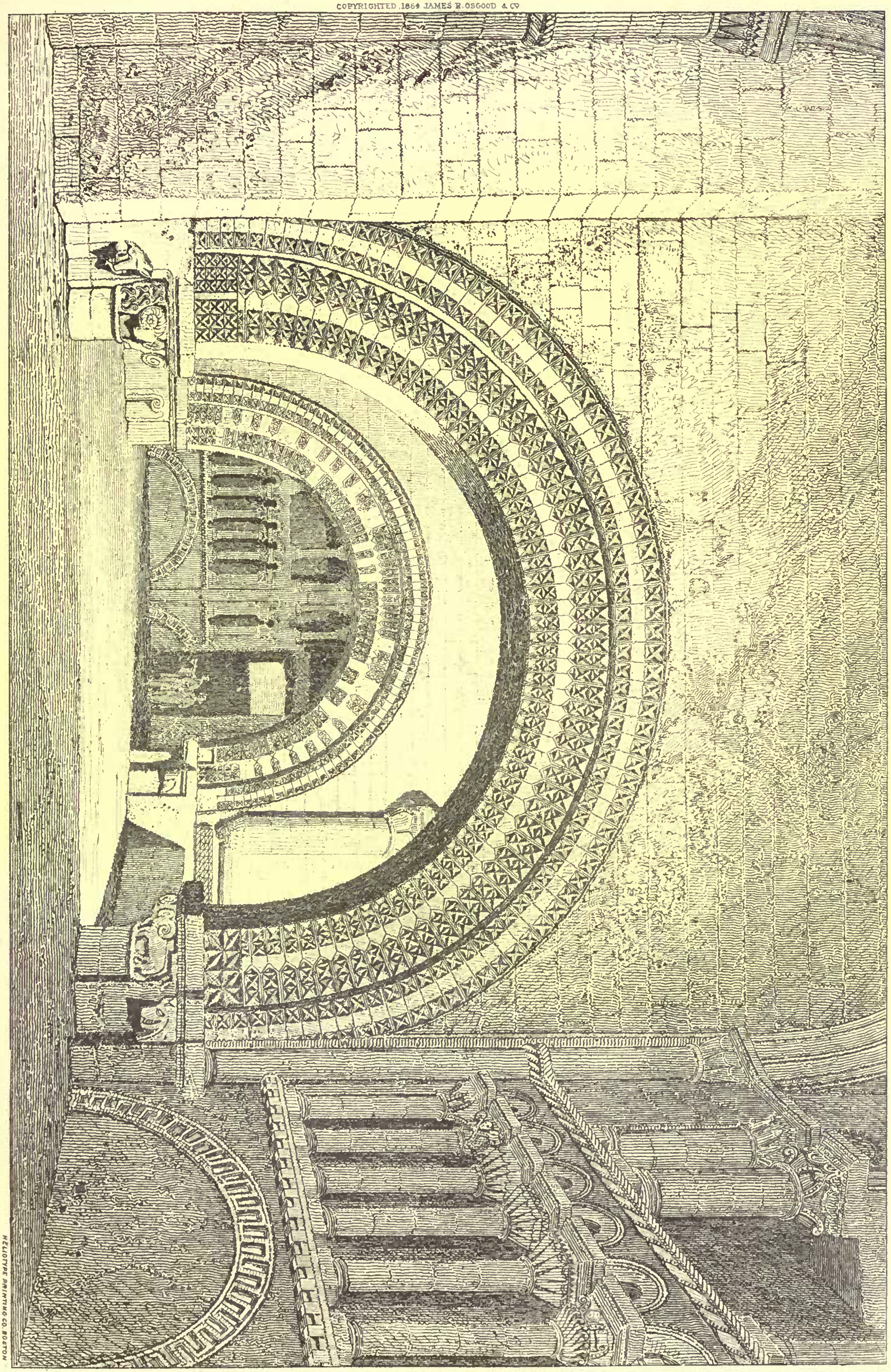


Alcove with table & seat in one of the Bedrooms.


CRAIGNETHAN HOVSE.
LANARKSHIRE.
SCOTLAND.
Lintel, doorway in out-house.
Oak door 3-2 x 8-6
four panels.
Door Latch,
forged iron.
Jamb & Label.
Door in staircase
tower.



House on Prospect Ave., Milwaukee, Wis.
Alex. F. Oakey, Arch't, 129 E. 42D St. New York.



ABBEY CHURCH OF THE HOLY TRINITY AT CAEN.

Arches under the central Tower looking from the South Transept.

paper a piece of gauze, or a piece of silk which has been inked with transfer ink. Of course what then takes place is similar to what happens in the case of the plate; the threads of the gauze get crushed out to a greater or less width, but this method in which the gauze is crushed down is not nearly so perfect as the method with the plate of type metal.

A third mode of working, which Mr. Zuccato also claims in one of his specifications, is the pressing of the relief upon a lithographic or zincographic surface on which an ink stipple has been impressed. The stipple gets crushed out more or less, according to the extent of the pressure; this of course depends on the thickness of the relief.

Messrs. Brown, Barnes, and Bell, of Liverpool, have recently made some excellent blocks, and, judging from the appearance of the prints, they appear to me to be likely to have been produced by some method more or less resembling the Ives' process; still I have no knowledge on this point. These gentlemen have made certain patent claims, but as various methods are referred to, one cannot judge from the specifications as to what process is actually employed.

Before you go, perhaps you will look at some reproductions of phototype blocks, which Mr. P. Barry has made by casting in brass. The details are wonderfully preserved, but it does not appear to me that this process of reproduction is likely to supersede electrotyping.

THE ILLUSTRATIONS.

THE CATHEDRAL, PALERMO, SICILY.

A DESCRIPTION of this building, accompanied by one of Mr. A. H. Haig's masterly drawings, showing the campanile of the archbishop's palace and the arches separating it from the cathedral front seen from the opposite direction, may be found in the *American Architect* for April 27, 1878.

ABBEY CHURCH OF THE HOLY TRINITY, CAEN, FRANCE.[1]

For description and further illustration, see our last issue.

HOUSE AND STABLE FOR MRS. ELIZABETH BROOKES, NEWTON, MASS. MR. S. J. F. THAYER, ARCHITECT, BOSTON, MASS.

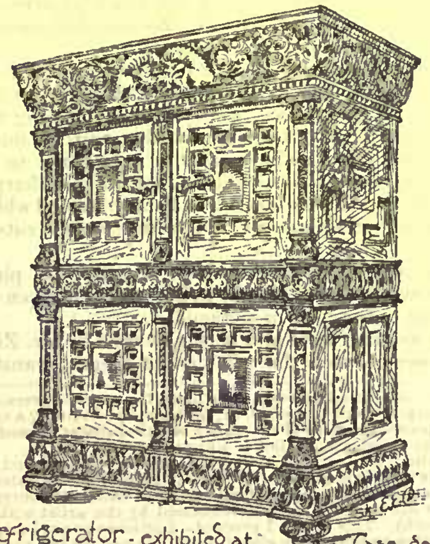
CRAIGNETHAN HOUSE, LANARKSHIRE, SCOTLAND.

DETAILS FROM THE HOUSE OF R. H. STEVENSON, ESQ., MILTON, MASS. MR. W. R. EMERSON, ARCHITECT, BOSTON, MASS.

Other details from this establishment were published in our last issue.

HOUSE AT MILWAUKEE, WIS. MR. A. F. OAKEY, ARCHITECT, NEW YORK, N. Y.

ART IN CHALDEA AND ASSYRIA.—IV.[2]


Refrigerator - exhibited at The Boston Mechanic's Fair: by the Baldwin Man^g Co: Burlington: V^t Case designed by Frank Hill Smith.

WE have thus cast a hasty glance at the principal characteristics of Mesopotamian architecture. We have seen how its main structures were built, and also recognized the existence of a subordinate and contrasted style of architecture in which the column was used,—a style, as M. Perrot thinks, that was evolved from the tent. and that ran its independent course parallel with that of the main fashion, uninfluenced and uninfluencing. We must now pass over some of M. Perrot's interesting chapters,—those on the orientation of buildings and their foundation ceremonies, and the mechanical resources and the graphic processes of the time,—and look very briefly at the funerary architecture of the Chaldeans and Assyrians. The palace is the best-preserved and most interesting structure left to us; not as with the ancient empire of Egypt the tomb, and not as with later Egyptian and with Greek developments the temple. We are far indeed from finding any sepulchre to compare with the mighty pyramids, or those later Egyptian tombs whose pictured walls unroll for us the story of local life in all its ranks, in all its beliefs, and in all its practical details. "We know," says M. Perrot, "hardly anything of their tombs. Chaldean tombs have been discovered in these latter years, but they are anonymous and mute. We do not possess a single funerary inscription dating from the days when the two nations who divided Mesopotamia between them were still their own masters. *As for Assyrian burial-places, none have been discovered.*" It is a strange but most indisputable fact that no one to-day has the slightest idea how the Assyrians disposed of their dead. Texts and monuments and sculptured pictures are all alike silent. There is no witness to prove how the body was disposed of when life was extinct, not with regard to the sovereign more than with regard to his humblest subject; no tombs, no urns, no writings, no testimony of any kind. Loftus suggests that all bodies were taken to Chaldea, since in this latter country cemeteries are as conspicuous as in Assyria they are lacking. The southern country was regarded as sacred by the northern, as being the birthplace of its race, and this fact gives color to the theory; but, as M. Perrot queries, would the Assyrians have confided the corpse of their almost deified monarch to the untender mercies of a nation with whom they were unceasingly at war? The whole question must be left unsettled for the present.

The Chaldeans evidently held something akin to the Egyptian belief with regard to the nature of the soul, and the necessity of preserving the body after death. This is proved by Assyrian writings, and by the careful way in which their tombs were built. The bodies were mummified, though not so perfectly as the Egyptian, since the skeleton alone remains to-day. We find no funerary mounds in Chaldea. The dead were interred in small brick vaults, under terra-cotta lids, or in terra-cotta coffins of varying shape. These coffins, however, were heaped one upon another, so that with the lapse of years they themselves grew into mounds. No sepulchre has as yet been discovered which stands out by its size or richness as being that of an important personage, and yet certain inscriptions, if such testimony were needed, tell us that royal tombs did have a conspicuous existence.

The Assyrian temple has already been briefly referred to as the "staged tower." Some of these towers have been called "observatories," but there is no proof that they were not all temples; and, indeed, the two functions may very well have been combined in Mesopotamia. The most typical form is a seven-staged tower formed of cubes decreasing in size, placed each in the centre of the one below, unbroken by any interior apartments, crowned probably with a plinth or tabernacle, and encircled by either one or two sloping ramps for ascent or descent. For a description of the variations of this type which have been catalogued, the reader must turn to M. Perrot's words, and to the admirable, discreet, and conscientiously explained restorations of M. Chipiez. The great mound called Birs-Nimroud was a temple, and it still stands to the height of 235 feet. Strabo says it once measured over 600 feet, but M. Perrot deems this an exaggeration. It is certain that none of the temples yet discovered attained the bulk of the great pyramid of Gizeh. Remains of these temples have been found at ancient Ur and other Chaldean sites, as well as in later Assyria, and the Chaldean examples are the largest.

Smaller buildings that evidently were temples have also been discovered. Sometimes they showed the columnar structure to which I have already referred, but sometimes they were merely brick houses of not excessive size (the naos in one at Khorsabad measures about 47 feet in length), decorated after the customary fashion with sculptures and enamelled bricks. The bas-reliefs show that the triangular pediment was not unknown among their forms of roofing.

We cannot follow M. Perrot through the full and interesting description he gives of Sargon's palace at Khorsabad. It has already been many times referred to, and a very general idea is all that a review can give, even though it be extended to undue length. Other Assyrian palaces are all of a similar type, though no two are identical in plan. Sargon's is the most instructive because it stands alone on a site unoccupied before and untouched later, while in other places successive builders have left conflicting traces, one having often mutilated the remains of him who had built at an earlier day; for each Assyrian monarch erected his palace for himself, as the Egyptian did his tomb, and none was content with the legacy of his predecessor. Often old materials were converted to new uses, as we see in the sculptured slabs, which are sometimes worked on both sides with pictures of different dates, the later comer having turned the first face to the wall and placed his records on what had been the hidden side. Certain ancient Chaldean ruins have been partially uncovered which show that the same palace-type prevailed through all ages. And later Babylon confirms the belief; that is, in so far as she speaks through written history: for the river has destroyed her in part, and what is left has not been properly explored. A great harvest probably awaits the investigator who shall open the three or four great mounds that still stand on the site of Babylon, looking still like natural hills, and shall excavate them as fully and scientifically as M. Place has done with the palace of Sargon.

All Mesopotamian cities were thoroughly fortified, but again we must pass over M. Perrot's interesting analysis. It is hardly necessary to add that Babylon and probably other cities were of enormous circuit, uniting within their walls, most likely, many separate towns

[1] From Cotman's "*Antiquities of Normandy.*"

[2] *A History of Art in Chaldea and Assyria*, from the French of Georges Perrot and Charles Chipiez. Illustrated, translated, and edited by Walter Armstrong, B.A. London: Chapman & Hall, New York: A. C. Armstrong & Son, 1884. Continued from page 222, No. 463.

or villages, large gardens, and even cultivated fields, to afford sustenance in case of siege. Each entrance through the town walls was in reality a succession of rooms, hollowed out of the enormous thickness. They were of two kinds at Khorsabad, the simpler showing outside only ornament in colors, but the more splendid those huge animals and winged genii that are familiar to the frequenter of European museums. Paved and elevated causeways extended from these gates and formed roads across the plain as well as streets within the town. At Khorsabad the streets were forty feet wide. M. Place could not entirely excavate the remains of the small town, but did enough to know that such remains exist below the present surface. Of the houses of the private Assyrian citizen we know very little, but the bas-reliefs show us that they must have had both flat and domed roofs.

I have barely touched upon the most important points in M. Perrot's survey of Mesopotamian architecture, and yet I have been led beyond my original intentions. I have been tempted on by the fact that his book is the first that has explained the subject in a thorough way; that has united the testimony hitherto dispersed through a number of costly volumes, each devoted to a special site; that has collected the evidence given by all recent explorers, and has woven all their new-gained knowledge into one coherent story. We may be doubly grateful for his labor since the form of his book puts it within reach of every student. And now we must look very briefly at the art of the Mesopotamian sculptor.

Its beginnings are more obscure than we found them in Egypt. Only a few fragments dating from very early days exist, — only just enough to show that the art had an independent origin and was not derived from that of Egypt, and that a school existed which carefully studied nature and was successful in its treatment. But there was no such incentive here to faithful naturalistic work as there was in Egypt. Though similar ideas prevailed as to posthumous life, no sepulchral statues seem to have existed in Chaldea. The strong impulse toward careful portraiture they gave in Egypt was lacking in Mesopotamia, so when we come down to that period when our materials are most abundant — to the Assyrian empires — we find an art that is powerful in many ways, but limited in its range, monotonous in its subjects, and extremely conventional in its treatment of the human form and face. Perhaps, however, the chief reason for this last characteristic lies in the fact that the Mesopotamian sculptor lived among a people who did not go half-clothed like the Egyptians, or entirely naked like the Greeks upon occasion, but who were covered with voluminous drapery. History tells us, moreover, that these Eastern folk, unlike the Greeks, thought it shameful to uncover the body. Opportunity and impulse were thus alike wanting for that constant study of the nude which can alone preserve an art in the path of true and powerful portraiture. We may believe that if these conditions had been different the sculptor would have produced very different work when he treated the human body; for no art whatever has treated animal forms with such artistic truth, such majesty, and such vital, expressive force. Another consequence of these conditions, taken together with the soft quality of the stone employed, is that the sculptor's art soon restricted itself almost entirely to bas-relief. Semi-detached figures are frequent, but entirely detached subjects seem to have been more and more abandoned as the ages passed; and the true bas-relief is the chief product of the school. Its principles were admirably understood. Examples occur in which the figures occupy two planes, but a single plane is the most common device. Even in the later days of the school when, as always in such days, the sculptor tried to do too much at once, he still did not violate the principles of his process as his brethren have done amid more modern nations. He had a true artistic instinct to guide him in the selection of important facts, and to counsel the omission of those that were relatively useless. Naturally, the relief is higher where the figures are of larger size, but it is never more than mezzo-relievo, and the true basso-relievo of extremely slight projection is the best-beloved expedient. The Greeks preferred mezzo-relievo, and low relief was never again so frequently, understandingly, and beautifully employed as it was by the Assyrians until the early Renaissance sculptors of Italy again perceived its charm.

In the lions and human-headed bulls that guard the gateways we find a very peculiar compromise between "the round" and the relief. Looked at from the front they seem independent figures, the heads, chests, and forelegs standing out with freedom; but seen from the side they are reliefs, partly engaged in the visible slab behind them. A most peculiar device was adopted to make them seem complete from either point of view. Each was given *five* legs. Two are seen placed close together in front, and the animal appears at rest; but at the side we see four legs so placed that he is walking. The device is, however, as rational as it was bold and, so to say, unnatural. Only thus could both aspects have been made life-like and effective, and, as M. Perrot declares, many a one might look often at such a figure without perceiving the anomaly; it is only from one point that an oblique view reveals all five legs at once.

In Assyrian bas-reliefs, as in Egyptian, the faces and feet are almost always in profile and the bodies full front. Even on occasions where the full face is shown the feet retain their awkward profile; but the effect is hardly as disturbing as in Egyptian work, since the voluminous draperies partly conceal the deformity. One or two types — a bearded face and a smooth face — include between them all the faces on these reliefs. All the kings look alike, and all their bearded attendants bear something more than a family resemblance to them. Royalty is denoted by costume and dominating height, without any attempt at definite portraiture; and the type is the same that was handed down to the Assyrian by his Chaldean predecessors. The whole genius of the art is conventional as far as renderings of humanity are concerned; but, as I have said, it is very different when we come to look at animal forms. Here the sculptor's power was not hampered, and he proved it to be great indeed. The magnificent mastiffs, the horses, the wild asses, the lions and lionesses are rendered with a keen insight, a fiery force, and a skill in seizing upon essentials and omitting unessentials which could not be overpraised. The captive lion stepping proudly from his cage, or the wild one writhing wounded but defiant, is a creation which alone would entitle the art which produced it to rank with the world's great developments. There is one figure of a wounded lioness, her hindquarters paralyzed by an arrow which sticks in her spine, that is an unsurpassable masterpiece of action, character, and feeling. The lion hunt of Assurbanipal found at Nineveh and now in the British Museum proves what the Assyrian sculptor might have done with human forms, had circumstances favored him as they favored the Greek.

At Nimroud (now Callah), the earliest seat of the Assyrian monarchs, and at Khorsabad, which was built by Sargon, the first king of the second dynasty, the figures on the reliefs are very large, filling the whole height of the slab, and measuring more than nine feet; but later on, the slab was divided into seven or eight parallel compartments, and the figures are of small size. This was a consequence of the growing desire to enliven and vary the severe monotony of the earlier style, to introduce a greater number of figures, more indication of backgrounds, and a greater diversity of incident; but throughout the whole art it is marked by what seems to us great monotony. We find the same scenes of battle, of worship, and of hunting repeated over and over again with similar figures similarly disposed. There never was a time when any one but the king was thought worthy of being perpetuated in art. There is nothing to be found even remotely approaching in character to the reliefs and paintings in which the Egyptian artist depicted the real life of the nation. Assyrian sculpture was as conventional in its themes as, so far as humanity is concerned, it was conventional in its treatment.

The colossi which flanked the entrances are so well known that I need hardly dwell further upon their characteristics here, especially as there is no space to give M. Perrot's interesting analysis of the meaning attached by the Assyrians to those curious combinations of man and beast that so often occur. M. G. van Rensselaer.

THE KIND OF ARCHITECT WHO CANNOT GET ON.

Mural Monument
Breda Cathedral,
Holland

HIS father was the vicar of a small country parish, and, the church requiring restoring, he thought it a good opportunity to make terms with the eminent architect who conducted that nowadays thankless operation for the professional education of the subject of our sketch. The anxious father was moved thereto by several considerations. First of all, young hopeful had missed the scholarship which was to have smoothed the way to a university career, and had disconcerted all the family plans thereby; and, secondly, the good vicar was taken aback at the, to his thinking, ample remuneration which the fashionable architect received for a few slight drawings and a casual visit or two — an amount which contrasted sharply with the very moderate stipend which rewarded his own ministrations. He was, moreover, dazzled by the long list of similar commissions which the professional gentleman had on hand, and upon which he expatiated with off-hand volubility. And so the preliminaries were discussed and settled, the premium paid (not without a pang), and the young man, duly articled for three years, left his country home for the office of the great London architect, carrying with him the hopes and fears of his impoverished parents. He was not badly equipped for the profession selected for him. He had received a fair education at the local grammar school; his breeding and his home life in an English parsonage had given him the manners and bearing of a gentleman, and his father's position might reasonably be counted upon for an introduction to the superior clergy and the county families.

His reception in the office of the master of the building arts was not quite what he expected. In the first place, his principal was rarely seen. The important commissions he had on hand, and the still more important ones he had in view, kept that accomplished artist running about the country a good deal. His office business was conducted by one scantily-remunerated, but trusty clerk, of tried fidelity, skill and experience, and of untiring industry, assisted by a number of pupils, who did as little and absented themselves as much as possible. The new pupil was taught nothing. He picked up the simple but showy art of tracing, and he copied specifications. In response to the importunate clamors of sundry clerks-of-works, he adapted to new circumstances some stock details which had done similar duty on several occasions, and he compiled some wonderful specifications by a process of selection from a store of originals. In neither of these occupations did he take any real interest, nor did either of them afford any suitable opportunities for his advancement. The *rationale* of the art he was supposed to be acquiring was never explained to him, and he knew but little at the end of his three years' apprenticeship that he did not know at its commencement. The excellent aids to study which the ingenuous youth of the present day has at command did not then exist, and if they had existed, our friend had not the energy to avail himself of them. When the day of his emancipation arrived, which his friends certainly thought would have brought with it a secure and honorable position in his employer's office, or a crop of cathedrals to restore, or churches and parsonages to build, they were surprised to learn that there was no longer room for him in the office. He was "pushed from his stool" by a newer crop of pupils, who were about to pass through the same course of "study." In this predicament he tried various devices. He failed to find an entrance to the offices of other architects. His friends with one accord recommended him to "set up for himself," to "start upon his own account." To their innocent minds this seemed like securing fortune by a sort of *coup-de-main*.

He took a dingy office in the Adelphi, very high and airy, and he added his name to the long list on the door-posts, garnished with his professional titles; and he soon discovered that "setting up" and "starting" were not quite the same thing. He did not "start," but "stagnate." It was very dull, sitting alone in that dingy apartment waiting for the clients who never came, and soon those little leaflets which grow on many an office-door began to show themselves, bearing dates which could not be reconciled with the confident statements as to the immediate return of the tenant. The young gentleman was meanwhile consorting with other young gentlemen similarly conditioned, who railed on Lady Fortune in set terms, and could not for the life of them make out how it was that the Scotts, and Streets, and Waterhouses of the period got all the work. This state of things was brought to a sudden close. The youth returned to his ancestral home, whence he was driven by the death of his father, and the consequent disruption of his home. A compassionate friend found him office-room and a pound a week, as a temporary measure. This asylum failed him after a short time, and then his path in life led undeviatingly downwards. He had no qualifications for the battle of life. He was not even a draughtsman in any sense of the word, and could not subsist on that "charing" which has formed for so many young men the bridge from clerkship to independent practice.

That "able assistance" which is so very easy to obtain, *vide* advertisements, was not his to give. Pen-and-ink perspectives of the effective sort he could in no wise prepare. The designs which he once undertook to furnish "from the rough sketches" of a distant and deluded employer were returned to him with a scornful letter, rougher than the sketches. Of all practical knowledge he was quite innocent. "Quantities" had always been so repugnant to him that he never fully understood the meaning of the word, and was certainly unacquainted with the operations involved in their preparation. He could not have written an intelligent specification to save his life, and to price or criticize a builder's account was not to be thought of. He could trace what was drawn for him and copy what was written, and these he could do but "indifferent well." There is but a limited demand for such arts as these, and the remuneration they command is but trifling. And thus it came to pass that he fell into disgrace and poverty, and kept out of the way of those friends whose patience and purses he had long since exhausted.

There are but few architects in town who have not recently suffered a call from one or another of the numerous specimens of this class. The type varies but little, and one portrait will serve for the whole. He has no card, but sends in a name; a very good one, of course. The office-boy delivers it with mysterious reserve, but cannot enter upon explanations in the hearing of the caller, who is close upon his heels. The embarrassment he manifests is variously interpreted by his master; it may mean another vicarious application for that little account, and the professional gentleman is perturbed at the thought and at the impossibility of retreat — offices are generally so badly planned. Or it may be a new client; hope springs eternal in the human breast, and this delusive suggestion gains a decisive victory. The stranger is admitted, and his whole story is read at a glance; it is an oft-told tale. His costume is mainly noticeable for new and ingenious adjustments; his bearing is either offensively servile and his address a whine, or he puts on the easy swagger of a familiar friend. Has Mr. Blank a vacancy in his office? Unfortunately, no; things are flat. It is found by the visitor to be so in other quarters; even the great Mr. Friba cannot offer him employment. Will Mr. Blank kindly look at a few drawings? At this juncture Mr. Blank suddenly recollects a very important engagement; but his retreat is cut off, and, before he can escape, the dirty package is untied and some dirtier drawings displayed. Poor things enough! Designs for a country school, or something of the kind, culminating in a pen-and-ink perspective ludicrously out of drawing, with inhuman figures more preposterously ill-drawn still. A short lecture is delivered thereon, with the volubility of frequent repetition. It appears that they were submitted in competition, but "of course a local man got the job," etc.

The conversation, or rather monologue, takes a sudden turn in the direction of certain irregularities in the matter of daily meals: of the absence of breakfast on that particular morning, on many previous mornings, and finally settles down upon the immense relief which would follow the temporary — merely temporary advance of half a crown. Sometimes the appearance of the applicant is a sure indication of the real cause of his misfortunes. In the saddest cases ability is not wanting, only the ability to keep away from the establishment at the corner. And there are cases where the failure to keep a footing in the crush and crowd of modern life is not culpable. As the American Æsop wisely says in his modern version of the fable of the tortoise and the hare, "the race is not *always* to the slow." We have exact information as to at least one instance in which merit is but inadequately rewarded. Nevertheless a specialist can always get a living of some sort; an artist will always find a market for art; a practical man can at least find employment as a clerk-of-works. If luxury cannot be attained, no one able and willing to work need despair of modest comfort. But woe to those who fail to qualify for some branch of the great profession which they adopt. As the world is more and more, the individual certainly becomes less and less; he drops out of the crowd and is lost sight of. As the years go by, the descent into Avernus becomes increasingly easy, and it is now more than ever necessary for those to bestir themselves who are ambitious even to keep their foothold; doubly so for those who would "get on." — *The Builder.*

A PICTURE MANUFACTORY.

IN a certain town of the North, and in one of its principal streets, may be seen a large picture dealer's warehouse. The quantity of the work shown is very large in proportion to its quality, and as there are still some latent doubts in the mind of the dealer as to the authenticity of his works, it has been advisable, to soothe his feelings and to direct and improve the wavering public taste, to affix to each work a placard to its purport; plain, decisive, and concise: "An oil painting, warranted. Signed. Price 45*s*. Frame worth as much." Every afternoon there is a sale by auction, and curiosity had taken us there on more than one occasion. The idea came to one of our correspondents one day to make the acquaintance of this man of many pictures; so the following morning, having armed himself with a small landscape (a castle made weird and phantom-like by fog), he strolled leisurely into the shop. The work was uncovered, and criticism indulged in. "Well, sir, from an artist's point of view, this is, no doubt, a very fine picture; from mine it is not worth a ——. We want something with plenty of flash color; crude green, and brilliant reds, with an appearance of finish, which is got by using very thin color, and putting plenty of small touches, to imitate flowers in the foreground. We want no hidden sentiment, all must be on the surface, and the more superficial it is the better it sells. What do the public want with castles hid in fogs? Their ideas, what with family matters and business, are always in that state, and they want a little sunshine to refresh them. Something decorative to make a bright spot in a room. And this is what we strive to give them."

"Well," we asked, "is much to be made by this kind of art?"

"A great deal. An American artist came over to this country some two years ago, and he has already put £1200 by. Do you see that picture there?"

There was no mistaking it; it was a vermilion sunset, with a spot of crimson lake for the sun; a few besoms, with their handles stuck in the ground, were standing out in bewildering relief. "That is something like a picture! Sells well, and three like that can be painted in a day, and the artist gets £1 a piece for them. I pay him £60 a month; and he in a course of two years will paint two hundred or more like that one."

"And do you make a big profit?"

He seemed to think we were chaffing him or thought him "green," and did not answer; from which circumstance, we may judge, he lives in clover. His confidence in the judgment and appreciation of the public was limited.

"Judge a picture?" said he. "Do they judge music? Do they like any picture if the artist's name is unknown, or a critic has not said 'Admire it, it is splendid.' I say no. Music to most ears must be noise, harmonious or otherwise, providing there be a tune; a picture to most eyes must be flash, startling, and crude; of the higher branches of both, they form their judgment by the opinion of others. I do business also in Paris; for though they talk more of the high walks of art than in our matter-of-fact country, my pictures find a market — sell well, ha! ha! sell very well."

And this is in the nineteenth century, and in the days of Oscar Wilde! *Sic itur ad astra!* — *The Artist.*

MECHANIC'S LIENS FOR ARCHITECTS.

NEW YORK, November 5, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,—In your last edition, in answer to inquiry of correspondent, you say, "The precedents vary in different States; in New York it has been decided that the lien laws are not intended for the benefit of architects," etc.

The General Term of the Superior Court in 1877 rendered such a decision as you mention, but this decision was reversed, upon appeal, by the Court of Appeals, in January, 1879, and judgment given to the plaintiff (the architect). This decision is reported in 76 New

York, page 50. It is also reported in 32 American Reports, 262, and is discussed in 21 Albany Law Journal, 405. We have heard of nothing later than this. If the decision you refer to is of later date, you will confer a favor if you will kindly send us such particulars as you may have of such later decision. Yours truly,

Hubert, Pirsson & Co.

[We are very much obliged for this correction. The case mentioned is probably the same as that to which we referred, and the reversal of the decision of the inferior court, by the highest State court, is of great importance to architects. — Eds. American Architect.]

BRACKETS.

To the Editors of the American Architect: —

Dear Sirs, — Can you kindly direct me to an illustrated article or chapter on brackets, their form and construction.

Respectfully, A Subscriber.

[For good forms of brackets, look at any architectural dictionary, under the word "console." For additional forms, some good and others not, the illustrated American books on house-carpentry and village architecture will furnish a variety.—Eds. American Architect.]

NOTES AND CLIPPINGS.

A Perilous Pathway. — The travels of the native East Indian explorers, their stratagems and their disguises, their hazards and sufferings, their frequent hair-breadth escapes, are teeming with excitement. One of them describes a portion of his track, at the back of Mount Everest, as carried for a third of a mile along the face of a precipice, at a height of fifteen hundred feet above the Bhotia-kosi River, upon iron pegs let into the face of the rock, the path being formed by bars of iron and slabs of stone stretching from peg to peg, in no place more than eighteen inches, and often not more than nine inches wide. Nevertheless this path is constantly used by men carrying burdens. — *Scientific American.*

The Radiating Power of Metals. — M. Walter Meunier has, according to the *Revue Industrielle*, been experimenting on the comparative loss of heat from cast-iron, wrought-iron and copper tubes. The experiments were carried out in a room having a uniform temperature, and were made simultaneously with the three materials in question. The tubes were all 2.5 metres long and 150 millimetres in diameter, connected at one end with a steam supply, and at the other with a worm condenser in water. Observations showed that the weight of water condensed per square metre of heating surface per hour was, with naked pipes, 3.484 kilograms for the cast-iron, 3.900 kilograms for the wrought-iron, and 2.816 kilograms for the copper. The non-radiating power of copper in comparison with iron is thus manifest. It is not stated, however, whether the pipes were all of equal thickness and similarly polished, or left with their natural surfaces. It is to be understood, perhaps, that identical conditions were, as far as possible, preserved.

The Hildesheim Treasures.— The museums of Germany bear witness to the dominion of the old Romans. From Buda-Pesth to Treves, from Cologne up to the higher Rhine, the earth has yielded of the conquering race buried arms, helmets, coins, bronzes and marbles. Yet, for the most part, the relics in the outlying provinces of the empire are of more archæological curiosity than art value. An exception, however, must be made in favor of the Hildesheim treasure, removed to Berlin in accordance with the policy of concentration in the capital. This "Silberfund," consisting of some fifty pieces of banqueting plate, were in 1858, by happy accident, dug up at Hildesheim, nine feet below the surface, by a party of Prussian soldiers engaged on military works. All the objects had suffered much from the burial of centuries; handles and feet were torn from shattered vases, but a local sculptor succeeded in good degree in piecing the fragments together. Some members, however, are lost beyond recovery. Altogether I find the originals in Berlin in very different plight from Christofle's reproductions, which serve as poor consolation to the town of Hildesheim for the treasures of which she has been robbed. The Hildesheim treasures have provoked controversy without definite conclusion; neither history nor internal evidence gives clue to their precise origin or use. The place of burial could only have been an accident, and hardly more than a conjecture is the statement that this table plate, with the corresponding culinary utensils, formed part of the equipage of some Roman general, who, on reverse of fortune, hid away the prize he could not hold. The nationality of some of the pieces is questionable; all are not Roman, and equally is the chronology hypothetical. The official catalogue I believe to be wrong in giving as the date the early Roman Kings; certainly some vases — that, for instance, bearing on the surface human heads, as the Warwick vase — belong to the late empire. And nothing can be more false than the assumption that because all the objects were found in one place they must belong to the same time; diversities of style alone prove the lapse of several centuries between the earliest and the latest. And still more difficult to determine is the precise or even the approximate period of burial. The common conjecture that the hiding was in the first decade of our era, when the Roman legions under Varus were cut to pieces in Germany, is disproved by the presence of an art posterior in date. The earliest time I can venture to name is the second century, but the latest possible date cannot be fixed; it is just as easy to suppose the owner to have been a connoisseur of the Middle Ages as a Roman general. Fortunately, as to art merit, little question can be raised; so irresistible was the temptation to throw articles in the precious metals into the melting-pot, that few finer relics of the past are preserved for our times. By common consent the best of the Hildesheim treasures are of rare beauty; the proportions share symmetry with Greek vases; the ornament in the treatment of figure and foliage, if a little florid, still comports sufficiently well with the canons of classic art. — *The Nineteenth Century.*

The Seine below Clichy. — A recent investigation, the results of which are published in the *XIXe Siècle*, shows that from the point where the Paris drains enter the river at Clichy the aspect of the Seine is that of a moving mass of vegetation, like the "sudd" of the Upper Nile, only that it is full of putrid matters not found in Egypt. This "sudd" almost interrupts the course of the river, and converts it into a morass of mud. The odor arising from the "water" is indescribable. At St. Denis the horrors culminate. "The river — if the name can still be given to the depository before us— boils under the action of the gases arising from it. Lumps of filth rise from the bottom and come to the surface, suddenly exploding and forming circles on the water, quickly effaced, but incessantly repeated. The Seine is nothing but an immense fœtid mass of putridity formed by chemical decomposition, the surface of which, all boiling with globules, shines in the sun."

The American Church in Paris. — A serious impediment, says a correspondent of the *Guardian*, has arisen to the completion of the handsome church which the American Episcopalians are building in the Avenue de l'Alma. It has now been in the course of erection for about two years, and was expected to be ready for provisional use by Christmas, and to be finally inaugurated by Easter next, at the latest. Now, however, an unexpected obstacle has occurred, which will greatly delay these intentions. It appears that a Jura marble of a too fragile description has been used for the clustered shafts which support the pier arches of the nave. The consequence has been that these columns have proved unequal to the support of the superincumbent weight of the edifice, and have begun to crack and splinter under the pressure imposed on them. The whole building has been obliged to be shored up with wooden arches and ponderous beams placed under the pier-arches, while ten at least of the clustered columns of the nave will have to be removed and replaced by a more solid material. The expense and labor attendant upon such an operation will be very great, and the time required will probably delay the completion of the church at least six months beyond the date anticipated. The difficulty will, no doubt, be met and overcome; but its occurrence, and the prolongation of the work, will prove a serious strain upon the energies of the highly-esteemed rector, Dr. Morgan, who has been already so long and anxiously occupied in the completion of the enterprise, and now sees his expectations disappointed just as they seemed on the point of fulfilment. One can only heartily wish him safely through these new difficulties. Some time ago, when looking over the church, it was pointed out to the correspondent as a more correct style of Gothic construction that the segments of the columns were much longer, and therefore more perpendicular, than was the case in similar French architecture. And certainly, French builders generally form their columns of very short segments, and in the case of Classical buildings, like the Madeleine, of circular blocks hardly thicker than a millstone. The effect of so many joinings is not agreeable to the eye; but the solidity attained, both as to resisting pressure or even a slight shock, is much greater. The too great length of the segments of the columns in the above case seem to have been one cause, perhaps, why the marble had not been able to bear the strain which was put upon it.

The Most Expensive City in the World. — New York (writes a correspondent to the London *Times*) has become the most expensive city in the world, except, perhaps, St. Petersburg, of which I know nothing. A modest house for a small family in a respectable locality cannot be had for less than £200 to £600. In the enormous "flat" houses which are rapidly going up all over the upper part of the city, an apartment of seven or eight rooms, in nowise luxurious, costs £200 to £400, and in less eligible localities, and most moderate in pretension and accommodation, rarely less than £100. At a well-known commercial restaurant I lunched off the joint the day before yesterday, and with a pint of cider and a cup of detestable black coffee my lunch cost me 6s., and was in nowise equal to the half-crown lunch of a London restaurant. The beef that is sent from here to England and sold at 6d. to 10d. a pound costs us here in New York twice that, the fillet 4s. per pound, and everything in proportion. A style of living which in London costs £1,000 a year, here will cost £2,000. The large profits are met by proportionate expenses. A man grows reckless of the dollars. At the hotels you not only pay enormous bills, but the greed of the attendants makes it impossible to get decent service without continually tipping them, and not in the modest way one does in England. There is no charge made for service, but if you want your lunch served quickly and well you must fee the waiter when you give the order. He marks every *habitué* who tips him or who does not, and the tips are on the American scale — anything less than a "quarter" (a shilling) is contemptible, and the true American will never consent to be contemptible even in the eyes of a waiter. He will at all costs avoid the reputation of meanness and has little inclination to distinguish between meanness and economy, and being always in a hurry to get back to business says that he loses more than a shilling by the delay which the waiter imposes on him. At the hotel the guest who does not fee in advance soon finds the zeal of the waiters falls off. I stopped three days at a fashionable hotel lately, and found that the second day my energetic waiter of the first found occupation at another table, and that of the second day failed me on the third, on which day I was attended by a decrepit old fellow, whom on leaving I tipped for his self-sacrificing spirit, as he must have known I did not fee the others. You pay a bootblack a dime (5d.), and so on to the end of the list. And we have no suburbs to cheapen life in. The Hudson River blocks us on one side with its uncertain winter navigation; and Brooklyn, across the East River, is as dear as New York. I was offered a furnished flat of seven moderate rooms there for £25 a month. And everybody is so intent on his own getting on that he does not stop to think that this system of enormous profits for everybody eats up all his surplus gains: and a man who gets £500 a year here is no more comfortable than a London clerk at £250. There is the chance of a great hit, and he believes in his luck. And the devotion to business is certainly phenomenal. If it is wise and healthful, the future will tell better than to-day.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents heremention ed, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

307,437. PNEUMATIC DISPATCH-TUBE. — Henry Clay, Philadelphia, Pa.
307,439. CLAMP. — Philip F. Corbett, Boston, Mass.
307,440. BENCH-DOG. — Thomas Crispin, Detroit, Mich.
307,451. MIXED PAINT.—Wm. D. Folger, Calcutta, India.
307,453. VISE-JAW ATTACHMENT. —Edward A. Galbraith, Boston, Mass.
307,456. FIRE-EXTINGUISHER. — Frank Gray, New York, N. Y.
307,459. REFRIGERATOR AND REFRIGERATOR-BUILDING.— Jos. F. Hanrahan, Ottawa, Ontario, Can.
307,471. MIXING-MACHINE FOR ASPHALT, CONCRETE, ETC. — Wm. H. H. Knight, Washington, D. C.
307,496. RADIATOR. — Joseph W. Shaw, St. Louis, Mo.
307,499. HEATING-APPARATUS. — Sidney Smith, Cambridge, Mass.
307,507. RATCHET-DRILL. —Chas. E. Tunelius, Chicago, Ill.
307,519. CALCIMINING AND WALL BRUSH.—Henry Bintz, New York, N. Y.
307,520. WATER-CLOSET. — William Bunting, Jr., Boston, Mass.
307,526. VENTILATING-ATTACHMENT FOR WATER-CLOSETS.—Minford S. Clark, Brooklyn, N. Y.
307,545. BOLT. — Charles E. Hart, New Britain, Conn.
307,551. STAIRS.—Peter H. Jackson, San Francisco, Cal.
307,558. STREET-BOX FOR GAS AND WATER SERVICE.—Edward Lindsley and Chas. E. Lindsley, Cleveland, O.
307,575. SASH-HOLDER.—Obadiah G. Newton, Trenton, Mo.
307,585. DOOR-HANGER. — Isaac B. Perry, Knoxville, Tenn.
307,586. BEDDING-STRIP FOR STONE-MASONRY, ETC.—George R. Phillips, Providence, R. I.
307,590. SHEET-METAL ROOFING-PLATE. — Patrick H. Regan, Nashville, Tenn.
307,593. LOCK-HINGE.— Chas. E. Robinson, Brooklyn, N. Y.
307,617. GRAINING COMPOUND. — Hezekiah Bailey and Wm. H. Bailey, St. Thomas, Ontario, Can.
307,660. BURGLAR-ALARM.—Peter Keffer, Reading, Pa.
307,668. WATER-CLOSET. — Wm. H. McAndrews, Bradford, Pa.
307,675. LUMBER-MEASURE. — Earl C. Newton, Batavia, Ill.
307,688. SELF-CLOSING HATCHWAY. — Richard D. Thackston, St. Louis, Mo.
307,711. BRUSH.—Oren Fish, Cleveland, O.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report nineteen permits have been granted, the more important of which are the following: —
W. J. Clendinen, 6 three-st'y brick buildings, n s Preston St., between Bond St. and Broadway.
Jos. M. Cone, 13 three-st'y brick buildings, s s Harlem Ave., between Brune and Fremont Sts.; 3 three-st'y brick buildings, e s Fremont St., s of Harlem Ave.; 11 three-st'y brick buildings, s s Harlem Ave., between Brune and Chatsworth Sts., 3 two-st'y brick building, e s Brune St., s of Harlem Ave.
Jacob Gisriel, three-st'y brick building, w s Argyle Ave., n of Pitcher St.
John Murray, 3 three-st'y brick buildings, s s George St., between Brune St. and Clinton Ave.
Wm. Carback, 2 two-st'y brick buildings, w s Chapel St., s of Eager St.

Boston.

BUILDING PERMITS. — *Eustis St.*, n Albany, Ward 20 3 brick dwells., for W. F. Collins, 21' x 40', flat; W. F. Collins, builder.
B. & A. Railroad, passenger station, Ward 25, brick depot, for B. & A. R. R. Corporation, 30' 2" x 75' 10", pitch; Norcross Bros., builders.
Vale St., Ward 21, for Dennison Mf'g Co., brick manufactory, 42' x 115', flat; D. H. Jacobs, builder.
King St., bet. Elmwood and Roxbury Sts., brick stable, 30' x 52', flat.
Brooks St., Ward 23, J. M. Baker, wood dwell., 12' x 15' and 20' x 26', pitch; J. M. Baker, builder.
Wheelock Ave., n Hancock St., Ward 24, A. P. Wheelock, wood dwell., 21' x 32', pitch, E. H. Hubbard, builder.
Carouth St., n Van Winkle St., Ward 24, wood dwell., 8' x 10' and 21' x 25', pitch; Edw. Beal, builder.
Maywood St., n Blue Hill Ave., Ward 21, Henry Walker, 2 wood dwell., 15' x 15' and 23' x 49', flat, Pinkham & Russell, builder.
Washington St., n Codman Pl., Ward 21, Patrick F. Sennott, 2 wood dwells. and store, 20' x 39', flat: M. Sullivan, builder.
Goldsmith Pl., Nos. 8-11, Ward 19, for S. Goldsmith, 7 wood dwells., 20' x 45', flat; S. Goldsmith, builder.
Atwood Ave., Ward 22, for Andrew Cassidy, 2 wood dwells., 21' 6" x 30', hip; A. Cassidy, builder.
H St., Nos. 147-149, for Ward 14, J. B. Howe, 2 wood dwells., 20' x 34', flat; Holbrook & Harlow, builders.
East Ninth St., No. 506, Ward 14, Lyman Locke; wood dwell., 18' x 33'; flat; L. Locke, builder.
Metropolitan Ave., n Poplar St., Ward 23, for A. Fox, wood dwell., 11' x 14' and 16' x 26', pitch; Jno. Alden, builder.
Cambridge St. cor. Harvard Ave., Ward 25, for Isaac Dearborn, 3 wood dwell., 24' x 26', flat; G. W. Adams, builder.
Adams St., cor. River View Ave., Ward 21, L. H. Brown, wood dwell., 14' x 20' 6" and 22' x 34' 6", pitch.
Corey St., n Walnut St., Ward 25, for Catherine Smith, wood dwell., 8' x 12' and 28' x 30', pitch; Geo. A. Spear, builder.
Washington St., n Norfolk St., Ward 23, for Enoch A. Carter, wood mechanical building, 18' x 22', pitch; E. A. Carter, builder.
Duncan St., n Greenwich St., Ward 24, Thos. Lundrigan, wood dwell., 11' x 16' and 23' x 29', flat; E. Merville, builder.
New Album St., cor. Palm St., Ward 23, for S. Murphy, wood dwell., 28' x 30', flat; S. Murphy, builder.

Brooklyn.

BUILDING PERMITS. — *Columbia St.*, e s, 170' n Cole St., three-st'y brick store and tenement, tin roof, wooden cornice; cost, $5,000; owner, Mr. Burke, on premises; architects, M. Freeman's Sons.
Bergen St., Nos. 111 *and* 113, 2 three-st'y brick dwells., slate roofs; cost, each, $4,500; owner, Thos. H. Robbins, Keyport, N. J.; architect, Amzi Hill; builder, E. K. Robbins.
First St., e s, 60' s South Second St., 3 four-st'y brick tenements, felt, cement and gravel roofs; cost, $20,000; owner, Chas. J. Dodge, 146 Keap St.; architect, E. F. Gaylor; mason, James Rodwell; carpenters, Marinus & Gill.
Fourth Ave., w s, 50' 2" s Thirty-seventh St., three-st'y frame tenement, tin roof; cost, $4,500; owner, Hugh Crawshaw, Jersey City, N. J.; architect, S. B. Bogert; builder, John H. O'Rourke.
Greene Ave., s s, 360' e Bedford Ave., 4 three-st'y brown-stone dwells., tin roofs; cost, each, $6,500; owner, etc., W. L. Dau, 117 Pulaski St.
Sumpter St., n w cor. Stone Ave., two-st'y frame dwell., tin roof; cost, $2,350; owner, James W. Keveny, 238 Keap St.; architect, Louis F. Schillinger; builder, John Dohlman.
Vanderbilt Ave., e s, 235' n De Kalb Ave., two-st'y brick stable, tin roof; cost, $3,200; owner, J. Cox, 302 Clinton Ave.; architect, E. M. Howe; builders, W. Buckley and Miller & Howe.
Leonard St., e s, 30' n Devoe St., four-st'y frame factory, tin roof; cost, $8,000; owner, John E. Anderson, 302 Ewen St.; builder, Chas. Vincent.
Troutman St., n s, 230' e Evergreen Ave., three-st'y frame tenement, tin roof; cost, $4,250; owner, Edward Hechinger, 128 Troutman St.; architect, Frank Holmberg; builders, Jacob Muller and Fred. Stemler.
Lee Ave., s w cor. Lynch St., three-st'y frame store and dwell., tin roof; cost, $3,500; owner and carpenter, W. H. Cook, 69 Lynch St.; mason, H. Bruchhauser.
Seventh Ave., n e cor. Eighth St., 4 two-st'y and basement brown-stone dwells., and one three-st'y brown-stone dwell., tin and wood roofs; cost, four $5,000 each and one $8,000; owner, Charles Long, 450 Ninth St.; builder, J. F. Wood.
Bleecker St., s w cor. Evergreen Ave., three-st'y frame tenement, tin roof; cost, $4,500; owner, Edward Monahan, Sr., 11 Bleecker St.; architect, Fred. Weber; builder, Jacob Schoch.
St. Mark's Ave., No. 263, n s, near Underhill Ave., two-st'y brick dwell., tin roof; cost, about $4,000; owner, W. M. Lane, on premises; builders, Smith Wood and Richard Bennett.
Bedford Ave., s e cor. Halsey St., 5 three-st'y stores and flats, gravel roofs, wooden cornices; cost, each, $5,000; owner, etc., D. H. Fowler, 14 Verona Pl.
Middleton St., s s, 85' e Marcy Ave., three-st'y frame tenement, tin roof; cost, $3,500; owner and builder, Philip Bossert, Wall St., near Bushwick Ave.; architect, John Platte.
Union St., s w cor. Seventh Ave., three-st'y and basement livery-stable, gravel roof; cost, $10,000; owner, B. C. Hollingsworth, 651 Warren St.; architect, Frances Ryan; builder, Matthew Ryan.
Ninth St., s s, 30' w Gowanus Canal, two-st'y frame storage of coal, board roof; cost, $6,000; owners, Chas. Pratt & Co., 44 Broadway, New York; architect and builder, D. E. Norris.
Herkimer St., s s, 250' w Utica Ave., 3 three-st'y brick dwells., tin roofs, wooden cornices; cost, each, about $2,500; owner and builder, Geo. W. Lung, 20 Utica Ave.; architect, Chas. E. Hebberd.
Stockton St., Nos. 322-326, s s, 400' e Sumner Ave., 3 three-st'y frame tenements, tin roofs; cost, each, $4,500; owner, Cath. Straub, 11 Lewis St.; architect, Th. Engelhardt; builder, Geo. Straub.
First St., e s, 60' s South Second St., 3 five-st'y brick stores and tenements, felt, cement and gravel roofs; cost, each, $10,000; owner, Chas. J. Dodge, 146 Keap St.; architect, E. F. Gaylor; builders, James Rodwell and Marrinus & Gill.
ALTERATIONS. — *North First St., No.* 107, n s, 60' w Third Ave., add two and three stories; cost, $4,000; owners, J. W. Mathison, 107 and 109 North First St.; architect, E. F. Gaylor.
Seventh St., n s, 100' e Sixth Ave., propose to cut out a well-hole and put in platform stairs, also lower gallery; cost, $3,000; owner, Park Congregational Church; architect and builder, C. B. Sheldon.

Chicago.

BUILDING PERMITS.—S. H. Emery, 3 two-st'y dwells. 228-230 South Paulina St.; cost, $6,000.
Evangelical Church, one-st'y church, 97-103 Ambrose St.; cost, $2,500.
L. H. Eames, six-st'y store, 320-322 Wabash Ave.; cost, $40,000; architect, Halberg.
W. S. Johnston Estate, four-st'y store and flats, Chicago Ave., cor. Wells St.; cost, $45,000; architects, Cobb & Frost; builders, Angus & Gindele.
C. J. Kavanagh, 2 two-st'y dwells., 962-964 West Monroe St.; cost, $7,000; architect, D. E. Greene; builder, Wm. H. Hancox.
J. Nelson, three-st'y dwell., 207 North May St.; cost, $6,000; architect, P. H. Anderson; builders, Lund & Gilbert.
Mrs. Barbara Titus, 3 two-st'y dwells., 355-359 Vernon Ave.; cost, $13,500; architect, R. Rae; builders, Geo. Lehman & Co.
Mrs. Barbara Titus, 6 two-st'y dwells., 3300-3308 Rhodes Ave.; cost, $26,000; architect, R. Rae; builders, Geo. Lehman & Co.
Mrs. Barbara Titus, 8 two-st'y dwells., 111-117 and 120-126 Thirty-third St.; cost, $36,000; architect and builders, same as last.
Mrs. Barbara Titus, 6 two-st'y dwells., 626-630 and 356-660 West Harrison St.; cost, $25,000; architect and builders, same as last.
Mrs. Barbara Titus, 5 two st'y dwells., 527-529 and 970-972 West Jackson St.; cost, $22,000; architect and builders, same as last.
Mrs. Barbara Titus, 2 two-st'y dwells., 153-155 Laflin St.; cost, $8,000; architect and builders, same as last.
Geo. Bender, two-st'y dwell., 588 Robey St.; cost, $4,000; architect, J. Clifford; builders, Mowat & Crawford.
P. Kipley, three st'y store and flats, 477 Twenty-sixth St.; cost, $6,000; architect, Ackerman; builders, Goodrich & Bro.
C. L. Jenks, seven-st'y store and office-building, 125 Van Buren St.; cost, $28,000; architect, C. Chapman; builder, B. Cullen.
C. W. Boynton, 3 three-st'y dwells., 183-187 North Morgan St.; cost, $12,000; architect, H. M. Hansen; builder, C. W. Warren.
W. A. Giles, two-st'y additional, 300-304 Wabash Ave.; cost, $6,000; architect, F. R. Schock; builders, Barney & Rodatz.
Miss J. Walsh, two-st'y dwell., 391 South Oakley St.; cost, $2,500.
W. W. Phelps, 5 two-st'y dwells., 80-84 Eda St.; cost, $10,000; architect, W. A. Furber; builders, Angus & Gindele.
C. F. Rakebrand, three-st'y flats, 285-289 Fremont St.: cost, $9,500.
American Express Co., freight-house, 222-226 Van Buren St.; cost, $25,000.
Shoenman & Bro., three-st'y cooling-room, Archer Ave.; cost, $5,000.
L. Silverman, 8 three-st'y stores and dwells., 3543-3587 Cottage Grove Ave.; cost, $30,000; architect, Oscar Cobb; builder, A. Lanquist.
Newberry Estate, one-st'y addition to warehouse, 117-119 Kinzie St.; cost, $3,000; architect, F. A. Wascher.
S. E. Gross, 12 cottages, Gross Terrace St.; cost, $20,000; builder, S. E. Gross.
Mrs. C. McCormick, six-st'y warehouse, 214-220 Market St.; cost, $75,000; architect, A. M. F. Colton; builder, E. Earnshaw.
F. White, three-st'y store and dwell., 817 Milwaukee Ave.; cost, $6,000.
G. Fiedler, three-st'y store and dwell., 3644 State St.; cost, $9,000; architects, Furst & Rudolph; builders, McMillan Bros.
J. M. Pearson, two-st'y dwell., 3319 Forest Ave.; cost, $3,000; builder, B. F. Branch.

Detroit.

BUILDING PERMITS.—*Gratiot Ave., No.* 246, three-st'y brick stores; cost, $8,000; A. J. Moran, owner.
Brush St., Nos. 470-474, double brick house; cost, $12,000; Wm. Scott & Co., architects.
Cass St., double brick house; cost, $7,000; P. McDonald, builder.
Woodward Ave., 2 stores; cost, $3,500; Mrs. Bradshaw.
Woodbridge St., 2 stores; cost, $20,000; Mr. Weeson; W. Scott & Co., architects.
Cass Ave., Nos. 507-511, 2 dwells.; cost, $13,500; John Waterfall, builder.
Joy St., Nos. 28 *and* 30, 2 brick dwells.; cost, $9,000; Mrs. Green, owner.
McDougall Ave., brick dwell.; cost, $7,000; T. A. Wadsworth, builder.
Hendrie Ave., No. 24, frame dwell.; cost, $3,000; T. A. Wadsworth, builder.
Third St., Nos. 350-354, 3 brick dwells.; cost, $5,000; T. A. Wadsworth, builder.
Woodward Ave., Nos. 1416, 2 brick stores; cost, $4,000; J. R. McBrearty, builder.
West Columbia St., No. 54, double brick house; cost, $5,000; W. C. Shaw, builder.
Cass Ave., No. 730, brick building; cost, $5,000; W. C. Hayes, builder.
Jefferson Ave., No. 670, brick dwell.; cost, $10,000; Jas. W. McGregor, builder.
Fremont St., brick church; cost, $6,000; Albert Albrecht, builder.
Peterboro St., No. 38, brick dwell.; cost, $11,000; Joseph Taylor, owner; G. W. Lloyd, architect.
Woodward Ave., double brick house; cost, $15,000; Gen. W. T. Baynal, builder.
Woodward Ave., church; cost, $83,000; Baptists, owner; M. S. Smith, architect; Topping & Fisher, builders.
Cass Ave., brick dwell.; cost, $8,000; S. W. Itsell, builder.
Cass Ave., No. 507, brick dwell.; cost, $7,500; John Waterfall, builder.
Woodbridge St., five-st'y brick store; cost, $20,000; N. Mitchell, builder.
Congress St., three-st'y building; cost, $25,000; American News Company, owner; Donaldson & Meier, architects.
Joy St., 2 residences; cost, $9,000; Mrs. Green, owner; Donaldson & Meier, architects.
McDougall Ave., brick dwell.; cost, $7,00; architects, same as last.
Charlotte Ave., 3 houses; cost, $20,000; John Waterfall, owner; architects, same as last.
Gratoit Ave., brick store; cost, $500; Jacober, owner; architects, same as last.

Minneapolis, Minn.

Building Permits. — P. G. Lamoreaux, two-st'y frame saw mill, s w cor. Water St. and Tenth Ave., n e; cost, $20,000.

P. G. Lamoreaux, 3 two-and-one-half-st'y frame dwells., w s First Ave., south, bet. Thirty-second and Thirty-third Sts.; cost, $19,500.

E. B. Cooper, double two-st'y dwells., w s Portland Pl., bet. Twenty-second and Twenty-third Sts., south; cost, $4,000.

A. J. Finnegan, three-st'y brick store and office-building, 312 Hennepin Ave.; cost, $13,000.

Campbell Bros., two-st'y frame on First Ave., s.; cost, $3,000.

New York.

Apartment-Houses. — On the e s of Second Ave., from Seventy-sixth to Seventy-seventh St., 8 flats to cost $128,000, are to be built by Messrs. Higgins & Keating.

On the n s of Sixty-second St., 225' e of Tenth Ave., a five-st'y brown-stone flat, 25' x 81', is to be built for Mrs. Kelly, at a cost of about $20,000; from plans of Mr. Montrose W. Morris.

On the s s of Fifty-fifth St., 225' e of Eleventh Ave., 5 five-st'y brick, stone, and terra-cotta double tenements, 25' x 84' each, are to be built by Mr. C. H. Bliss, at a cost of about $100,000; from plans of Messrs. Thom & Wilson.

On the s s of One Hundred and Eighteenth St., 90' e of Fourth Ave., 2 five-st'y brick and brown-stone tenements, 25' x 84' each, are to be built for Mr. H. Chenoweth; from plans of Mr. J. C. Burne.

Residences. — On the s w cor. of Fifth Ave. and One Hundred and Twenty-eighth St., 5 or 6 four-st'y brown-stone residences are to be built by Mr. Robt. Elliot.

Building Permits. — *Forty-seventh St.*, s s, 260' e Tenth Ave., 3 five-st'y brick tenements, tin roofs; cost, each, $15,000; owner and builder, Joseph Johnston, 475 Second Ave.; architect, Julius Boekell.

Railroad Ave., e s, 190' 4" n One Hundred and Sixty-ninth St., one and part two-st'y brick factory, tin roof; cost, $9,000; owner, George Hey, 331 Broome St.; architect, Julius Boekel.

East Forty-fifth St., Nos. 331, 333, *and* 335, two-st'y brick stable, tin roof; cost, $8,000; owners, Oppermann & Muller, 346 East Forty-sixth St.; architect, Chas. Stoll.

Eighth Ave., w s, from One Hundred and Fifth to One Hundred and Sixth St., four-st'y brick and stone hospital building, slate and tin roof; cost, $190,000; owner, New York Cancer Hospital, Jno. E. Parsons, President, 208 Madison Ave.; architect, Chas. E. Haight.

First Ave., w s, Forty-first to Forty-second St., four-st'y brick factory, tin roof; cost, $35,000; owner, W. L. Cutting, 24 West Twenty-second St.; builders, Dawson & Archer.

One Hundred and Sixth St., n s, 150' w Ninth Ave., five-st'y brown-stone front tenement, tin roof; cost, $24,000; owner, Wm. B. Pettit, 444 West Thirty-fourth St.; architects, A. B. Ogden & Son; built by day's work.

Alterations. — *East One Hundred and Nineteenth St., Nos.* 317 *and* 319, one-st'y brick extension, tin roof; cost, $3,500; owner, St. John's German Evangelic Lutheran Church, on premises; architect, Bart. Walther.

Ninety-second St., s s, 200' e Third Ave., raise two st'y and internal alterations; cost, $35,000; owner, Geo. Ringler & Co., on premises; architect, Charles Kinkel.

South Washington Sq., No. 52, raise one and a half st'y, and a four-st'y brick extension, tin roof, arrange for flats; cost, $25,000; owner, Wm. S. Maddock, 313 East One Hundred and Twenty-Third St.; architects, Maclay & Davies; builders; Wm. Haigh and James H. Banta.

Bond St., No. 32, raise attic to full st'y, remove interior partitions, etc.; cost, $6,000; owner, Chas. E. Butler, trustee, by Aug. White, 409 Broadway, builders, F. & W. E. Bloodgood, and P. Roberts.

Broadway, Nos. 503 *and* 505, put in a passenger elevator; cost, $5,000; owner, Joseph F. Loubat, 155 Fifth Ave.; architect, Jno. B. Snook; builder, not selected.

One Hundred and Thirteenth St., s s, 50' w First Ave., two-st'y brick extension, tin roof; also raise present extension one st'y; cost, $7,000; owner, John Dwight, 33 Mt. Morris Ave., and John R. Maurice, Maspeth, L. I.; architect, J. W. Davison; builders, J. & W. C. Speare, and R. Thompson.

St. Louis.

Building Permits. — Forty-three permits have been issued since our last report, nine of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

M. M. Maoney, two-st'y brick dwell.; cost, $5,000; I. Taylor, architect.

Mrs. Troxler, two-st'y brick dwell.; cost, $3,000; Biermann & Ahring, contractors.

F. Tacke, two-st'y brick dwell.; cost, $3,600; G. S. Gerber, contractor.

T. Collins, two-st'y brick dwell.; cost, $3,400; C. L. Aufderheide, contractor.

Fred. Gottschalk, 2 adjacent two-st'y brick dwells.; cost, $4,000; G. Meumeister, contractor.

S. M. Hellmann, 3 adjacent two-st'y brick dwells.; cost, $6,000; A. Beinke & Co., architects; T. G. Gorman, contractor.

J. Morrison, two-st'y brick dwell.; cost, $6,500; sublet.

J. Dwyer, two-st'y brick dwell.; cost, $4,100; Gaines, architect; John Dwyer, contractor.

Washington.

Building Permits. — The following permits have been issued since last report, for new buildings worth $3,000 or over: —

H St., bet. Four-and-a-half and Sixth Sts., s w, brick dwell., for Patrick Cullimane; Holtzlaw & Hepburne, builders; cost, $2,500.

Seventeenth St., bet. O and P Sts., n w, 3 dwells., for C. V. Trott; cost, $11,000.

T St., bet. Thirteenth and Fourteenth Sts., n w, 2 dwells., for W. C. Morrison; cost, $9,400.

Alley, bet. M and N Sts., Nineteenth and Twentieth Sts., n w, private stable, for C. Heiurich; C. A. Didden, architect; cost, $6,000.

Green St., bet. West and Stoddart Sts., n w, 2 dwells., for Jos. F. Birch; J. J. Fry Sons, architects and builders; cost, $8,000.

Fenton Pl., 13 two-st'y dwells., for C. W. King; cost, $5,200.

Eleventh St. cor. K St., n w, three-st'y brick dwell., for Weston Flint; T. F. Schneider, architect; cost, $17,000.

Twenty-first St., cor. Mass. Ave., s w, three-st'y brick dwell., for B. H. Warner; Wm. M. Poindexter, architect; cost, $15,000.

Seventh St., s e, 2 dwells., for Jos. Boudren; cost, $4,000.

Mass. Ave., bet. Thirteenth and Fourteenth Sts., n w, three-st'y dwell., for Chas. A. James; Gray & Page, architects; M. M. Magruder, builder; cost, $15,000.

Eighth St., bet. E and D Sts., n w, private stable, for E. Burgdorf; cost, $3,000.

K St., bet. North Capitol and First Sts., n w, two-st'y brick dwell., for P. Ginney; cost, $2,000.

Alley, rear of Mass. Ave., bet. Thirteenth and Fourteenth Sts., n w, studio, for R. Hinckley; R. I. Heming, architect and builder; cost, $3,000.

Sixteenth St., cor. K St., s w, three-st'y brick dwell., for Mrs. Lucy J. Wheeler; Arthur Hooper Dodd, architect; Dearing & Johnson, builders; cost, $14,500.

C St., bet. First and Second Sts., n e, two-st'y dwell., for Mrs. F. Lenfert; cost, $2,300.

Twenty-eighth St., n w, two-st'y brick dwell., for I. N. Rollins; cost, $5,000.

Four-and-a-half St., cor. M St., two-st'y building, for Jas. Archer; cost, $3,500.

South Capitol St., bet. K and L Sts., s w, 7 dwells., J. H. Grant; cost, $5,000.

Four-and-a-half St., cor. H Sts., s w, 3 dwells., for Wm. Buckley; cost, $4,000.

L St., bet. North Capitol and First Sts., n w, two-st'y dwell., for W. F. Nash; cost, $2,000.

Alley, bet. Thirteenth and Fourteenth Sts., and M and N Sts., n w, private stable, for J. V. Hinck; S. T. G. Morsell, architect; cost, $2,500.

Tokoma Park, county, two-st'y dwell.; cost, $2,500.

New York Ave., between Ninth and Tenth Sts., n w, three-st'y dwell., for Wm. Hahn; C. A. Diddin, architect; cost, $8,000.

N St., bet. Fourth and Fifth Sts., n w, 3 two-st'y dwells., for N. T. Haller; cost, $7,000.

General Notes.

Charlottesville, Va. — Stone church for University of Virginia, style, early pointed, cruciform; seating capacity, 300; cost, $15,000; Chas. E. Cassell, architect, Baltimore.

Kansas City, Mo. — Permit to Josiah Kellogg, to build a brick business-house, 27' x 47' and five stories high, at Ninth and Main Sts., adjoining the *Times* building on the north; cost, $12,000.

Rhodes, Io. — Two-st'y brick building; Foster & Liebbe, architects; cost, $7,000.

St. Paul, Minn. — E. S. Esty, two-st'y brick block, stores and dwells., 50' x 120', s e cor. of Exchange and Seventh Sts.; cost, $7,500.

Wonseca, Minn. — Dwell., for Mr. Miller; cost, $7,000; C. A. Dunham, architect, Burlington, Iowa.

Double house for Dr. J. B. Weller and Mrs. Stone; cost, $8,500; architect, Edward L. Woodruff.

House for A. MacCafferty, Esq.; cost, $3,500; architect, Edward L. Woodruff.

Washington, Conn. — For Mr. E. S. Barnes, a two-st'y and attic dwell., 30' x 40', is to be built at a cost of $10,000, from designs of Messrs. Rossiter & Wright, of New York.

Parker, Cook & Gowen, one-st'y frame roller skating-rink, 65' x 180', Summit Ave.; cost, $6,000.

COMPETITION.

AMERICAN ARCHITECT COMPETITIONS. — NEW SERIES.

As the busy season for this year has nearly passed, the younger men who have in past years evinced an active interest in the little competitions we have held from time to time, may be ready to test once more their skill in design in competition with their fellows. Therefore we take pleasure in inviting their attention to the following

PROGRAMME.

Most people who live in the country, or in the suburbs of a large town, and have sufficient means, usually feel obliged to "set up their carriage," and of course a carriage implies horses, and a building in which the entire establishment can be housed. Therefore we propose as the subject of the present competition a barn such as the dweller in a house that has cost $5,000 would consider an appropriate adjunct of his establishment; but as this may be somewhat ambiguous, seeing that some men think more of their horses than they do of their families, we will say that the proprieties would be best observed if the cost of the barn should range between $1,000 and $1,500.

The barn must furnish accommodation for two horses and a cow; the carriage-room must be large enough for two wheeled vehicles and a sleigh; and proper provision must be made for harness, feed and hay, and the stableman must not be overlooked. Water and ventilation must also be kept in mind.

Required: — A perspective drawing of the barn, elevations of the sides not shown in the perspective, a plan or plans, and a reasonable amount of detail; all to be included on a single sheet, 21" x 33" within the framing lines. A short description and the result of a *bona fide* estimate must also be furnished. For the best three designs we will pay equal prizes of thirty dollars each.

Conditions: — Drawings must be received at the office of the *American Architect*, on or before Saturday, December 20, 1884.

The three prize drawings are to remain the property of the publishers.

All designs submitted are subject to publication in the *American Architect* at the pleasure of the editors.

All designs must be sent in signed only by a motto — *not a graphic symbol* — the name and address of the author being sent enclosed in a sealed envelope, endorsed with a duplicate motto.

The jury of award will be composed of three architects.

PROPOSALS.

IRONWORK.

[Near Charleston, W. Va.]

U. S. Engineer Office, 378 St. Paul St.,
Baltimore, Md., October 30, 1884.

Proposals for ironwork in the foundations of a movable dam, at Lock No. 6, on the Great Kanawha River, W. Va., about four miles below Charleston, will be received at the U. S. Engineer Office, Charleston, Kanawha County, W. Va., **until noon of December 2, 1884,** and opened immediately thereafter.

Blank forms, specifications, and any desired information can be had upon application to Mr. A. M. Scott, Assistant Engineer at that office.

WM. P. CRAIGHILL,
465 Lt.-Col. of Eng'rs, U.S. Army.

POROUS TERRA-COTTA TILE FOR ROOFS.

[At Buffalo, N. Y., and Toledo, O.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 7, 1884.

Sealed proposals will be received at this office, **until 2 p. m., on the 22d day of November, 1884,** for furnishing the porous terra-cotta tiles for the roof of the custom-house, etc., buildings at Buffalo, N. Y., and Toledo, O., estimated as follows: —

4,500 superficial feet at Buffalo, N. Y. 13,000 superficial feet at Toledo, O., in accordance with drawing and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent at each building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

H. G. JACOBS,
465 Acting Supervising Architect.

TIMBER, BOLTS AND STONE.

[Near Pt. Pleasant, W. Va.]

United States Engineer Office,
Cincinnati, O., October 23, 1884.

Sealed proposals in duplicate, will be received at this office **until noon** (local time) **on Monday, the 8th day of December, 1884,** for furnishing material and building two ice piers in the Great Kanawha River near Point Pleasant, West Va.

Approximate quantities of material required: —
204,472 feet B. M., oak timber.
9,536 lbs. iron drift bolts.
2,486 cubic yards riprap stone.

Specifications and blank forms for proposals will be furnished on application to this office. Letters asking specifications should be marked "Official Business" on the envelope.

WM. E. MERRILL,
466 Lt.-Col. of Engineers.

TIMBER.

[At Chicago, Ill.]

United States Engineer Office,
25 Honore Building,
Chicago, Ill., November 8, 1884.

Sealed proposals in triplicate, will be received at this office, **until 12 o'clock, noon, Tuesday, December 9, 1884,** for furnishing pine and hemlock timber for breakwater construction at Chicago, Ill. The total amount required will be about two millions one hundred and sixty-seven thousand (2,167,000) feet B. M., to be delivered between the opening of spring navigation and September 1, 1885.

Parties who are not prepared to furnish the entire lot may submit propositions for a portion only, but not for less than two cribs.

For specifications, blanks for proposals, and all information, apply at this office.

WM. H. H. BENYAURD,
466 Major of Engineers, U. S. A.

SAFES AND VAULTS.

[At Washington, D. C.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., October 23, 1884.

Sealed proposals will be received at this office **until 2 p. m., on the 25th day of November, 1884,** for supplying the burglar-proof safes and chests, fire and burglar safes combined, fire-proof safes, fire-proof doors, shell safes, and single and double steel-lined vault-work required by the Treasury Department, and as may be ordered during the fiscal year ending June 30, 1885, in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, on and after November 5, 1884.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
464 Supervising Architect.

IRON WORKS.

[At St. Louis, Mo.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., October 24, 1884.

Sealed proposals will be received at this office **until 2 p. m., on the 8th day of November, 1884,** for furnishing and fixing in place complete the cast-iron ornamental panels for area railing around the custom-house and post-office building at St. Louis, Mo., in accordance with drawing and specification, copies of which may be seen and any additional information obtained on application at this office, or the office of the custodian at the building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
464 Supervising Architect.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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NOVEMBER 22, 1884.

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A CONTRACT has been at last made by which the New York Board of Aldermen concedes to the Broadway Surface Railroad Company the right to build and operate a horse-railroad on Broadway from the Battery to Fifteenth Street, under certain restrictions; the most important of these being the requirement that each car must have two horses, and a conductor and driver, unless, with the consent of the abutting owners and of the city authorities, some improved motive power should be substituted for the horses. In consideration of the grant of this privilege, the Company is obliged to pay into the city treasury for five years, on the first day of November in each year, a sum amounting to three per cent of its gross receipts for the year just past. After the five years have expired, the annual payment is to be raised to five per cent of the gross receipts. In addition to this, the Company must, after the road has been one year in operation, pay into the city treasury forty thousand dollars in cash, and the same amount annually afterwards. This payment of forty thousand dollars a year is equivalent to four per cent interest on one million dollars, which is regarded as the value of the privilege bestowed by this ordinance. A proposition was once made, when the concession for a Broadway surface road was contended for by two corporations, that the franchise should be sold at auction to the highest bidder; but some one pointed out that as the privilege desired consisted simply in the consent of the Board of Aldermen to a certain bill, there was an obvious impropriety in selling the decisions of the Board at auction, and the payment of an annual sum was very prudently substituted.

THE *Sanitary Engineer*, in a recent issue, describes a plumber's trick which deserves to be remembered by those whose duty it is to guard innocent persons from the consequences of similar rascality. It seems that one of the inspectors of the Board of Health in New York, while examining a row of new houses in an excellent neighborhood, discovered some vent-pipes of lead projecting above the roof, and soldered to the tin of the roof in the usual manner. A few years ago this would have been an indicationof very good work in the house below; but the present New York plumbing law requires all pipes which extend above the roof to be of iron, probably on account of the danger that lead pipes may be injured or cut away. The lead vents, being thus in violation of the law, attracted attention, and a closer examination revealed the fact that they were simply dummies, consisting of short pieces of lead pipe nailed to the tin roof and soldered. They did not even go through the roof boards, and, of course, had no connection with the plumbing work below. This evidence of ingenuity on the part of the plumber naturally led to a closer inspection than usual of the plumbing work inside the house; and all the washbowls in the upper story of the row of five houses were found to be provided with back vents from the traps consisting of inch-and-a-half lead pipes inserted into the space between the studs of the nearest partition, and terminating there. The ends of the pipes, instead of being left entirely open, were hastily hammered together, but crevices remained through which an ample supply of air from the drains was diffused through the adjoining rooms. The contractor of the plumbing work, who lived near by, was called before a justice, and made the usual defence, that his workmen had arranged the pipes in the manner complained of without his knowledge, and for the purpose of getting him into trouble. The justice, however, who had probably heard before of this strange maliciousness on the part of workmen, thought it only prudent to put the contractor under bonds to show his innocence before the proper court.

BUILDING gives an account of a recent case, decided in the Supreme Court of New York, in which an architect, who had been employed to prepare plans and specifications for a certain building which was never carried into execution, was obliged to sue for his pay. His bill was two and one-half per cent for the plans and specifications, and two hundred dollars additional for making measurements and surveys, and for consultations. The defendant seems to have been a prey to the common delusion that if an owner concludes not to carry out the plans made for him, the architect who made them should not expect any pay, and, to judge from the account, urged this as a reason for not settling the bill; but he, or his lawyer, discovering that this plea would not count for much in court, took refuge in a different claim, and represented that the plans were not working drawings, but simply preliminary sketches, and as such should only be valued at one per cent on the proposed cost, instead of two and a half. Ten out of the twelve jurors are said to have agreed with the architect in his valuation of his work, but the other two objected, and a verdict was at last rendered awarding him five hundred dollars. The cost of the building was to have been twenty thousand dollars, so that this was two hundred dollars less than the amount of the claim. Why the charge should have been cut down we cannot see; and we assure our readers that it is very unusual for a jury to make such deductions from an architect's charges, based on the ordinary schedule. The case, however, still serves to illustrate the maxim to which we so often call the attention of the younger members of the profession,— that every man who, at the request of another, does with reasonable skill and care any professional work, is entitled to be paid for it, and can collect his pay by legal means. It is useless for the employer to argue that "he only asked for sketches," and that "it is usual for architects to make sketches without charge, in the hope that they may bring them employment," or that "architects' sketches are always understood to be subject to approval," or that "architects make no charge, if their designs are not carried out," and so on. The fact is, that an architect's work is never presumed to be done subject to the condition that it is not to be paid for unless the person for whom it is done happens to fancy it. If an architect is so foolish as to agree in unmistakable language to such terms, he is at liberty to do so; but, unless he is shown to have done so, all courts will hold that he expected to be paid, and that the one who employed him is bound to pay him, whether he likes what was done for him or not. If a man, for instance, wants the privilege of choosing from a number of sketches for a certain building, he can have it by paying a number of architects what they ask for making such sketches; but there is no law or custom by which he can obtain them for nothing, unless those who are to make them expressly agree beforehand to make no charge for them. We are anxious to insist upon these points, as we know something of the experiences of young architects, and are certain that many thousands of dollars are now fairly and honorably due to the more modest members of the profession, which they are kept out of solely on such pretexts as these. Until we can have here some such protective organization as that now just established among the French architects, it would be, perhaps, impolitic to counsel all our readers who may be in such case to fly to the law for redress; but we will, at least, advise them for the future to let no timidity or bashfulness prevent them from giving their clients to understand that under all circumstances their labor is to be paid for. If they wish to enter into competition, there is nothing to prevent them from doing so; but it should be explicitly understood that in such cases they give valuable services at a reduced price in return for a fair chance of securing an important commission. We need not say here what constitutes "a fair chance" in competition; it is sufficient to point out that if fair conditions are required by competitors, the law, which cannot conceive that a professional man in his right mind should give his services without expecting to be paid, will see that they are complied with.

THE cholera in Italy has had the effect of delaying the execution of the great monument in Rome to King Victor Emmanuel. Our readers will remember that in the second competition the first prize, with the execution of his design, was awarded to the Signor Giuseppe Sacconi. The drawings were advanced rapidly, and the 2d of last October, the anniversary of the *plébiscite* by which Rome passed under the dominion of the King of Italy, was appointed as the day for the laying of the corner stone; but the cholera epidemic was at that time nearly at its height, the present king was busy in caring for his afflicted subjects, and the Victor Emanuel monument was forgotten, and the laying of the corner stone indefinitely postponed. Meanwhile, however, the completion of the memorial by the statue which the monument is to guard had been provided for, and another competition, which was announced in August, invites models of an equestrian statue of the late king. The statue, according to the conditions of the programme, is to be eight metres high, and to be placed on a pedestal of twelve metres in height, the whole forming a most imposing object, sixty-seven feet high. The models are to be at one-half the full size, and must be delivered by the 28th day of February next. The author of the best design will be employed to carry it into execution, and a second prize of six hundred dollars will be given to the next in merit.

IN recognition of the very moderate interest which American scholars and scientific persons have taken in the operations of the Egyptian Exploration Fund at Tanis, a vote has been passed by the members of the Association to present a portion of the objects discovered there to the Museum of Fine Arts in Boston. The collection is to be made as the work proceeds, under the care of a committee, and of Mr. Petrie, the director of the explorations, who will give to the Boston Museum the second place in the selection of specimens, the British Museum being first. Two or three hundred of the smaller objects already found are to be sent over at once, including bronze furniture and fittings, a beautiful group in porcelain, some colored woven garments, and many small figures and other articles. It seems that Mr. Petrie was unable to move the heaviest objects found in the excavations, on account of the low state of the Nile at the time operations were closed for the season, in June, but they will undoubtedly be sent away at the first opportunity, and shared between the English and American Museums. The explorations are to be recommenced immediately, and, judging from the results of the first year's work, a rich reward awaits the association.

AT the recent Exhibition of Decorative Art in Paris, a new process was shown for hardening stone, which seems to have attracted much attention. Most architects know something of the old processes employed for this purpose, in which silicate of soda or potash, dissolved in water, was spread over the surface of the stone to be hardened, and either left there to find its way into the pores of the stone and fill them with a glassy substance, or applied in alternation with chloride of calcium or some other soluble lime salt, which decomposed the alkaline silicate in the pores of the stone, depositing insoluble crystals of silicate of lime, and setting free chloride of potassium or sodium, which soon washed out. None of these processes have been found quite satisfactory. The alkaline silicates are not easily dissolved to a thin liquid in cold water, and when a hot solution is applied to stone, it forms a jelly as it cools, so that it penetrates but a short distance into the stone, and the hard skin formed by the superficial filling of the pores is liable to be thrown off by frost. Moreover, the soluble silicates often effloresce in dry weather, disfiguring the stone containing them, while, even if the stone is so skilfully treated as not to show spots from the unequal absorption of the silicate solution, any neighboring windows spattered with it are irretrievably spoiled. On account of these inconveniencies in the use of the alkaline silicates, some experiments have been made with hydrofluosilicic acid, which acts strongly on limestones, dissolving them to form hard, insoluble compounds, which are deposited in the pores of the stone. This process is not entirely satisfactory, since the acid acts so violently on the superficial portions of the stone that it does not penetrate far, and the new method introduced by Messrs. Faure and Kessler seeks to improve the operation of the hardening agent by substituting soluble fluosilicates for the acid itself. The fluosilicates act upon limestones but slowly, and it is found that the solution penetrates three or four inches into the stone before the decomposition by which the lime is dissolved, to form real fluor spar in the pores, has advanced far enough to check absorption. Twenty-four hours is, however, enough for effecting the reaction, and on the day after the application of the liquid the stone is completely hardened. So hard and tough is the substance formed by the combination of the fluosilicates and the lime that a mere powder of the limestone may be used to fill cavities; and this, when saturated with the solution, will become nearly as hard as the rest.

A SUGGESTION is made by the *Sanitary Engineer* in relation to tenement-house reform which is quite worthy of the intelligent common sense of that excellent journal, and deserves to be kept constantly in mind by those who may be interested in that important subject. Mr. Joshua, or Joseph, Chamberlain, of England, once put in compact form the theory of tenement-house legislation by saying that a man should no more be allowed to offer unclean or unwholesome houses in the market than diseased pork or beef; and this assertion, which few would wish to dispute, indicates clearly the duty both of those who own such houses and of the authorities who have the right to control them. The answer to Mr. Chamberlain's position from those who wished to find excuses for neglecting their opportunities to reform the poorer class of dwellings has always been that the tenants of the cheapest houses preferred filth, and, if placed in the best of model houses, would speedily reduce it to the condition which suited their habits and tastes. There is, unfortunately, no doubt of the truth of this; and no plan for improving the dwellings of the poor can be thoroughly efficient which fails to consider that thousands of persons, many of whom, too, are perfectly honest and virtuous in their humble way, like to sleep in a sociable manner, on the floor of their apartment, in company with fifteen or twenty other congenial souls, and firmly believe that they owe their good health, or strength, or beauty, to a conscientious abstinence from soap and water, and to the avoidance of such unnecessary exertion as would be implied in going down-stairs to empty a pailful of slops, instead of throwing it out of the nearest window, or in climbing back and forth from the basement after a stick of kindling-wood, instead of twisting out one or two convenient stair balusters. There is, however, as the *Sanitary Engineer* points out, no real reason why the tastes of such tenants as this should be consulted by landlords to the detriment of the rest of the community; and the fact that a few persons like dirt should no more justify real estate owners or boards of health in affording them the opportunity to enjoy it than the proof of a depraved appetite on the part of certain persons should excuse a license to butchers to display tainted meats upon their tables. That careless and improvident tenants will quickly make rooms unfit to be inhabited by decent persons does not alter the duty of the health inspectors to compel the landlords to cleanse their rooms or buildings as often as they begin to grow dirty. The landlords are at liberty, if the expense of keeping their buildings clean is too great for them, to turn out their filthy tenants, and take decent ones in their place; and if the former find themselves rejected, on account of their nastiness, from every sort of dwelling, they are likely, rather than camp out in the street, to begin making some attempt, as the *Sanitary Engineer* says, "to live in accordance with the customs of civilized beings on the Western Continent." However great our respect for individual liberty, there is no place in this country for persons whose habits of life endanger the lives or health of other people; and the simplest and easiest way of reaching and reforming, or driving away such persons, is by the medium of the tenement-house laws, which, as a rule, put it in the power of local boards of health to compel all the inhabitants of the towns of which they are the guardians to conform to certain necessary regulations, or seek a residence in some less squeamish community.

RECENT IMPROVEMENTS IN BUILDING.[1] — II.

IN many parts of New York water is more dreaded than fire, and the same ingenuity which is generally sure of its reward there has produced a method, now very extensively used in the low-lying districts along the Hudson River, by which cellars below the water-line are lined with several thicknesses of felt soaked in Trinidad asphalt, and rendered entirely water-proof. The main difficulty about the application of this method, which seems simple enough, is the necessity for providing against the hydrostatic pressure of the water outside.

If the line of the ground-water, in high tides or heavy rains, should rise six feet or more above the floor of the protected basement, as often happens, the cellar is turned into a boat, often of very large dimensions, whose tendency to float is converted into an upward pressure upon the parts of the cellar floor least able to resist it. No concrete will keep out the water under such circumstances. Unless the layer is very thick, it will be forced up by the pressure and broken to pieces, while, if it is strong enough to withstand this strain, the water will be driven through it in drops like dew, which collect and make the basement damp. In using the felt, therefore, which, though perfectly water-proof has little strength, it is necessary, after protecting every part of the cellar with a continuous coating, brought well up on the walls, to provide for holding it in place by a mass of concrete or masonry. To save expense, the usual way is to cover it with brickwork, laid in the form of a shallow inverted arch, which gives great resistance at the place where the strain is most severe. The hollow of the arch is then levelled up with concrete, and in the best work a flooring of rock asphalt is laid on the concrete, to prevent it from accumulating dampness from the inside of the building. The felting turned up against the walls, piers and columns is lined in the same way with a mass of concrete from twelve to twenty inches thick, according to the pressure which must be resisted. The cost of this operation is considerable, averaging perhaps a dollar a square foot; but it is effectual and permanent, and millions of dollars' worth of dry goods and groceries are now stored, perfectly dry and safe, in rooms below the water-line of high tides, and some even below the low-water level of the North River. As architects and engineers often pronounce it impossible to keep a basement below the water-line dry, it is worth while to remember this system, which is not less valuable because it is patented, and is at least a great advance over the old mode, still used here, of enclosing wet cellars with sheet piling, filled in with boxing-clay, which is itself far from being impervious to dampness, while it leaves the floor almost unprovided for.

Next to the great commercial buildings, in which an amount of ingenuity has been displayed proportionate to the value of the goods to be cared for and handled in them, the newer first-class apartment-houses show the greatest advances in the art of construction. Especially in plan, the modern houses are much superior to those of ten years ago, and are not surpassed by those of Paris or London. This is probably due in part to the independence of our architects, who care little for tradition, and soon cast aside a time-honored arrangement if they see reason for doing so. In this way the old-fashioned central court-yards, large and small, enclosed on all sides, which all Parisian plans show, have in New York and Boston become obsolete. Experience has shown conclusively that such court-yards, even if they are large enough to furnish light to the rooms which surround them, form great reservoirs of stagnant air, unmoved by the winds which blow outside, and constantly accumulating foul vapors, which they receive from the surrounding kitchens and rubbish holes, to diffuse them again in a more advanced stage of putrefaction, through the bedroom windows which look out upon them. In Paris, where court-yards are generally larger, and the buildings less high than with us, a strong feeling against them has set in among architects, but New York deserves the honor of having been first to find means for abolishing them, and to replace them by open spaces, which, although tortured by the complexity of plan which the new mode of arrangement involves into shapes indescribable by any name in geometry, are always open at one side or end to the outer air, so that if the wind is from one side it blows into the space, and if from the other side it draws the air out of it, to be replaced by a fresh supply from above, in either case the interior of the building being kept supplied with an atmosphere which, if not so pure as that of a mountain-top, is at least infinitely preferable to the ancient miasma of the old-fashioned enclosed court.

In other respects the newest apartment-houses furnish interesting examples of a very difficult kind of domestic planning. The best architects now, when commissioned to cover a lot, say a hundred feet square, with such a building, place before themselves, as indispensable conditions, that every room and bath-room shall have at least one window opening to the external air, and this not on a court, or the five-foot square shafts, appropriately called wells, which abound in the apartment-houses of ten or fifteen years ago, but on a space into which the wind blows, and the sun shines. Besides this, every apartment, out of the four or five which would occupy each floor of such a building, must be at one end closely connected with the main hall and the principal elevators, and at the other end with the servants' hall and stairway and the servants' elevator; and the planning must be so compact as to give the minimum of passage way, which, of course, subtracts from the space available for renting. To fulfil all these conditions, especially in a fire-proof building, which allows less liberty than one of lighter construction, requires not only study and skill, but a certain courage in devising radical methods for securing a given end. Not long ago, for instance, the novel plan was introduced of making the front portion of such a building consist exclusively of parlors, dining-rooms, and other reception-rooms, while the bedrooms were collected in the rear portion, and space was thus saved by putting three stories of bedrooms to two stories of reception rooms. This arrangement, which goes under the name of the Duplex system, and is, I think, patented, is economical of room, and the short flights of stairs, up or down, which are necessary to connect the front and rear rooms on the different levels, are not found objectionable, so that a considerable number of the largest houses in New York are built in this way, including at least one which contains fifteen stories of rooms in the rear, or bedroom portion. The most serious objection made to the duplex planning is the rather trivial one that in the evening the hot-air and burnt-gas from the parlors run up the short flights of steps and fill the bedrooms; but this could easily be prevented by proper ventilation of the passage-way.

A still more economical system, however, has been employed within a year or two, in which each apartment, instead of comprising front and rear rooms on different levels, is in two stories, connected by a small private staircase. In this way from one-half to two-thirds of the space usually given up to corridors is saved, as it is no longer necessary to carry long passages past all the other rooms to reach a bedroom at the end of the flat; another great economy is made by having the low-studded bedroom stories alternate with the high stories devoted to reception-rooms, and the bedrooms are much pleasanter than in the Duplex system, as they occupy, equally with the parlors, the street fronts and sunny portions of the house.

The single short flight of stairs in each apartment is not generally regarded as an inconvenience. On the contrary, many people like to have their parlors isolated by a tier of bedrooms from those of their neighbors above or below them, and the stairway, well-arranged, forms an effective decoration for the apartment.

In respect to plan and construction, the best New York apartment-houses have thus reached a high degree of excellence. The next considerable advance will probably be in the direction of ventilation. Already something has been done: the kitchens of all the good modern houses are provided with flues which, being high and straight, act very efficiently, and the halls are generally ventilated by skylights, with open sides or something else of the kind; but attempts at changing the air of the rooms systematically are rare. One or two of the newest houses provide for furnishing fresh air to each room by means of steam radiators with fresh-air supply taken from the outside, on the so-called direct-indirect system of heating, but the constant withdrawal of foul air from all parts of the rooms which forms the proper supplement to this system has not yet been attempted in apartment-houses, although it has in several office-buildings.

Strange as it seems, the last structures to feel the effect of improved methods are dwelling-houses. A man who would not think of risking his valuable business papers in anything but a fire-proof office-building will leave his wife and children with perfect equanimity in a house, such as many of the cheaper apartment-hotels, where, in case of fire, they would have little or no hope of escape, and families which live perfectly contented in dwelling-houses with oil-cloth carpets in the halls, and steep wooden stairs to go to and from their bedrooms, have no words to express their disgust for an apartment-house without pavements of tile or marble, and costly elevators to carry them up and down. Still, improvements are made, although generally in matters of detail, rather than in systematic methods of construction.

The best tendency of modern house building is toward the more extensive introduction of light. I remember a certain house on Beacon Street in Boston, on the corner of one of the cross streets, having thus three sides open to the light, in which the only bathroom in the house, a most unpleasant apartment, was situated in the central portion, against the only dark wall of the building, where it received no light whatever, except from a gas-jet, and no air, except what was drawn into it under the door from the hall-way, to be restored again, with heightened flavor, for distribution among the bedrooms overhead. Such planning as this, although still popular among cheap builders, is not now tolerated by the best class of house owners. As those who have tried it know, the application of systematic ventilation to dwelling-houses is a very difficult matter, but light can be had without the exercise of much science, and most good city houses in the middle of a block have the central portion now lighted by a shaft, at least five feet square, covered by a skylight, with a ventilator to give a slow current through it, and illuminating very effectively, besides airing moderately, the bath-rooms and closets grouped around and under it. With the help of such shafts as these, and of the modern fashion of leaving plumbing work open, without casings or enclosures, the middle of city houses is no longer, as it once was, the breeding-ground of Croton-bugs and cockroaches, and the source of the sickly smells which we know so well.

[1] A paper read before the Society of Arts, Boston, October, 1884, by Mr. T. M. Clark. Continued from p. 232, No. 464.

Beyond such general tendencies as these, little change is to be remarked in domestic building as a whole. Individuals please themselves by establishing dynamo-machines in the basement of their houses, and lighting their rooms with incandescent lamps; or by setting up Ericsson pumps for supplying the building with water, or small passenger elevators for their convenience, but such fancies are always exceptional, and the average owner is rarely willing to try any experiments, or incur any extra expense, in the construction of his house, unless, as is now becoming very common in New York, he adopts a completely fire-proof construction.

The one subject which now interests any large number of householders is drainage, which though not strictly a department of building, is at least very intimately connected with it. It is perhaps best not to say anything of the improvements in interior drainage, that is, plumbing. That subject could hardly be entered upon without going to considerable length, and using a great deal of illustration; and it may be sufficient to know that plumbing appliances are now produced in great variety, with which any good plumber can fit up a house with perfectly wholesome, durable, and clean apparatus. The tendency in such work is decidedly toward reducing the number of appliances, and improving their quality. Double-thick waste-pipes, of cast or wrought iron, are now used where single-thick were until lately thought sufficient, and white stoneware is rapidly superseding enamelled iron and soapstone for kitchen sinks, bath-tubs and wash-trays.

In regard to exterior drainage, particularly for country houses, since that of city dwellings requires little thought on the part of architect or owner, the last few years have witnessed a rapid development of the practice of doing away with that object of the sanitarian's particular hatred, the old-fashioned leaching cesspool. In one or two towns, where public sewers have been provided, the use of such cesspools, whether new or old, has been summarily forbidden, and even where there are neither sewers nor health regulations, the sense of the unwholesomeness of a soil saturated with filth has become quite generally diffused in the community. In places without sewers, the only practicable alternative to the use of cesspools is the utilization of house wastes on the land, particularly by the system known as subsoil irrigation, and in some towns this has become quite common.

As the subject is a very important one to persons living out of the reach of sewers, it may be worth while to mention the modifications which have taken place in the practice of this system since its first introduction. Even now, the mode of applying it varies in nearly every case, but something, at least, has been learned from experience. Ten years ago, as those who have read the works of the most enthusiastic advocate of the system will remember, it was customary to provide houses in which it was to be applied with two drain-pipes, one taking the more purely liquid wastes, which were discharged over a Field's flush-tank, usually buried in the ground near the house, and the other carrying such drainage as might contain solid or semi-solid substances, which could not be passed through the flush-tank. This drain joined the drain from the flush-tank at some distance from the house, and both then proceeded together to a tight brick cesspool or settling basin, of twelve or fifteen hundred gallons capacity. A pipe from this settling basin, usually 4 inches in diameter, was led to some part of the ground about 15 inches below the surface, and there began to throw off laterals, consisting of round drain-tiles, 2 inches in diameter, with collars over the joints, all laid about 12 inches below the sod. From 500 to 1000 feet of these were put in for an ordinary dwelling-house, in lines 3 or 4 feet apart, the main 4-inch pipe being carried out far enough to supply the whole system.

This method, as described in books still popular, has not proved entirely satisfactory. The old flush-tanks were expensive, and the siphons which formed a part of them soon became clogged with grease, and had to be taken up frequently, and the grease melted out, while the open grating over which the waste-pipes discharged was anything but pleasant to sight or smell. The pipes with collars over the joints also proved unsuitable. The collars fitted so closely that the sewage liquids, on their way out of the joints into the ground which was to absorb them, left solid particles of that curious black sediment which forms in sewage, entangled between the collar and the pipe, and this obstruction rapidly increased, until the flow was stopped at that joint, when the same process was repeated at the next. The trouble with the flush-tanks was the most serious one. The object of using them is, of course, to give an intermittent discharge, by which the liquid from the settling tank is sent forcibly into the outlet-pipes, and through their joints into the ground, and this is a very desirable one, but in my own practice, after struggling with a flush-tank for a year or so, it was finally cut out and abandoned, and the sewage has been disposed of for five or six years since with much less trouble than before, while in another case, where, on account of this experience, no flush-tank was put in, and only one drain for the whole house, the irrigation-pipes have done their duty faithfully for five years without giving any trouble beyond a single stoppage in the main outlet, a few feet beyond the settling tank, which was, or could have been, remedied in fifteen minutes. In this instance the round pipes were used, but without collars, the pipes being simply laid end to end, with an interval of a quarter of an inch between them, and, as I recollect, a bit of paper laid on each joint to prevent the earth from falling in and obstructing the pipe. It is often said, and not without reason, by engineers, that a subsoil irrigation system without flushing apparatus is sure to choke rapidly, but this particular set of pipes has worked so long and efficiently in a soil so compact that the leaching cesspools of the two neighboring houses, built at a cost nearly as great as that of the irrigation system, began to overflow in six or seven months after they were put into use, that the experiment cannot be considered very dangerous, and the saving of the expense and care of the flush-tank is an important matter for most families.

The flushing system is now, however, somewhat modified, so that it gives much less trouble in use, and there is, of course, an advantage in being able to apply the flushing action for preventing sediment in the pipes. In order to secure this result in a way which should be at once less expensive and less troublesome than the siphon, I had occasion a year ago to try an experiment which resulted favorably, and as it is, if not the latest improvement, at least the latest modification in the subsoil irrigation system, I hope it is not necessary to apologize for explaining it. Briefly, the flushing apparatus, instead of a siphon, consists of a tumbling-tank, that is, a tank so shaped as to overturn when filled with water, recovering its balance as soon as emptied. This is set in a tight cesspool of brickwork in cement, occupying one corner, as shown on the diagram, and separated from the main part of the cesspool by a partition wall, which is built on a flagstone, set in the walls of the cesspools as they are laid up. An ordinary stoneware T is built into the little partition wall, the lower end dipping always below the surface of the water in the cesspool to avoid taking in floating grease, while the upper end is open to facilitate cleaning, and the branch projects through the wall and overhangs the tumbler tank. Just above the flagstone which forms the bottom of the tank compartment, a number of 2-inch sole tiles are built into the brickwork. These form the upper ends of as many lines or irrigation pipes, which diverge like an irregular fan from the cesspools. The whole is covered with flagstones. The cesspool holds about 1200 gallons, so that all the matters which get into it dissolve and settle before passing into the tumbler-tank. While any plumbing apparatus in the house is used, the waste water running into the cesspool, makes its overflow into the tumbler-tank, which, when full, overturns, throwing its whole charge directly into the mouths of the irrigation pipes. These pipes, which are all 2-inch sole tile, were not laid, as is the best, but most expensive way, in permanent channel tiles, but were simply placed in the bottom of the trenches, with a bit of asbestos paper over the joints, instead of the earthenware caps used where the cost can be afforded. The whole has continued to work perfectly until now, and the tumbler-tank shows no sign of deterioration. The advantages of the system seem to be its cheapness and simplicity, the spacious water-way everywhere, so that no obstruction can take place in the apparatus, and the accessibility of all the outlet pipes. Where these are laid as branches from a main stem, it is often necessary, when they show signs of clogging, to dig up the main line in order to obtain access to the laterals, which can then generally be washed free, without disturbing them, by a good stream from a hose; but by this modification the laterals are directly accessible, by taking the covering stone off the little compartment and lifting out the tank, without any digging outside. In the same way, the tumbler-tank and the compartment in which it works can be washed perfectly clean with a hose, or a few pails of water, without disturbing them, or interfering with their action, and in fact the whole system, with the exception of the cesspool itself, can be cleaned, repaired, or even renewed entirely, without stopping the use of any of the house plumbing for a moment. The cost of the brick cesspool is something like sixty dollars, which is about the same as that of a leaching cesspool suitable for disposing temporarily of the same amount of waste; the tumbler-tank made of galvanized-iron, with brass bearings, costs perhaps fifteen dollars; the outlet pipes costs two cents a foot, or ten dollars for the minimum amount which it is safe to use for a dwelling furnished with a batbroom, and the laying costs about as much more. These items constitute the whole expense, and bring the system within the means of every one. In fact, the cost of cleaning out a leaching cesspool of the same capacity, according to the experience of my neighbors, makes that in two or three years the more expensive apparatus of the two in actual outlay. Since my experiment, the same system has been introduced, as I believe, in about a dozen other places, and, so far as I can learn, with successful results.

Returning from this digression to purely building matters, I need only mention further a few disconnected details. Much of what might be called improvement in the art of construction is as yet rather a prospect than an actual and secure advance. Among the inventions which promise most for the future is certainly the application of the Bower-Barff preserving process for iron. For some reason, perhaps the cost of the process, it has come little into use, but the time cannot be far distant when our iron drain-pipes, as well as smaller articles of hardware, will be generally protected by it. Another possible improvement is to be found in the use of steel instead of iron for the simple forms of rolled beams and girders with which architects generally have to deal. It is remarkable that although we use so much less iron in building than the French or English, the American mills were the first to offer a full assortment of sections of steel building beams to architects, and what is more singular still, they are quoted here at the same price per pound as the iron beams, while the French steel beams, which are just coming into the market in Paris, cost considerably more than the iron. Four steel beams were very kindly presented to the Institute, by Mr. A. R. Whitney, of New

York, for test, but they proved much beyond the powers of the testing-machine, and are therefore preserved as samples. Other tests have, however, been made in this country, which tend rather to cast doubt on the advantage of the steel over iron for floors, partly because the sudden shocks to which floors are liable, act more unfavorably on steel than on iron, and partly because of the temptation which would be presented to builders or iron manufacturers to add stiffness to their beams by a proportion of carbon which would increase their dangerous qualities.

PHOTO-MECHANICAL PRINTING PROCESSES.[1] — III.

INTAGLIO PLATES. COLLOTYPES. PHOTO-MECHANICAL METHODS, AS APPLIED TO THE DECORATION OF POTTERY. MISCELLANEOUS PROCESSES.

PERHAPS the most perfect mode of printing is from an incised or "cavity" plate, as by this method the most minute markings can be reproduced with a degree of perfection which is not attainable either in the case of lithography or typography; but what is, perhaps, of more importance, is the circumstance that by adjusting the depth of the cavities to the requirements of the subject, not only can the engraver of the plate determine which portions of the print shall be covered with ink, but he can also determine how much ink shall be devoted to each part of the subject. To put the case in another way, not only can the engraver plot out his subject in black and white, but, within certain limits, he can determine how black the lines shall be.

Intaglio plates made by the aid of photography have been produced in great perfection by several methods; but up to the present time there has not been a very large market for them, partly, perhaps, from the considerable expense attending the work of printing from them. Intaglio plates are, even in the present day, generally printed from by hand, and this notwithstanding the fact that very excellent machines have been constructed for the purpose of plate printing.

One may generally put it that any transfer method for the production of a lithographic or typographic surface may also be applied to the production of intaglio plates, it being merely necessary to make a transfer in which the whites and blacks are reversed, to put this down upon a copper or steel plate, and to etch away the uncovered parts by suitable means.

It will be thus seen that, by the Ives method and its modifications, intaglio plates may readily be made; but there is but little inducement to do so, as such plates will not give much better impressions than the typographic or lithographic surfaces produced by similar methods, so that the great expense of printing from the intaglio plate steps in as a determining circumstance. There is, however, an exception in the case of printing surfaces to be used for pottery decoration. For this purpose intaglio plates are generally used, the method of printing being so rough and simple that the impressions cost about the same as prints from a type block. Hence it happens that intaglio plates made by means of photography have a special value to the potter. On the bed of this little press is a Woodbury relief made from a positive, that is to say, just such a relief as is used for the stannotype method, those parts of the relief corresponding to the whites of the original being high, and those parts of the reliefs corresponding to the darks of the orininal being low. Mr. Barker has uniformly inked it by means of an ordinary printer's roller, and let me now take an impression from the inked relief on a sheet of paper which has been grained in relief by means of pressure against a ruled plate. You see that a negative transfer in stipple is thus obtained, and when this is transferred to a copper plate, it serves as a resist to the etching fluid, a solution of perchloride of iron in water being one of the best mordants.

An extremely simple and expeditious method of engraving line subjects upon copper plates is the bichromated albumen process, practised with much success by Gobert and others. A plate is covered with a film of bichromated albumen, and exposed under a transparency until the whole of the ground, that is, the part not covered by the lines of the transparency, is rendered insoluble. The plate is next washed with cold water, so as to remove the albumen from the lines, after which the etching is effected by an alcoholic solution of ferric chloride.

The following details will be sufficient to enable the method to be carried into practice: One hundred cubic centimetres of albumen are mixed with a solution of two and a half grammes of bichromate of ammonia in fifty cubic centimetres of water, and, after having been well beaten, the mixture is filtered. A carefully cleaned plate of copper is now coated with the mixture, and, after the excess has been well drained off, the plate is dried at a very gentle heat, it being retained in a horizontal position meanwhile. The exposure required is by no means a long one, half a minute in moderate sunshine being sufficient in ordinary cases; but this must, of course, be learned by experience. Instead of developing (washing away the unaltered albumen) in plain water, it is better to use a weak solution of aniline red or magenta dye, as under these circumstances the ground becomes tinted, and the progress of the development can be watched. When the plate has been dried, nothing now remains but to varnish the back and edges with an ordinary black varnish, such as the so-called Brunswick black, and to etch. The etching bath is made by dissolving one part of perchloride of iron in five of alcohol; and ten minutes is generally a sufficient time for etching to the required depth.

On the table are some early specimens illustrating the photo-engraving method of Mr. Woodbury, now so successfully carried into practice by Messrs. Goupil & Co., of Paris. A gritty powder — crushed glass answers well — is incorporated with the gelatine used for making the Woodbury relief; and a leaden reverse being taken by pressure from the rough relief, the leaden reverse is reproduced by a twofold electrotyping. This reproduction of the leaden reverse is the printing plate.

The method which Major de la Nöe calls typogravure is, in reality, an intaglio process; but the printing is conducted as in the case of ordinary zincography. The details are as follows: A prepared zinc plate is coated with a film of sensitive bitumen by well-known means, and exposure is made under a transparency or a tracing, so that when development is carried on with turpentine or benzole in the usual way, the lines alone are bare. The plate is now etched with dilute nitric acid (1 and 40) until a depth of about a two hundred and fiftieth of an inch is reached, after which the plate is dried and once more coated with bitumen. The ground is now polished off with a stick of charcoal, leaving the bitumen in the lines, after which the plate is gummed and printed from by the usual zincographic method. This process is admirable for map work, although it is obviously inapplicable for the reproduction of subjects with widely extended blacks; and it has the advantage that the lines show no tendency to spread.

Before going any farther, you may with advantage look back at some of the older examples of photo-engraving in half-tone. Here are some specimens done by Talbot's etching process over twenty-five years ago, and they are admirable; while yonder is an example done by Mr. Dallas in 1864, and issued with the *Photographic News* of that year. These examples of work done by Pretsch twenty years ago are quite sufficient to prove that good work is not altogether a thing of to-day. Among the newer methods, that of Klic deserves special mention; and this specimen, which was issued with the "Year Book of Photography for 1882," will serve to show you how perfectly this method can render the lighter or more delicate shades of a photograph. Messrs. Annan Bros., of Glasgow, are working the process commercially in this country, and they have turned out some admirable plates. Klic has not published his method, but it is said to be an etching process, and the following details are given in a recent number of the *Photographic News:* —

> "The process itself was a secret at first, but we are informed that the principle of working is as follows: A copper plate is dusted with powdered asphalt, and the plate is heated, so that the asphalt becomes nearly melted. A negative carbon print is now transferred on to the copper plate, and the plate, now covered with the negative in carbon, is etched, at first by a strong solution of perchloride of iron, which penetrates only the thinnest parts of the picture, then by a weaker solution of the same salt, the solution etching through the thicker parts. By employing more and more diluted solutions, it is possible to etch through thicker and thicker layers of gelatine, so that only the high lights remain unetched."

On the table are some exquisitely fine plates made by Messrs. A. & W. Dawson, the managers of the Typographic Etching Company, these being reproductions of subjects after nature, and of difficult drawings in wash.

Major Waterhouse has been remarkably successful, during the past few years, in making intaglio plates, and he has published the details of his method. The process is a modification of one introduced some time previously by Geymet, and it is based on the mechanical reticulation or breaking up of the Woodbury relief.

A Woodbury relief is developed upon a plate of silvered copper (but the relief need not be nearly so high as that required for the Woodbury process; in fact, an ordinary carbon print will answer), and when the relief is taken out of the developing water, it is dipped into a solution of potassium bichromate, drained, and dusted over with fine sand, this sand having been previously waxed by being heated in an iron pot and stirred up with a small proportion of wax. The layer of waxed sand is allowed to remain on the film until it is quite dry, when it is brushed off, leaving the gelatine granulated, or pitted, all over, the pits being deepest in the thick parts. The plate is now blackleaded, and a cast is made in the electrotype bath, this cast being the printing plate.

The specimens on the table will show you what excellent work can be done with this method; and you must remember that Major Waterhouse has not only published full working details,[2] but he has demonstrated the process before several gentlemen interested in the matter; moreover, he has not patented the method.

Before you are some fine examples of the application of photo-engraving to pottery decoration, by Mr. F. S. Emery, of Burslem, and one photographic method which this gentleman adopts for the

[1] Cantor Lecture delivered before the Society of Arts by Thomas Bolas, F.C.S., and published in the *Journal of the Society of Arts.* Continued from No. 464, p. 235.

[2] *Photographic News;* p. 1880, p. 568.

reproduction of pottery designs is of special interest. He coats a plate with sensitive bitumen, puts down upon this surface a transfer from the plate to be reproduced, and exposes to light until the ground is insoluble. Development is now effected with the usual solvents,—say, a mixture of turpentine and benzole,—only those parts of the ground which were protected by the transfer dissolving. The etching is effected by perchloride of iron.

As regards collotype printing, the progress to be reported is principally as regards extension of work and some minor details; while, as far as this country is concerned, the Autotype Company practically holds the thing in their own hands. Excellent as the specimens of foreign work may be which are placed before you to-night, you will find nothing better than the specimens shown by the Autotype Company. In Germany, the steam press is largely applied to the rapid production of collotypes; and before you are drawings of the machine collotype press constructed by Messrs. Schmiers, Werner & Stein, the most striking feature being the large number of rollers, used in order to ensure equal inking and damping. The transfer of collotypes to porcelain has been practised to a small extent, vitrifiable colors being dusted on afterwards; but the results obtained have not been very satisfactory.

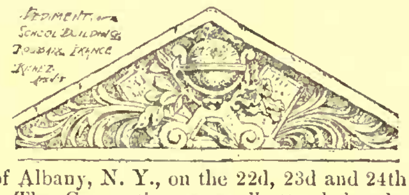
Collotyping in colors from several plates has been introduced to compete with chromo-lithography for fine work; but the only examples exhibited in this country are, I believe, some shown by Mr. Meyerstein, and a selection of which is now before you.

Before you go, do not fail to look at some intaglio plates intended for the decoration of porcelain as made by Mr. Dallas; and you will also find some prints from them. Mr. Dallas does not tell us how he makes them.

As you may well suppose, the things omitted from this short course of lectures are more numerous than the things discussed, far more progress having been made than can be described in three hours.

You will, before you go, allow me to express the obligation we are all under to Mr. Barker who has so ably assisted me in showing you what ouy have seen.

EIGHTEENTH CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.



THE Eighteenth Annual Convention of the American Institute of Architects held its session in the Circuit Court Room of the Federal Building in the city of Albany, N. Y., on the 22d, 23d and 24th of October.

The Convention was well attended and much interest evinced by its members in the business brought before it, and in listening to the Reports of Chapters and Committees. President Walter presided; his annual address was received with marked attention and respect. The Report of the Board of Trustees showed a satisfactory increase in the professional membership of the Institute, both in the Fellowship and Associate grades. The following list comprises the full number of elections since the Seventeenth Convention: —

FELLOWS BY PROMOTION.

M. Fred Bell, Fulton, Mo.	E. H. Kendall, New York, N. Y.
W. C. Smith, Nashville, Tenn.	W. G. Preston, Boston, Mass.
Arthur Rotch, Boston, Mass.	E. Townsend Mix, Milwaukee, Wis.

FELLOWS BY FIRST ELECTION.

A. H. Stem, Indianapolis, Ind.	E. J. Hodgson, Indianapolis, Ind.
J. H. Stem, " "	James G. Cutler, Rochester, N. Y.

John Ord, Philadelphia, Pa.

ASSOCIATES.

P. L. Le Brun, New York, N. Y.	J. McDonnell, Green Bay, Wis.
Leoni W. Robinson, New Haven, Ct.	F. W. Humble, Buffalo, N. Y.
H. W. Kirchner, St. Louis, Mo.	Eugene H. Taylor, Des Moines, Iowa.
B. H. Enos, Indianapolis, Ind.	R. W. Gambier-Bousfield, Montreal, Canada.
C. G. Mueller, " "	
W. S. Wicks, Auburn, N. Y.	David L. Stine, Detroit, Mich.
E. R. Willson, Providence, R. I.	J. J. Deery, Philadelphia, Pa.
F. W. Vogdes, Indianapolis, Ind.	Fred. B. White, New York, N. Y.

One Fellow — Mr. Henry Fernbach, of New York, N. Y. — has died during the year, and two Associates have been dropped from the roll, leaving the net gain in professional membership, since the last Convention, seventeen.

The Report of the Treasurer shows that the finances of the Institute have been carefully managed and are in a good condition.

The papers read before the Convention were as follows: "An Architectural Résumé," by Henry M. Congdon, F. A. I. A.; "Old Art in Europe, a Help and a Hindrance to New," by Russell Sturgis, F. A. I. A.; "Metrology," by Rev. H. G. Wood, Sharon, Pa.; "Chemical Preservation of Building Materials," by R. Ogden Doremus, M. D., New York. These papers were listened to with interest and referred to the Committee on Publications.

The Nominating Committee presented the following list of officers for the year 1885, who, after balloting, were declared to be unanimously elected: —

President, Thomas U. Walter, L.L. D., Philadelphia, Pa.

Treasurer, O. P. Hatfield, New York, N. Y.

Secretary, Geo. C. Mason, Jr., Newport, R. I.

Trustees: Messrs. H. M. Congdon, New York, N. Y.; A. J. Bloor, New York, N. Y.; Napoleon Le Brun, New York, N. Y.; E. T. Littell, New York, N. Y.

Secretary for Foreign Correspondence: W. L. B. Jenney, Chicago, Ill.

Committee on Publications: Messrs. H. Hudson Holly, New York, N. Y.; T. M. Clark, Boston, Mass.; Chas. Crapsey, Cincinnati, O.; J. McArthur, Jr., Philadelphia, Pa.

Committee on Education: Alfred Stone, Providence, R. I.; Henry Van Brunt, Boston, Mass.; Prof. N. Clifford Ricker, Champaign, Ill.; Prof. W. R. Ware, New York, N. Y.; Prof. T. M. Clark, Boston, Mass.

Upon announcement of the result of the ballot, President Walter, in a few graceful sentences, thanked the Convention for the honor which had been again conferred upon him, and expressed his desire to forward, by all the means in his power, the interests of the Institute and the profession of architecture.

The most important business brought before the Convention was the report on a revision of the Schedule of Professional Practice and Charges, prepared by a sub-committee of the Board of Trustees.

The discussion of this report occupied nearly the whole of the morning session of the 23d, and resulted in the re-adoption of the present Schedule, with several changes and amendments. The Schedule as amended will shortly be printed and distributed to members of the Institute.

The annual dinner, courteously tendered to the members of the Convention by the architects of Albany, was given at the Delavan House on the evening of the 23d. About forty-five architects, with other gentlemen interested in art, literature and the professions were present. Mayor A. Bleecker Banks presided, and among the guests may be enumerated Rev. Dean Norton, of All Saint's Cathedral, Rev. Dr. Battershall, of St. Peter's Church, and Mr. St. Clair McKelway, editor of the Albany *Argus*. Speeches followed the dinner, nearly every one present being called upon and answering in a pleasant and felicitous manner.

Among the good results of the convention will probably be the rehabilitation of the Albany Chapter.

A most courteous and hospitably worded invitation was received from the Art Club of Nashville, Tenn., requesting the Institute to hold its nineteenth convention in that city. The matter was referred to the Board of Trustees, the members present generally expressing the opinion that if possible it would be desirable to hold the next convention in a southern city.

The afternoons of the days of the convention were devoted, under the guidance of their hosts, the Albany architects, to visiting the Capitol, City-hall, foundations of All Saint's Cathedral, the Van Rensselaer manor house, the Schuyler mansion, the Van Rensselaer house at Greenwich, and the new draw-bridge across the Hudson. At the Capitol the members of the Convention were presented individually to Governor Cleveland, were shown through the building and viewed the extensive works in progress, under the guidance of Mr. Isaac Perry, the superintending architect.

The freedom of the Fort Orange Club-house was extended to the visitors.

Before adjournment a vote of thanks was tendered to the Albany architects.

The third day of the convention was devoted by many of the architects to excursions to points of interest in Albany and its vicinity.

This gives only a brief and summarized outline of the proceedings of the Eighteenth Convention, and is prepared in haste. Full accounts, accompanied by the papers and reports, will appear in the published "*Proceedings*" of the Institute.

Very respectfully, GEORGE C. MASON, JR.,
Secretary, A. I. A.

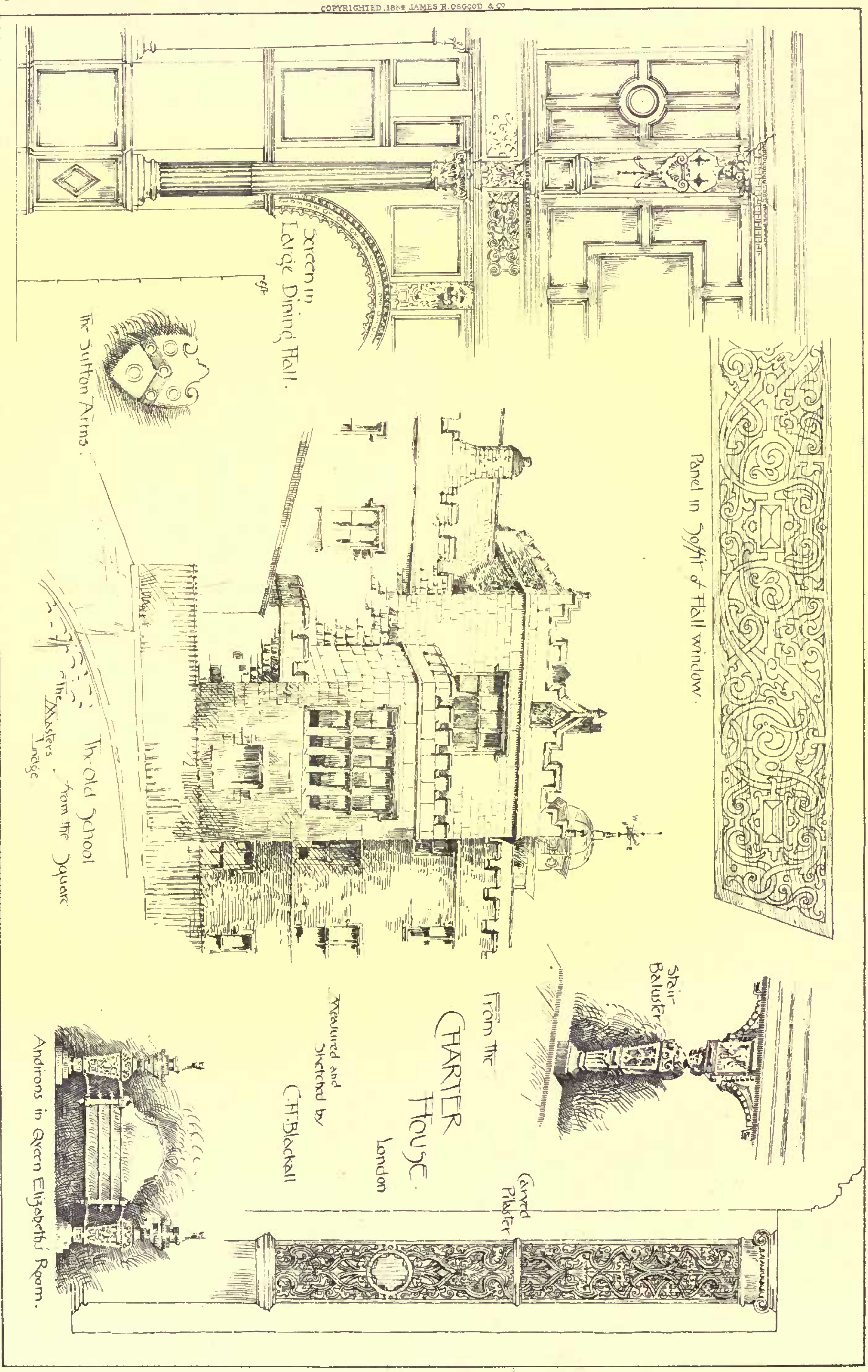
THE ILLUSTRATIONS.

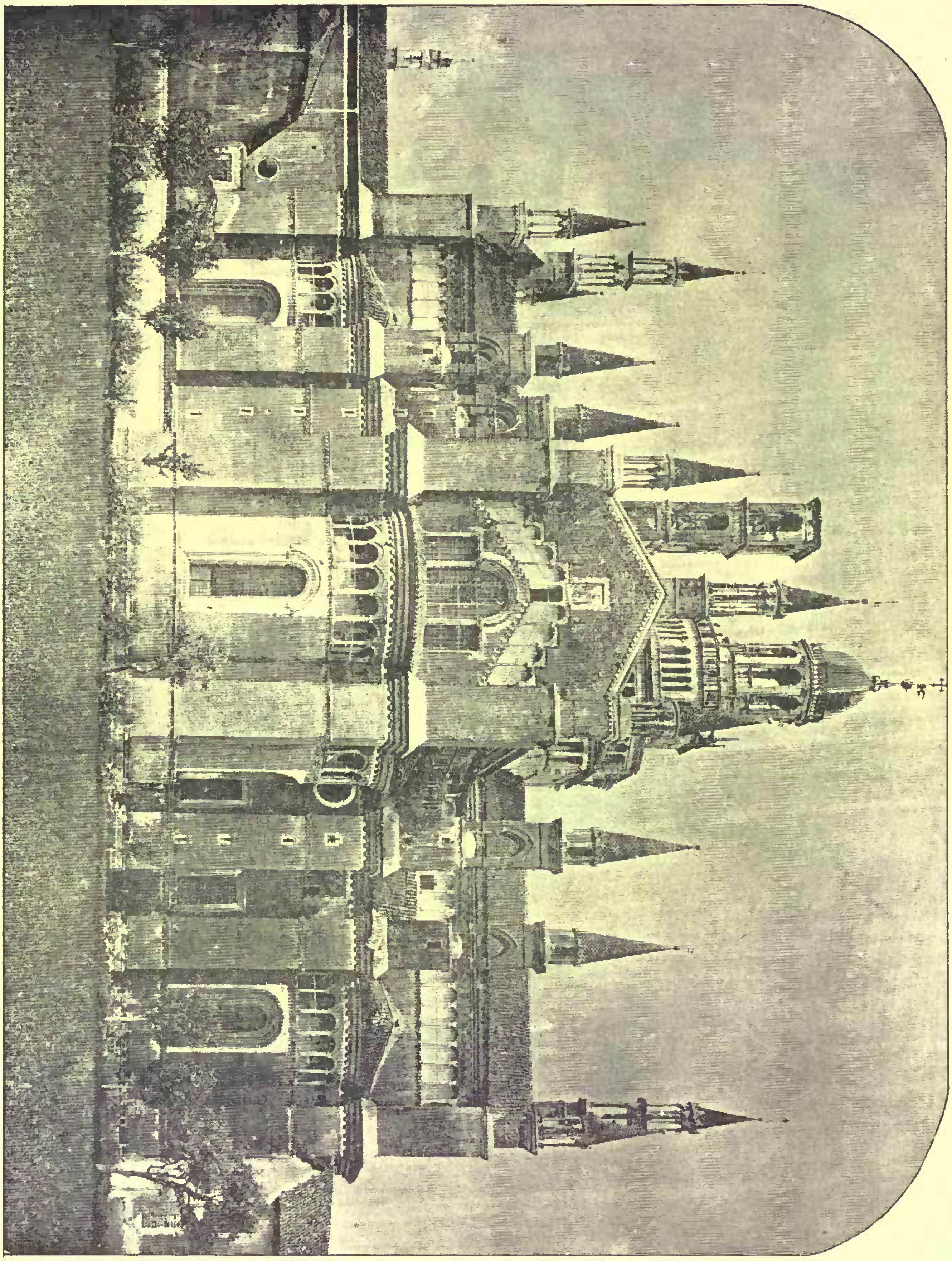
ABBEY CHURCH OF ST. OUEN, AT ROUEN.[1]

THE beauty of the Church of St. Ouen, has been a frequent theme of admiration among the lovers of ancient ecclesiastical architecture. The excellencies of the building have been denied by none, while some have gone so far as to consider it as the very perfection of that style, which has generally, however improperly, obtained the name of Gothic.

A recent English traveller, whose attention was expressly directed to the different departments of the arts, bears the following testimony in its favor: "Beyond all comparison, the finest specimen of Gothic architecture which we have met with in France is Saint Ouen, the secondary church at Rouen. Contrasted with Salisbury Cathedral, it is small; but it does not, I think, yield to that or any other structure I have ever seen, in elegance, lightness, or graceful uniformity." Previous to the suppression of monasteries in France, the Church of St. Ouen made part of the abbey of the same name, one of the most celebrated and most ancient in Normandy. It is now a parochial church, and is happily in nearly a perfect state, having suffered comparatively but little from the mad folly of the Calvinists of the sixteenth century, or the democrats of the eighteenth; though every studied insult was offered to it by the former, and in the fury of the revolution it was despoiled and desecrated — degraded at one

[1] From Cotman's "*Antiquities of Normandy*."


Screen in Large Dining Hall.
The Sutton Arms.
Panel in Soffit of Hall window.
The Old School from the Square
The Masters Lodge
Stair-Baluster.
From the CHARTER HOUSE London
Measured and Sketched by C.H. Blackall
Carved Plaster
Andirons in Queen Elizabeth's Room.



THE CERTOSA. PAVIA, ITALY.

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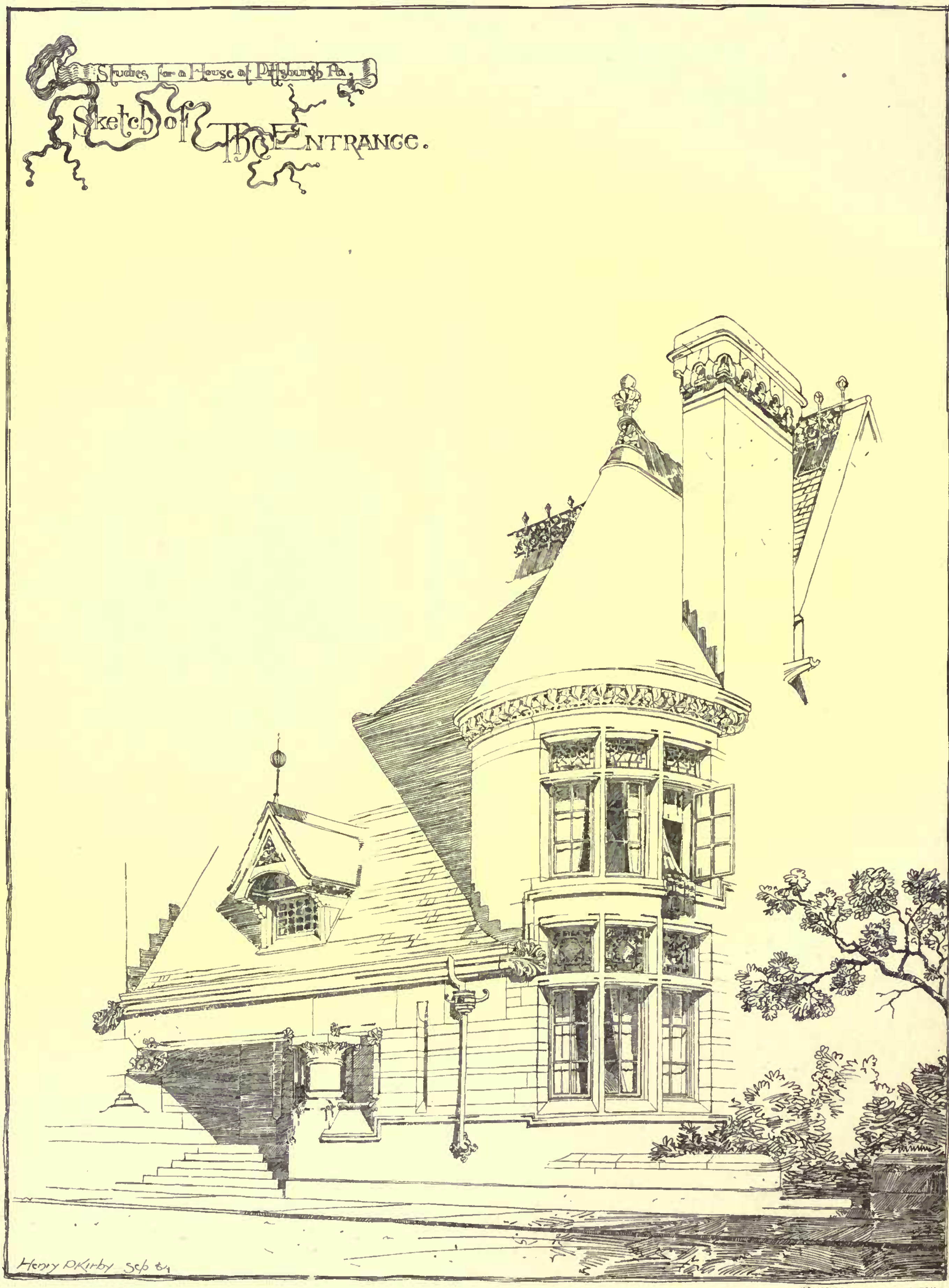

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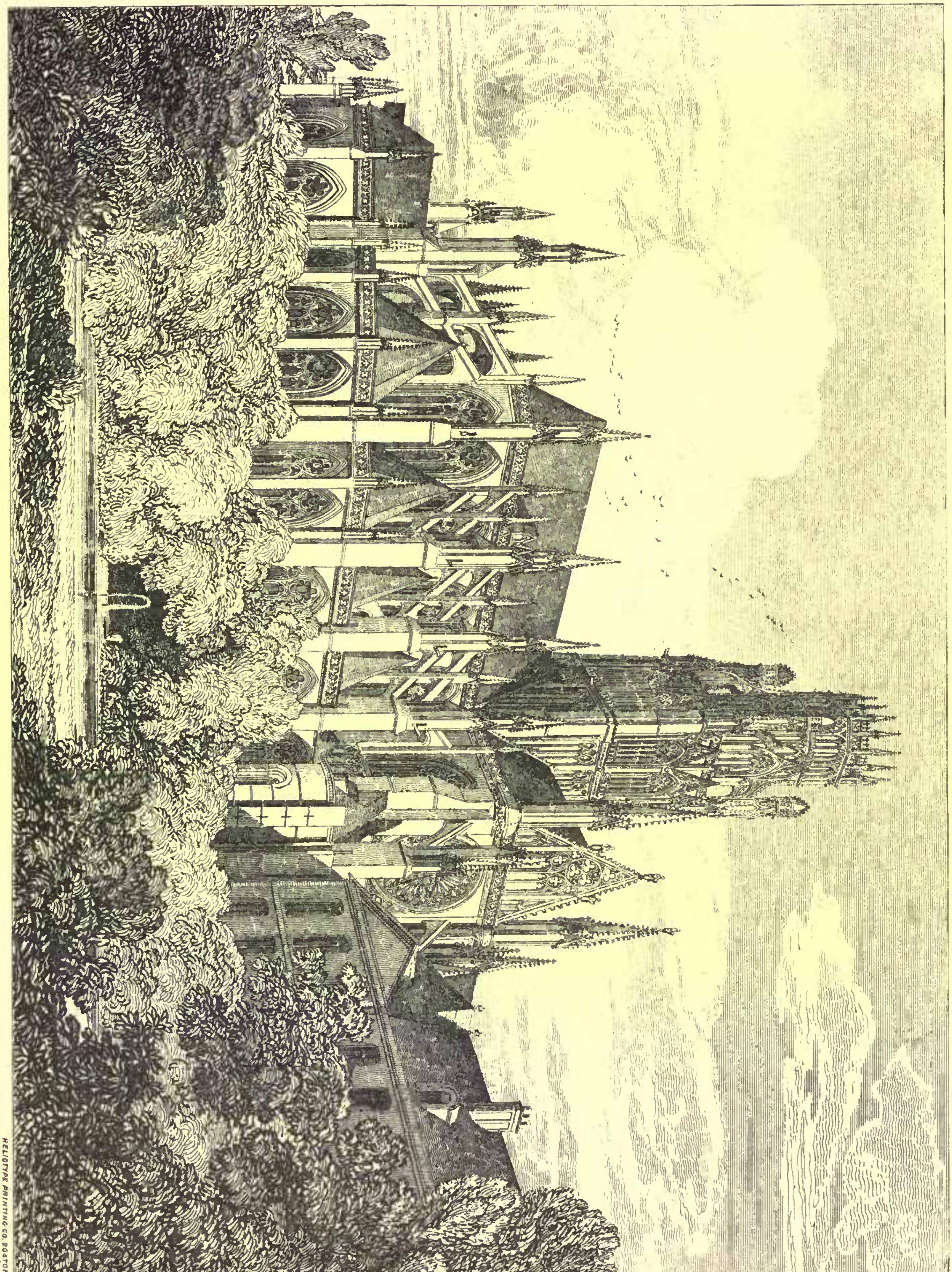


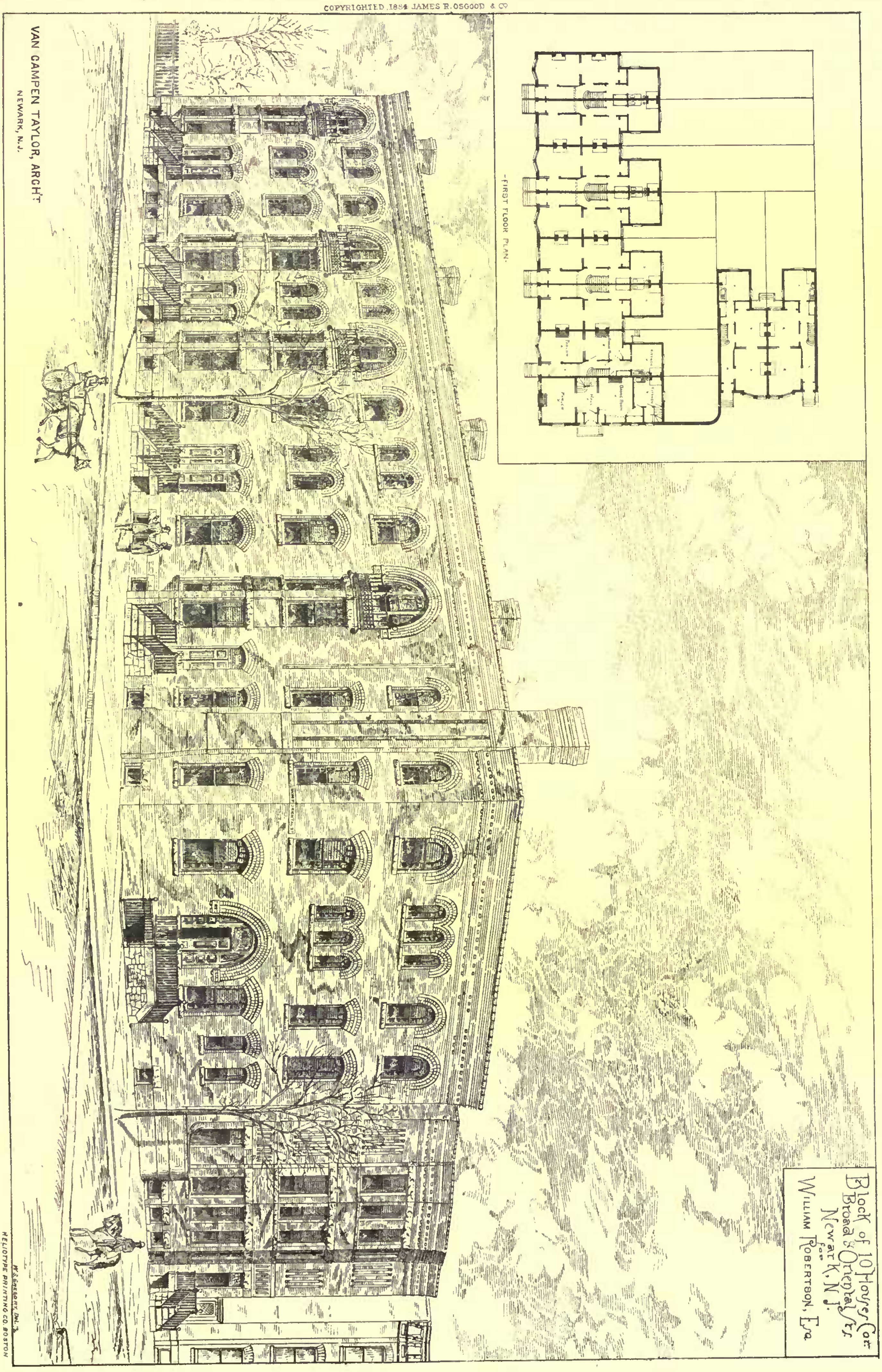
ABBEY CHURCH OF ST. OUEN, AT ROUEN.

HELIOTYPE PRINTING CO. BOSTON

American Architect and Building News, Nov. 22 1884 No. 465

PHOTO CAUSTIC, HELIOTYPE PRINTING CO., BOSTON.

CHURCH OF ST. NICHOLAS, GHENT, BELGIUM.


VAN CAMPEN TAYLOR, ARCH'T.
NEWARK, N.J.
-FIRST FLOOR PLAN-
Block of 10 Houses Cor. Broad & Orchard Sts
Newark, N.J.
for
William Robertson, Esq.
HELIOTYPE PRINTING CO. BOSTON

time to a manufactory for the forging of arms, and at another to a magazine for forage. Different accounts are given of the foundation of the convent; some writers contend for its having taken place as early as the last year of the fourth century, and having been the work of the piety of Saint Victrice, the Bishop of Rouen; others, and these the greater number, are content with tracing it from the reign of Clothair. Those who adopt the latter opinion are again divided, as to whether the prince himself was the actual founder, or only ratified by his royal sanction what was really the establishment of Archbishop Flavius. In either case, however, they agree in dating the origin of the abbey from the year 535.

Upon the irruption of the Normans in the ninth century, this abbey shared the common fate of the Neustrian convents; and, like the rest, it rose from its ashes with greater magnificence, after the conversion of these barbarians to Christianity. Nicholas, the fourth abbot of the convent, son of Duke Richard II, and of Judith of Brittany, is said by Ordericus Vitalis to have commenced "a new church of wonderful size and elegance." But though he presided over the fraternity nearly sixty years, he did not live to see the building finished; the bringing of the task to perfection was reserved for William Balot, the next but one to him in the succession; and even he died in the very year of the dedication, which did not take place till 1126.

This church which had cost eighty years to build, was suffered to exist but a short time after its completion; only ten years had elapsed from its dedication, when it fell a prey to a conflagration, which was at the same time destructive to the greater part of the city; another church built shortly after, and chiefly by the munificence of Richard Cœur-de-Lion, shared the same fate in 1248. But even these repeated disasters in no wise abated the spirit of the monks; they had retired with the wreck of their property to one of their estates near Rouen, and there, by economy on their own part, and liberality on that of others, they soon found themselves in a state to undertake the erection of a fourth convent, of greater extent than any of the former, and to inclose it with high walls. The honor of laying the first stone of the new church, the same that is now standing, is attributed to one of the most celebrated of the abbots, John Roussel, more commonly known by the name of Marcdargent. He had been elected to the prelacy in 1303; and fifteen years afterwards, he commenced the structure. He presided over the monastery thirty-seven years, and was buried in the Lady-Chapel of the church, which he had completed as far westward as the transepts. The remaining parts of the church were not finished till the beginning of the sixteenth century, when it was brought to its present state by the thirty-fourth abbot, Anthony Bohier, who, in the annals of the convent, bears the character of having been "a magnificent restorer and repairer of ancient monasteries."

Admirable as is the structure, the original design of the architect was never completed. The western front remains imperfect; and this is more to be regretted, as that part is naturally the first that meets the eye of the stranger, who thus receives an unfavorable impression, which is afterwards difficult wholly to banish. The intention was, that the portal should have been flanked by magnificent towers, ending in a combination of open arches and tracery, corresponding with the outline and fashion of the central tower. An engraving of this intended front, is given in Pommeraye's "*History of the Abbey*," from a sketch preserved among the records of the convent.

The view of this church etched by Mr. Cotman, is copied from a drawing made by Miss Elizabeth Turner. It represents the building, as seen from a seat in the gardens formerly belonging to the monastery, but now open to the public; and it is well calculated to convey a general idea of the character of the exterior of the building, including the central tower, which is wholly composed of open arches and tracery, and terminates like the south tower of the cathedral, with an octangular crown of fleur-de-lis. The plate also exhibits a portion of a circular chapel, now commonly known by the name of *la Chambre des Clercs*, the only remaining part of the church built by William Balot, in the beginning of the twelfth century. This chapel, the south porch, the central tower, and a specimen of ancient sculpture in the church, have been engraved by Mr. Turner in his "*Tour in Normandy*." The two first, of the same subjects, together with the western front, a general view of the church from the south, the curious bas-relief over the southern entrance, and a representation of the interior, have since been lithographized in M. Jolimont's "*Mounmens de la Normandie*." Considerable pains have been devoted in both these works to the description and the history of the building; and to them the reader must be referred, who is unwilling to engage with the ponderous folio of Pommeraye.

THE CHARTER-HOUSE, LONDON. SKETCHES BY MR. C. H. BLACKALL.

THE group of buildings now known as the Charter-House is situated in what was the old city of London, opposite the great Smithfield Markets, and but a short distance from the still existing St. John's Gate, a portion of the old city walls. The name has been corrupted from Chatreuse, a Carthusian monastery having been founded here in 1371, on the site of a burying-ground for persons dying of the plague. In 1535, Henry VIII dissolved the monastery, and shortly after, the property passed into the hands of Thomas Howard, Duke of Norfolk. Most of the existing buildings date from this period, and the old work was greatly enriched, and put in thorough repair by the Duke, who made this his family seat. Here Queen Elizabeth was entertained during five days, awaiting preparations for her coronation, and during a subsequent visit she is said to have become greatly incensed with her host, who loved his sovereign too little, or perhaps too much, and who was locked up in his own house for his coldness. James I also kept court in the Charter-House on first entering London. Subsequently, the establishment was much neglected, and was little used until 1611, when all that was left of the former buildings was purchased by Thomas Sutton, a retired merchant, who had made a great deal of money out of Government contracts. He put everything in very thorough repair, making a number of additions and changes, and converting it into a school for forty boys, and an asylum for eighty indigent and deserving gentlemen. Sutton left everything very thoroughly organized and richly endowed, and the Charter-House in many of its appointments has not changed materially since his day. Grace is still said at table in the same words used by the retired merchant, who thought so much of his formula, that he had it ordained that none other should be used. In 1872, the boys school was transferred to new and more sanitary quarters at Godalming, Surrey. The "Merchant Taylors Company" has lately acquired a portion of the old monastery close, and erected a large brick school-house, which however has nothing to do with the Charter-House. The "poor Brethren" still come and go as they did two centuries ago. They are very comfortably housed in apartments facing the interior courts. The school has always been crowded and has had among its former pupils, Barrow, Steele, Addison, Blackstone, Wesley, Grote, Havelock, and Thackeray. In "*The Newcomes*," Thackeray presents some very pleasing pictures of life in the old Charter-House School.

Of the old monastery buildings, nothing now remains but the pointed entrance gateway, and portions of the interior walls, though the kitchens appear to have been erected before the time of the Duke of Norfolk. The large dining-hall is considered the most perfect specimen of an Elizabethan room in London. The ceiling is of a Gothic feeling, however, and has the appearance of having belonged to the olden monastic refectory. One end of the room is crossed by a high oaken screen, very rich in carving and Elizabethan strap-work, the columns being very nicely proportioned. The Duke of Norfolk's monogram is cut on the frieze of this screen, with the date 1571. The room has a high wainscot all around and a narrow gallery along one side, connected with a musician's gallery over the screen above referred to. The old fireplace was built by Thomas Sutton, and is adorned with the Sutton arms, and various emblems of the manner in which the old merchant came by his wealth. In the same wing with the dining-hall is the old chapel containing some excellent wood-work, and a very handsome staircase-hall, very well preserved, and exceedingly rich in detail. Portions of the Suttons arms are found on the newel-posts. This staircase-hall has also quite a handsome ceiling of Elizabethan strap-work, and a wide mullioned window, with rich-carved pilasters on either side, and an elaborate soffit. The Queen Elizabeth room is in this same portion of the Charter-House, and is a very perfect example of the interior work of the period, with a huge mantel reaching to the ceiling. Some of the old furniture still exists, and the ceiling of moulded plaster strap-work, is in a very good state of preservation. The appearance of this room is not unlike that of the large chambers in Haddon Hall.

C. H. B.

THE CERTOSA, PAVIA, ITALY.

THE Carthusian Monastery is one of the most celebrated buildings in northern Italy. The famous façade of Ambrogio Borgognone, was begun in 1473, nearly a century after the foundation of the monastery. The view published to-day shows a much less familiar aspect of the structure.

THE CHURCH OF ST. NICHOLAS, GHENT, BELGIUM.

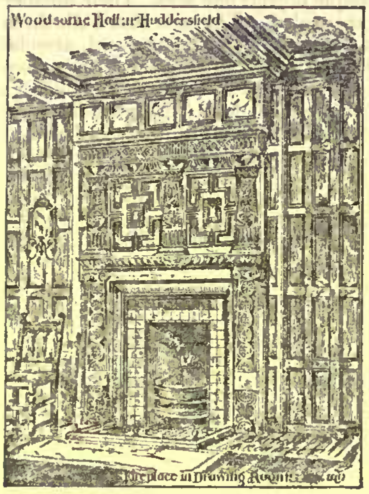
IT is of this church, the oldest in the city, that the following punning description is commonly given: *L'eglise a onze tours et dix sans* (pronounced *cent*) *cloches.* [The church has eleven towers, and ten hundred bells — literally, "ten without bells."] The greater part of this building dates from early in the fifteenth century.

STUDY FOR A HOUSE AT PITTSBURGH, PA., — SKETCH OF THE ENTRANCE. MR. H. P. KIRBY, ARCHITECT, PITTSBURGH, PA.

BLOCK OF TEN HOUSES FOR WM. ROBERTSON, ESQ., NEWARK, N. J. MR. VAN CAMPEN TAYLOR, ARCHITECT, NEWARK, N. J.

THE VALUE OF THE COEFFICIENT OF EXPANSION.— An illustration of the way in which a coefficient like 0.000006, that of the expansion of steel, may become a big thing with a few degrees of rise of temperature and long lengths has been seen, says the *Engineer*, on the new Midland line between Irchester and Sharnbrook, recently opened for goods traffic. The rails were laid during winter time, and insufficient room was left for expansion, consequently the summer heat expanded the rails to such an extent that the road burst out of line. Traffic had to be at once stopped and the permanent way altered and properly spaced. Accidents from the "spreading" of rails are far more frequent than is supposed on roads in this country. Your compiler long ago showed the vital necessity of regulating the space allowed for expansion at the ends of rails by constant reference to the height of the thermometer on the spot and during the whole process of laying the rails.

THE ASSOCIATION OF WESTERN ARCHITECTS AND THE AMERICAN INSTITUTE OF ARCHITECTS.



AT the banquet which was a feature of the recent convention of western architects, Mr. W. L. B. Jenney, F. A. I. A., responded as follows to the toast, "The American Institute of Architects": —

Gentlemen, — Please allow me to thank you in the name of the Institute for your kind remembrance and to extend to you her motherly love. Some thirty-six years ago the Institute commenced its existence as an incorporated body under auspices not as favorable as those that here obtain. The Institute was alone in her struggle for existence; we have to guide us her thirty-six years of experience and her assistance, besides that of numerous State and other local organizations. The Institute has endeavored to unite in fellowship the architects of this continent and to combine their efforts so as to promote the artistic, scientific and practical efficiency of the profession. What the Institute proposed to do for the continent, we propose to do for the West. The Institute two years ago had a membership consisting of some sixty-two honorary members, among them such well-known names as Sir Charles Barry, Wm. Burges, C. R. Cockerell, James Fergusson, George Godwin, Sir George Gilbert Scott, Viollet-le-Duc, and others; sixty-four corresponding members, men interested in architecture, but not practising architects; three hundred and sixty-two Fellows and Associates, architects in good standing located in all parts of the country. Numerous additions have recently been made, of which I have no record.

The annual meeting of the Institute is usually held in the East, because the attending members are largely from that locality. Each year endeavors have been made to interest the Western members, and to induce their attendance at the next annual meeting, but with little success. To further this end two years ago the meeting was held in Cincinnati, but there was only one member present from west of that city. A year ago the meeting was held in Newport and Providence, at the fashionable season; there was but one attendance from Chicago, and none from beyond, westward. A few days ago the meeting was held in Albany, at which there was no attendance from the west beyond Cincinnati and Cleveland. These meetings are all exceedingly profitable and interesting. The visiting architects are the guests of the local chapters, who entertain royally, assisted by many liberal-minded and wealthy gentlemen, who open their houses, show many beautiful interiors and works of art, and spread out a lunch-table with big bowls of capital punch and plenty of champagne and cigars. In spite of all these pleasures and profits, the attendance is not large. This year, at Albany, the visiting architects numbered but twenty-two, and one sees year after year nearly the same faces. Why this small attendance, and why confined to the same persons with but little variation?

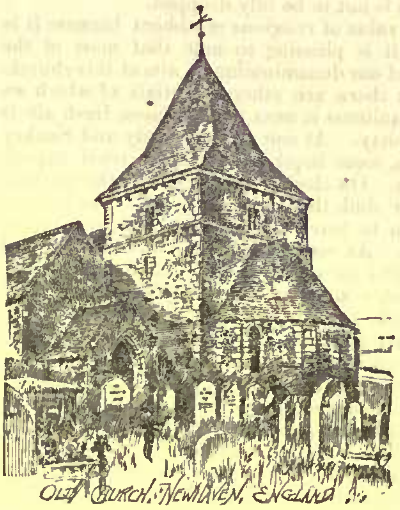
The immense extent of our country, and the difficulty of being absent from one's office for a number of days, just at the time the meetings are held, is one, but this is not the main reason. It is because those members who are not in the habit of attending, feel that they are not acquainted, and that they would not feel at home. This is a great mistake. Every person who has once attended a meeting of the Institute will do all in his power to attend every one thereafter. At a single visit he feels that he is received with such good fellowship that he counts every member his friend. This good fellowship among members is one of the greatest advantages to be derived from these associations; and it is with great pleasure and with encouraging hopes of a brilliant future that we see so many present at our first meeting, and our first duty is to make friends with each other.

The Institute has acquired an honorable name throughout the world, and it is to-day an honor to be enrolled among her fellows. I hope that our Board of Directors will sooner or later arrange with the Trustees of the Institute some method by which all members of this Association will become *ipso facto* members of the Institute, conferring as many benefits as they obtain. There is strength in numbers, and it is a good reputation to be known to frequent good company. This Association united with the Institute, will include nearly every architect of good standing in the land, and some of the more celebrated of Europe. We cannot be ignored. We will establish the profession on as firm a base and on as high a pinnacle as that of the law or medicine, and secure for its members the same high respectability that is so freely accorded them in Europe.

Fellows of the Association of Western Architects: The Institute extends to you all the right hand, and wishes you a success more brilliant than the most enthusiastic among you even dare to hope.

UNITARIAN CHURCH BUILDING.[1]

FROM AN ARCHITECT'S POINT OF VIEW.



ONCE, however, having chosen your site and your architect, the arrangement of the church next becomes important. Regarding this I would say that, looked at from æsthetic grounds alone, — as a matter of composition, of feeling, and of design, and aside entirely from such advantages as a minister would urge, — it seems to me that the church should be a church from bottom to top, sacred to devotion from foundation to spire. A Roman Catholic church is dedicated whenever it is ready for services, and it is used just as any room could be used for the mass and other ceremonies; but when it is wholly paid for, it is *consecrated*, and the altar, previously movable and temporary, is then put on a masonry foundation to stand for all time in a *church*. Now, I think that our churches should have, not temporary and removable altars which give place to the stage and the stove, but that they should be holy all the time, — in other words, *churches* right down to the ground; and I believe that the social meetings, the sewing-circles, the parish-parties, should be held in an adjoining structure. It is sometimes cheaper to have these in the basement, but it does not save so very much. On the other hand, the grouping of church and parish building will be attractive outside, and the sentiment of keeping the church sacred to the worship of God certainly is worth something.

The same ideas apply to the ground plan of the audience-room. If the church is really but an audience-room, theatres and concert-halls are our best models. These have grown up out of the necessities of seeing and hearing as the prime and only needs. This is a perfectly legitimate way of looking at the question of building Unitarian churches; and, moreover, grand effects can be thus obtained. I remember noticing this, especially in a large but cheap galvanized-iron church in New York, where the seats are amphitheatral and raised one above another, as in a Greek theatre. As an audience-room, it is well arranged for all to see and hear; as a lecture-room, it brings every one directly before the speaker; as a concert-room, the effect must be grand when the people join in the hymn. But it is not a church. What is there about it to distinguish it from any of the places I name, or to mark it as the house of God? If the preaching is everything, if we go to church for the sermon only, if association of ideas is nothing, if kinship with the worshippers of all the Christian centuries is nothing, if worship on our part is nothing, this is our best plan for a church. But in my experience, not as an architect, but as a man, our churches have, I will not say too much sermon, but certainly too little devotion. There are very many who are unable to master doctrines of atonement and redemption, and who feel that, when trained men differ so vastly about dogma, their own lack of training and knowledge makes them no judges of it. And yet many of these still believe in a God to whom it does them good, in company with their fellows, to confide their hopes, and sorrows, and joys, and fears, and faith, and in a Christ whose life and example are the best guide they have for right living. These go to church for devotion as well as for the sermon. It is this desire for a religious and devotional atmosphere that in my experience has taken young Unitarian-bred parents to other communions where the spirit of devotion is more conspicuous, so that, even if their own convictions are not secure, their children may grow up with that respect for holy places and holy things which is less strong now than when we were children.

All this is not architecture; but it explains why I would, in the plan of a new church, hold fast to all possible accepted forms and associations, and not be set aside by the too practical committee-man, who wishes every seat as good as the others, at any cost of association, dignity, or beauty. Far from agreeing with him, I think much should be sacrificed to gain brave responses, devout prayer, hearty singing. It is not a brilliant discovery of ours that mediæval churches do not wholly suit a congregational service. The mediæval builders must have known this perfectly well; but they valued other things also; they saw what was gained by effects of distance, perspective, mystery. When they worshipped they worshipped the Lord "in the beauty of holiness." These things meant something to them, and these same things lead us now to make reverent pilgrimages to all the cathedrals of England and the Continent. The cathedrals, the abbeys, the village churches of the Middle Ages would never have been what they are, would never have had their atmosphere of religion and devotion, if they had not been to their builders sacred places, retreats from the world without, and distinct and different from their

[1] Portions of a paper, by Robert S. Peabody, in the *Christian Register*.

habitual surroundings. And for us, too, if what we want is a lecture-room, it seems idle to be discussing *church* building. If we want churches, we must build *churches;* and the experience of eighteen centuries of church-builders is not to be idly dropped.

I have dwelt thus on the value of religious sentiment because it is so easily endangered, and it is pleasing to note that most of the recent important churches of our denomination do aim at this church-like-air, but it is plain that there are other essentials of which we must not lose sight. If cleanliness is next to Godliness, fresh air is likewise a powerful aid to piety. At one of the Moody and Sankey revival meetings in Boston, some inquiring engineers tried experiments on the fresh-air ducts. On closing them slightly, the meeting became torpid, the preacher dull, the audience sleepy. As less air was admitted, people began to leave the meeting, and at a given point a woman would faint. As soon as fresh air was admitted, all cheered up; with more air still, the speakers took courage, the hymns were stronger, and as the outer air poured in freely, we can readily believe that backsliders awoke to their sins, and conversions began. Of course, then, we must have fresh air. Of course, we must see and hear well, must have good seating, and warmth, and light, and with all this the ground plan of the church becomes important. There are ancient examples that might respond to most of these requirements. It has been well said of mediæval plans that "the typical Gothic church plan is an avenue; the typical Byzantine church plan is a central area. The one is arranged along an axis; the other is grouped around a point." These central-area plans are excellent examples for us. The church of St. Mark at Venice, for instance, is not far from possessing a good plan for a Congregational church; and there is not a spot on earth that bears more distinctly the mark of being holy ground. We cannot of course have the long, narrow-naved plans generally used in England, the "avenue plans" above referred to; nor are columns that intercept the view desirable, and light iron columns that seem too light for their work are worse than none. But a wide-naved church with wide transepts makes a fine audience-room and gives the "central area;" and galleries in the transepts, if desired, bring the audience very near the speaker, while a row of columns on the inside of the outside aisles may narrow the span, and add to the effect. Of our churches, All Souls in New York, the First Church in Boston, the Church of the Messiah in St. Louis, the church in Springfield, and many others, have more or less this type of ground plan, — a type that thus seems roughly accepted as the best to follow.

The really unsettled point in these plans is the position of the choir. In two of them it is beside the pulpit, in one behind it, and in the fourth in a side gallery. In short, there is no agreement as to the right spot. The minister must hold the eyes of his audience, but it is not elevating for the audience to watch four singers in the act. It is difficult not to observe that the soprano is attractive, or we constantly recall the appearance of the bass in "Pinafore." Neither congregational singing in a Congregational church, nor the singing of men and boys placed in the chancel of a ritualistic church seems out of place; but, for the half-way measure of a quartette or chorus, the best position is where the music can be given without the singers themselves attracting the attention of the audience, and this is, probably, over the entrance door.

After considering both the arrangement and the ground plan of the church, there remains, as to matters of design, only the style of its detail to consider. In a small church this may often be reduced to a minimum. Built of shingles or of cobble stones, its mass, and shape, and group will be better let alone than aided by detail. But a large building requires some detail, and some historical character must be given this detail. No single historical style is essential to the religious spirit. Examples of the most varied kinds can be cited, both ancient and modern, that have all the expression of religion, and yet are Latin basilicas, Byzantine churches, Mediæval and Renaissance cathedrals. Who can say that either St. Paul's in Rome, or St. Mark in Venice, Notre Dame or the Pantheon in Paris, Westminster, or Wren's buildings in London are not Christian churches? Yet how wide the difference in their styles! Details have to be used as words, expressions, and phrases are in writing; and they have the same history. Wren built St. Paul's in London, in the same Roman vein in which Milton wrote of Paradise, Chambers and Adam designed their elegant work as Addison wrote his essays. Our work is sure to be national; the needs and purposes of our buildings will make it so; but this language of detail will show its origin, and *should* be scholarly and harmonious, as much so as the phrases of the speaker in the pulpit. It can be American, as is the language of Whittier, of Bryant, of Lowell. This scholarship does not come to a designer by chance, any more than poetry finds fit expression through an illiterate man. You need for your architect a scholar, and a man of refinement, as you do for your minister. In such hands, the style employed has little to do with the character of the church, but the feeling and ability of the designer are everything. And when he has kept your church plain and simple, to be relieved at a few telling points by some lavish use of this detail we are talking of, by some bit of ornament, carving, color, or glass, do not cut this off. It is probably the centre that all else works up to. Remember it was Judas who said of Mary's costly offering of spikenard, "Why was not this ointment sold for three hundred pence, and given to the poor?" And it is added, "This he said, not that he cared for the poor."

A traveller through English country villages notes nothing more than the great number, the richness, and the beauty of the small parish churches. They form the central object of each village; and with their long and low lines, their ivy-covered towers and spires, backed by dark yew trees, and surrounded by their quiet church-yards, they are the most picturesque objects one sees. Their number is very great, and their fitness unequaled. The men that built these churches were *our* ancestors; and *our* history, poetry, and associations have been so built into them and grown around them that, when an Anglo-Saxon writes, speaks, or thinks of a *church* these buildings are in his mind. Whatever the grandeur of an Italian basilica, the richness of a lofty French parish church, none of them suggests to the Anglo-Saxon, simple piety, reverence, devotion, none seem holy places, so much as does an English village church.

Naturally, then, these buildings have much to suggest to us; and beyond anything perhaps, we notice the charming adaptation to their sites, their homely and simple beauty, their low and wide-spread mass, shooting up from the plains and meadows into lofty spires or buttressing the hillsides with sturdy towers. But, apart from matters of design, what we might well learn from English churches, ancient and modern, is the solidity of construction which has brought the former down to our day, and which will preserve those building now for a remote future. All the mediæval cathedrals and village churches were of masonry inside and out, and generally this masonry showed as brickwork or stone-work inside of the church as well as outside of it. Modern churches of this character are now built all over England, and I have noticed many mission churches, for instance, in the poor East End of London, as simple as they can be in brick and mortar, but well designed, of solid masonry inside and outside, and good without the aid of plasterer or painter for indefinite time. Even with cheap mission churches, a scheme worthy of imitation is to build a small portion of the church of masonry, and have the remainder of the cheapest and most temporary character. The stone part is a constant inducement to further work in the same way, and little is sacrificed by abandoning the cheap part.

Just a very few churches exist in our country with these lasting, permanent, beautiful, stone or brick interiors. They are beyond all comparisons the most church-like buildings we possess. But in general we build a stone church, and then, under the excuse that the climate requires it, we build practically a wooden one within it, and plaster on that wood, and paint the plaster with perishable colors in patterns which go out of fashion in a few years, and then the church is renewed in some new guise. If religious faith is a thing of the present, and so changeable that churches will in a few years be out of date, these temporary structures may be well enough; but, if we have anything worth going to church about, let us build solid churches to last. It is not a question of climate: it costs a little more to finish the walls inside with masonry, — with warm-hued stone, or with red or yellow brickwork, — but it is lasting and handsome; and when once thus finished, the church is beyond the reach of any hungry decorator.

I remember a Sunday passed in a town in the west of England. The ancient church with its lofty tower crowned a hill whose flanks were guarded by a great Edwardian castle. Its chimes rang merrily in the morning, audible far up the river valley. At church time, the mayor and council met in the market-house in their robes of office, and, preceded by the clerks bearing the maces, walked to the church and sat together in the state seats, with the maces set in the pew-end. The town seemed to come in a body to the service. It was evidently the proper thing to do. The anglers who were staying in the old inn went with us; the servant that waited on us in the old Jacobean coffee-room went too; and so did the landlord. The little surpliced choir boys threw their youthful spirits into the chants that rang in the stone vaults of the tower, and the congregation took up their part of the service as if they had as much to do with it as the clergyman. The latter gave us, it is true, a sermon unworthy of the surroundings and of his university gown; but we had been — in spite of dogma, doctrine, or creed, — *to church.*

Now I do not want to be other than an American, nor other than an American Unitarian. I did not agree at all with the clergyman in his prosy sermon. But I should have been glad to have had a hand in raising such a church with such a tower, — or rather, a church which in some small American town should have the influence which that church had there on that Sunday morning — an influence that brought a whole community to a common centre, to a *church,* filled with the atmosphere of devotion, and prayer, and praise.

TO CALCULATE THE WIND-PRESSURE.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,—Please publish how to calculate $P n$, when $P = 40$ lbs. as determined by Hutton's formula for wind-pressure $P n = P \sin a^{1.84 \sin a - 1}$, a being angle of roof. Which is the safer method of the two, this or Tredgold's recommendation of 40 lbs. per square foot of roof surface? Respectfully, M. S. STUDENT.

[THE problem is easily solved by the formula by finding the sine of a, and raising it, by the aid of a table of logarithms, to the power denoted by the exponent found by multiplying the sine of a, minus 1, by 1.84. This will give the value of n, and will represent the actual force of wind upon a roof inclined at a degrees with the horizon. Between this method of calculation and Tredgold's, which is founded on the unreasonable assumption that the wind blows downward as often as horizontally, we should choose the former; but neither is suited for practical use. The young architect who, on making his weekly visit to his first building, is suddenly seized with a misgiving as to the strength of a hip or valley rafter which looks unexpectedly slender in the frame, needs to be able to recalculate on the spot the strains to which it may be subjected, so that he can give orders for reinforcing it, if necessary, before he leaves the ground. It is very unlikely that he would have a table of logarithms in his pocket, still less one of sines, and without these, the formula alone would be absolutely worthless to him. He might, perhaps, guess at the value of a sine, but to raise a number with five or six places of decimals to a power denoted by an exponent with five or six more, without the help of the tables, would be out of the question, and he might as well seek information on the subject from a witch-hazel wand as from his formula without the key. This is a more serious matter than may at first appear. Left to simple guessing, for want of a method of solving his doubts which he can carry about in his head instead of his pocket, the nervous architect finds himself obliged either to leave the roof as it is, perhaps at great risk, or to order the timber strengthened, perhaps unnecessarily, and always at the cost of an extra bill, and of some humiliation on his own part. The best statement we know of, which presents the conditions of wind-pressure in a form which is easily remembered, is a short table, calculated from Hutton's formula, and giving the pressure per square foot on roofs of various inclinations, from five to sixty degrees. This is to be found in the first volume of Greene's series of books on graphical statics, as well as in one or two others, which may have copied it from him. The table is too long to quote in full, but it is worth remembering that the maximum wind-pressure, normal to the roof, may be taken without much error, at as many pounds to the square foot as there are degrees in the angle which the roof makes with the horizon; the maximum pressure for calculation being thus about twenty-six and one-half pounds per square foot for a "quarter-pitch" roof, sixty pounds for a Gothic roof of sixty degrees pitch, and so on. This gives rather too high pressures for steep roofs, but it is better than allowing forty pounds vertical wind-pressure on roofs of all sections, which is now nearly obsolete; and with a smooth board and a two-foot rule a diagram can be drawn in a few minutes, which will give the strain due to wind in a given timber with about as much accuracy as so uncertain a subject will allow of. Eds. American Architect.]

THE COMPOSITION OF HEMACITE.

Macon, Pa., November 5, 1884.

To the Editors of the American Architect: —

Dear Sirs, — What is the composition of hemacite? An answer, through your journal or otherwise, will oblige,

Yours truly, P. E. Dennis, Jr.

[The hemacite manufacturers naturally keep the composition of their product to themselves; but we have an idea gathered from the fact of its use for other purposes, that dried blood from the slaughter-houses, pressed in moulds, forms at least a part of it. — Eds. American Architect.]

PAINTING MARBLE.

Baltimore, November 7, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Can you tell us what is the preparation of paint now frequently used with successful results upon white marble mantels, etc., where it is desired to have color effect instead of the white surface? Also, if the same or any other preparation of the kind has been used and found durable upon *exterior* polished marble work.

Very truly yours, Wyatt & Sperry.

[We know of nothing better than common oil paint, which is often used for the purpose. Exterior marble-work we have never seen painted. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Long-Distance Telephoning.— The most remarkable piece of telephoning yet attempted has been just accomplished by the engineers of the International Bell Telephone Company, who successfully carried out an experiment by which they were enabled to hold a conversation between St. Petersburg and Bologæ, a distance of two thousand four hundred and sixty-five miles. Blake transmitting and Bell receiving instruments were used, and conversation was kept up, notwithstanding a rather high induction. The experiments were carried on during the night, when the telegraph lines were not at work. The Russian engineers of this company are so confident of further success that they hope shortly to be able to converse with ease at a distance of four thousand six hundred and sixty-five miles; but to accomplish this astonishing feat, they must combine all the conditions favorable for the transmission of telephonic sounds. If it is found possible to hold audible conversation at such extraordinary distances, it is possible that this fact will be speedily improved upon, and we shall be enabled to converse freely between London and New York, and by and by between London and the antipodes.— *Chamber's Journal.*

The New Paris Post-Office. — A building which has been for many years in the hands of the contractors will be opened for public use almost immediately. At a cost of over 9,000,000f. Paris has built a new post-office, and placed it on the site of the old one, erected in the year 1757. In the lapse of more than a century the French capital, like our own, has stretched westward, but still the Rue Jean Jacques Rousseau remains the centre of the great city on the Seine. The new building is simply an establishment on a very large scale for the reception, the sorting and the delivery of the correspondence of the French capital. In Rome the fresco-painter and the landscape gardener were called in to assist the labors of the architect, and the new post-office in the Via Convertiti is one of the most picturesque of modern buildings. In Paris business requirements alone were considered. Two improvements have, however, been adopted which might well be imitated on this side of the channel. A large room is set apart for the use of persons who desire to write letters. It is furnished with maps, guide books, dictionaries, and directories, and has a supply of pens, ink, and blotting-paper. An attendant supplies stationery at cost price, and there is a small charge of a penny or two pence for the use of the room. In another wing of the building a passage is fitted with letter-boxes hired out at an annual rent to merchants and business men. These boxes have doors in front and doors behind. The keys of the latter are with the post-office authorities, and as soon as the mails come in letters are put into their respective boxes, while the clerks outside bring them to their masters without the delay of a general delivery. This system, now about to be introduced into the capital, has for some years been in use in large towns in France and Switzerland. It is general in the United States. — *London Daily News.*

Cures for Dry-Rot.— Manufacturers suffering from dry-rot in their warehouses and stores will do well to note the following results obtained by Prof. Sorokin of Kasan, and communicated by him to a Russian contemporary. The chief agent in effecting the dry destruction of wood is the parasite, *merulius lacrimans*, which has a special fondness for places in which textile fabrics are stored in large quantities. Prof. Sorokin, in experimenting with a view to a convenient means of removing the parasite in question, has come to the following conclusions: (1) A thorough draught will destroy the parasite within twenty-four hours. (2) If the action of draught be assisted by that of sunlight, a few hours will often suffice to put a stop to further damage. (3) A concentrated solution of common salt is very efficacious, and the stronger it is used the more rapid its action. (4) The action of a concentrated solution of cupric sulphate (blue stone, blue vitriol) is still more energetic and complete than that of common salt. (5) Crude carbolic acid is rapid in its action, and cheap but inconvenient to use. (6) The best, cheapest and most convenient material to employ is the tar obtained when birch wood is distilled for acetic acid. Its mode of application is simplicity itself,— the under surfaces of the flooring are painted with it; and it has turned out to be the best and most practical remedy against this very injurious parasite. — *Manufacturer's Gazette.*

Limousin Enamel.— The Renaissance enamels, of Limoges in general, and of Leonard Limousin in particular, must, although during many generations they suffered under a curious depreciation in price, continue to be precious and eagerly sought for, for the simple reason that "*grandes pièces*" of this wonderfully beautiful ware are exceedingly scarce, and that it was precisely in 1555 that his rare talent had reached its acme. Enamelling is one of the oldest arts in the world; but that which may be termed painter's enamel, or enamels executed on a single surface, instead of incised surfaces, is a distinct outcome of the Renaissance, and was provoked by the desire to possess imperishable reproductions, for decorative purposes, of the great works of art which had been painted in Italy by Leonardo da Vinci, by Raffaelle and their successors. The movement began in the first years of the sixteenth century. Among the first promoters of the new process was a glass painter of Limoges named Nardon Penicaud, one of whose masterpieces, executed for the poet King René of Vandemont and Lorraine, and dated 1503, is now in the Cluny Museum at Paris. In 1532, Francis I of France, who, with all his faults, was as magnificent a patron of the arts as our Charles I was afterward, caused to be established a manufacture of enamels at Limoges, the direction of which he intrusted to Leonard, called "Le Limousin," or "Limousin." This artist, by express directions from his royal master, procured from Italy accurate copies of the best works of Raffaelle, Giulio Romano and Pinnaticcio, and he also had recourse to the great draughtsman and sculptor of the French Renaissance, Jean Cousin. The earlier works of Le Limousin had been mediæval and almost Byzantine in style; but the contemplation of the Renaissance models sent him from Italy led him to imitate the purer and more correct forms of revived Greek art. His mode of treatment was essentially his own. The general effect of his work was brilliant, light and harmonious, relieved and cheered by bright sky, blue tints, and turquois blue sparkling on a shining ground. He was especially distinguished by a bright yellow which he introduced into the hair of his personages, and by pink and limpid flesh tints, which added to the feeling of delighted surprise excited by his enamels, the effect of which has been compared to the chameleon-like brilliancy of shot satin. No one knew so well as he how to make touches of gold with which to brighten the effect of his medallions on a black ground. During his years of active life his productiveness was astonishing; but his later enamels, which come down to 1574, show the marks of an aged and failing hand. Yet, notwithstanding the multitude of dishes, vases, ewers, goblets, portraits and plaques in grissaile, cups and bowls signed by his well-known monogram of "L. L.," sometimes accompanied by a fleur-de-lis, the more important pieces of the "Limousin" soon grew rare. Many of his works have mysteriously disappeared. A large proportion of these vanished enamels were, in all probability, melted down during the stormy days of the first revolution in France, the perpetrators of the acts of vandalism being under the impression that the enamels were painted on gold or silver plate, whereas, in the great majority of instances, a substratum of copper was the material used. A very singular fate overtook no fewer than a score of enamels on which he had most assiduously labored. Francis I, being desirous of decorating the saloons of his newly erected Chtâeau de Madrid, in the Bois de Boulogne, with the most splendid specimens procurable of Limoges enamels, commissioned Limousin to paint twenty pictures of the extraordinary dimensions of five feet in length by four feet in height, illustrative of the heathen mythology. Twenty years were spent by the master enamelist of Limoges and his pupils in execution of these pictures; but Francis died in 1574, and not one of the twenty enamelled pictures was ever delivered. They remained in the possession of the heirs of Leonard de Lemousin until the outbreak of the Revolution, a period of more than two hundred years; and a French critic, writing in 1810, stated that the twenty enamels of extraordinary dimensions were purchased in 1803 by a Milor Anglais, who sent them to England. Where are they, and how many guineas apiece would they bring, were they put up at public auction? — *London Telegraph.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

307,778. FAUCET. — William A. Leggo, New York, N. Y.
307,783. PULL FOR SLIDING-DOORS.—Thomas Lincoln, Newark, N. J.
307,787. COMBINATION TRY AND BEVEL SQUARE. —Horace W. Merrill, Lynn, Mass.
307,794. PORTABLE VENTILATOR. — Theodore C. Perry, Chicago, Ill.
307,795 FLOORING-CLAMP. — Theodore A. Perry, Plymouth, N. C.
307,805. SASH-FASTENER. —Albert G. Safford, Boston, Mass.
307,830. PIPE-WRENCH. — Alfred Barbour, Tarentum, Pa.
307,848. TOOL FOR MAKING LOCK-MORTISES.—Simeon W. Drowne and Daniel K. Hubbard, Norwich, Conn.
307,852. RANGE-BOILER.—Henry P. Folsom, Brooklyn, N. Y.
307,860. DOUBLE-HAMMER BELL.—Frank O. Landgrane, San Francisco, Cal.
307,865. MACHINE FOR RABBETING, GROOVING OR MOULDING STONE. — Alexander McDonald, Cambridge, Mass.
307,889. FIRE-ESCAPE. — Daniel Wilkins, Chicago, Ill.
307,893. METALLIC LATH. — John W. Wissinger, San Francisco, Cal.
307,907. HOT-AIR FURNACE. — Nathaniel A. Boynton, New York, N. Y.
307,927. WEATHER - BOARD GUAGE. — William J. Dyer and Thos. W. Maxey, Nevada, Mo.
307,941. FIRE-ESCAPE.— George H. Herrington and Martin Heller, Wichita, Kans.
307,951. AUTOMATIC SIPHON. — James P. Hyde, New York, N. Y.
307,980. FREIGHT-ELEVATOR.— Charles B. Paxton, Vicksburg, Miss.
307,981. TROWEL. — Henry A. Peace, Brooklyn, N. Y.
307,985. SAFETY-ATTACHMENT FOR ELEVATORS.— John D. Phyfe, Demarest, and James J. Harold, Tenafly, N. J.
307,998. HYDRAULIC ELEVATOR.—Jonathan Smith, Toledo, O.
308,005. SCAFFOLD - CLAMP. — Henry Steinebrei, Brooklyn, N. Y.
308,010. ELEVATOR - ATTACHMENT. — George W. Thomas, Baltimore, Md.
308,037. CLAMP FOR SAW-HANDLES.—Andrew McNiece, Newark, N. J.
308,039. STEAM - HEATER. — John F. Pease, Syracuse, N. Y.
308,040. DRAWING-BOARD AND T-SQUARE. — Clifford H. Prescott, Lawrence, Mass.
308,041. MORTISE - LATCH. — William G. Richards, Providence, R. I.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report eighteen permits have been granted, the more important of which are the following: —

F. Fitzgerald, three-st'y brick building w s Fremont St., between Saratoga St. and Haming Lane.

Becker Bros., one-st'y brick building, 48' x 180', e s Washington St., between Chase and Biddle Sts.

Edw. M. Tracy, three-st'y brick building and two-st'y brick stable, n w cor. Aisquith and Hoffman Sts.

The Evangelical Church, brick church, n s Preston St., w of Ensor St.

Walter W. Watts, 4 three-st'y brick buildings, e s Argyle Ave., s of Cook St.

Geo. W. Donohue, 12 two-st'y brick buildings e s Wolfe St., between Monument and McElderry Sts.

S. R. Robinson, 11 two-st'y and basement brick buildings, n e Wilhelm St., w of Fulton Ave.

Chas. Mickelman, 7 two st'y brick buildings, w s Holbrook St., n of Preston St.

Boston.

BUILDING PERMITS. — *Seaver St., No.* 266, Ward 21, for Mary E. Parker, wood stable, 30' x 42', pitch; Wilson Bros., builders.

East Fifth St., No. 699, Ward 14, for W. G. Doe, wood stable, 43' x 48', flat; Thos. Rayner, builder.

Prospect St., No. 23, Ward 24, for J. J. Lucas, wood dwell., 22' x 28', pitch.

West First St., No. 394, Ward 14, for I. H. Graves, wood stable, 32' x 44', pitch; Robinson & Hatch, builders.

Unnamed St., near Boston St., Ward 20, for S. B. Pierce, 3 wood dwells., 25' x 29', pitch; W. J. Jobling, builder.

Tremont St., No. 1610, Ward 22, for Kate McKenna, wood dwell. and store, 24' x 38', flat; A. McDonald, builder.

Zeigler St., No. 45, Ward 20, for F. A. Brooks, wood mechanical building, 27' x 40', flat; W. Hayford, builder.

Whitney St., Ward 22, for Wm. Casey, wood dwell. and store; 25' x 36', pitch; E. J. Tully, builder.

Dorchester Ave., s of Greenwich Pl., Ward 24, for M. & P. Finnegan, 2 wood dwells. and stores, 25' x 32', flat; Jno. Bass, builder.

Rockland Ave., No. 16, Ward 21, for Mary J. Wetmore, wood dwell., 31' 3" x 32', flat; C. H. Wetmore, builder.

Heath Pl., near Heath St., Ward 22, for James Byrne, wood dwell., 20' x 28', pitch.

Ashford St., cor. Malvern St., Ward 23, for W. J. Conneroy, wood dwell., 14' x 16' and 24' x 26', pitch; W. J. Conneroy, builder.

Danforth St., near Wyman St., Ward 23, for Hammerle, 2 wood dwells., 20' x 35', flat; Jos. Hammerle, builder.

Linden Ave., near Vernon St., Ward 19, for Jas. Woodward, wood dwell., 18' x 28', flat; C. L. Monroe, builder.

Chestnut Hill Ave., opp. Englewood Ave., Ward 25, for Wm. White, 2 wood dwells., 14' x 14', and 22' x 32', pitch.

West Chester Park, Nos. 180, 182, 184, 186, *and* 188, Ward 18, for S. Stubbs, 5 brick dwells., 19' x 42', mansard; Sam'l Stubbs, builder.

Rodney St., No. 81, Ward 19, for A. Blume, brick apartment-house, 36' x 59', flat.

Newbury St., Nos. 222-226, Ward 11, for J. W. Shapleigh, 2 brick dwells., 23' x 57', mansard; A. Varien, builder.

Newbury St., Nos. 295-297, Ward 11, for W. N. Coffin, 2 brick dwells., 22' x 44', mansard; A. Varien, builder.

Brooklyn.

BUILDING PERMITS. — *Lafayette Ave.*, n s, 225' e Lewis Ave., two-st'y brick dwell., tin roof, wooden cornice; cost, $4,250; owner, The. Steenworth, 615 Van Buren St.; builder, John McDicken.

McDonough St., s s, 325' w Reid Ave., four-st'y frame tenement, felt, cement and gravel roof, wooden cornice; cost, $10,000; owner, Chas. Robins, 184 Macon St.; architect, Amzi Hill.

Spencer St., e s, 325' s Flushing Ave., three-st'y frame tenement, tin roof; cost, $3,500; owner, James F. Kirnon, 33 Spencer St.; builders, P. Sheridan and K. G. Knorr.

Baltic St., n s, 350' e Smith St., 2 three-st'y brick tenements, tin roofs; cost, each, $5,000; owner, Mary E. Lynch, Brooklyn; architect, I. D. Reynolds; builder, John McLean.

Macon St., s s, 200' e Tompkins Ave., 5 two-st'y brown-stone dwells., gravel roofs, wooden cornices; cost, each, $4,500; owner, Emma L. Turner, 924 Gates Ave.; builder, Albert Wilkinson.

Butler St., n s, 56' e Court St., four-st'y brick tenement, tin roof, wooden cornice; cost, $5,750; owner, M. Toomey, Twenty-eighth St., New York; architect and carpenter, Maurice Freeman's Son; mason, John J. Gallagher.

Court St., e s, 33' n Third Pl., four-st'y brick store and flat, tin roof, wooden cornice; cost, $9,500; owner, Wm. H. Middendorf, 427 Court St.; architect, John W. Bailey; builders, John Rolfe and Wm. C. Anderson.

Butler St., n s, 92' e Court St., four-st'y brick tenement, tin roof, wooden cornice; cost, $5,625; owner, M. Toomey, Twenty-eighth St., New York; architect and carpenter, Maurice Freeman's Son; mason, John J. Gallagher.

Willoughby Ave., s e cor. Grand Ave., 2 four-st'y brown-stone store and flats, felt, cement and gravel roofs; cost, $9,500 and $11,000; owner, Thos. H. Robbins, Keyport, N. J.; architect, Amzi Hill; builder, E. K. Robbins.

Decatur St., s s, 205' w Lewis Ave., two-st'y brown-stone dwell., tin roof, wooden cornice; cost, $4,500; owner, etc., E. J. Granger, 123 McDonough St.

Central Ave., No. 138, w s, 52' n Myrtle St., three-st'y frame tenement, tin roof; cost, $4,000; owners, Leopold Michael and Wm. Bayer, Ewen St., cor. Meserole St.; architect, Th. Engelhard; builder, Wm. Bayer.

Madison St., n s, 225' e Reid Ave., 4 two-st'y brick dwells., tin roofs, wooden cornices; cost, each, $4,000; owner, G. De Revere, 663 Greene Ave.; architect, Amzi Hill.

Herkimer St., s s, 70' w Fellows Pl., 2 four-st'y frame tenements, tin roofs, wooden cornices; cost, each, $3,800; owner, etc., C. P. Skelton, 1895 Atlantic Ave.

Louis Pl., w s, 144' s Herkimer St., 3 three-st'y brick tenements, tin roofs, iron cornices; cost, each, $5,500; owner, K. J. Peter, 2136 Atlantic Ave.; architect, H. Thiele; builder, Frank Metzler.

Clymer St., No. 139, n s, 160' e Bedford Ave., two-st'y brick carriage-repository, gravel roof, brick and slate cornice; cost, $3,700; owners, Douglass & Peterkin, 165 Clymer St.; builder, T. Rasson.

Wyckoff St., No. 173, three-st'y brick tenement, tin roof; cost, $5,000; owner, John Rayney, on premises; architect, I. D. Reynolds; builder, O. Nolan.

Decatur St., s s, 100' e Reid Ave., 3 two-and-a-half-st'y brick dwells., tin roofs; cost, each, $4,200; owner, William Siminson, 307 Reid Ave.; superintendent, John Dhuy.

Chicago.

BUILDING PERMITS. — H. Rohn, 2 three-st'y stores and dwells., 588-590 Blue Island Ave.; cost, $12,000; architect, C. O. Hansen.

Greg. Vigeant, 2 three-st'y dwells., 70-72 Bellevue Pl.; cost, $15,000; architect, G. Vigeant.

F. S. Butler, two-st'y dwell., 708 West Jackson St.; cost, $4,500; builder, Wm. Kerr.

John King, two-st'y dwell., 384 West Huron St.; cost, $5,000.

Thos. Christopher, two-st'y dwell., 3800 Emerald Ave.; cost, $4,000; architect, Van Pelt.

T. Theis, two-st'y store and dwell., 173 Johnson St.; cost, $3,500; architect, P. W. Ruehl.

T. B. Little, two-and-one-half-st'y cottages, Whipple St.; cost, $3,600; builder, E. Weirson.

H. Volmer, 3 three-st'y dwells., 740-742 West Adams St.; cost, $15,000; architect, A. Smith.

D. S. Smith, three-st'y addition, 341-345 Wabash Ave.; cost, $8,000; builder, C. Busby.

D. S. Smith, two-st'y addition, rear 341-345 Wabash Ave.; cost, $3,000; builder, C. Busby.

Mrs. Smith, 2 two-st'y dwells., 3254-3258 Groveland Ave.; cost, $6,000; architect, T. C. Chandler.

J. Wallers, two-st'y dwell., 308 West Taylor St.; cost, $5,000; architects, Furst & Rudolph.

W. J. Anderson, 8 cottages, 182-200 Colorado St.; cost, $11,000; builder, W. J. Anderson.

W. Hammer & Miller, two-st'y dwell., 434 Lasalle Ave.; cost, $7,000; architect, T. Karls; builders, Muller & Scheel.

J. W. Reedy, one-st'y foundry, 126-128 Indiana St.; cost, $6,000; architect, F. Wascher.

J. E. Hochbaum, three-st'y store and dwell., 406 Division St.; cost, $8,000; architects, Fromann & Gebsen.

E. Ewert, two-st'y dwell., 3815 Dearborn St.; cost, $4,000.

S. G. R. Bishop, three-st'y store and flats, Van Buren St.; cost, $7,500; builder, A. Ely.

W. R. Ryan, two-st'y dwell., 419 West Jackson St.; cost, $3,500; architect, W. G. Williamson.

J. W. Carpenter, three-st'y store and dwell., 759-769 West Van Buren St.; cost, $25,000; architects, Burnham & Root.

A. Gattemann, two-st'y dwell., 310 North Paulina St.; cost, $2,600.

S. E. Gross, 4 cottages, Colorado Ave.; cost, $7,-200.

S. E. Gross, 8 cottages, Colorado Ave.; cost, $14,-400.

S. E. Gross, 10 cottages, Gross Terrace; cost, $18,-000.

J. Kempscheld, two-st'y dwell. and stores, 350 Webster Ave.; cost, $2,600.

Mrs. S. Webb, two-st'y dwell., 280 Leavitt St.; cost, $2,500.

J. Hervey, two-st'y dwell., 2953 Michigan Ave.; cost, $10,000; architects, Treat & Folz.

H. Piper, three-st'y dwell., 202 Burling St.; cost, $8,000; architect, T. Karls.

Mrs. U. Clark, 2 two-st'y dwells., 3817-3819 Ellis Ave.; cost, $10,000; builders, Fowler & Carr.

M. Van Nostrand, two-st'y dwell., 3516 Prairie Ave.; cost, $3,000; builder, A. McIntosh.

Benes & Nemecek, 2 three-st'y dwells., 80-82 Johnson St.; cost, $7,000; builders, Benes & Sayer.

The Board of Education, three-st'y school-house, 194-200 Johnson St.; cost, $31,000; architect, J. J. Flanders.

P. H. Ruker, two-st'y flats, 146 Curtis St.; cost, $2,500.

Wm. Weinert, two-st'y dwell., 697 Ashland Ave.; cost, $4,500.

W. R. Thompson, two-st'y dwell., 238 California Ave.; cost, $4,000.

Riverdale Distilling Co., three-st'y warehouse, 264-266 Kinzie St.; cost, $2,500.

J. Morrhaler, two-st'y dwell., 1055 North Clark St.; cost, $6,000; architect, A. Bess.

E. C. Harmon, three-st'y flats, 3243 Prairie Ave.; cost, $5,000; architect, Thomas & Rogers; builder, J. S. Price.

Philadelphia.

BUILDING PERMITS. — *Adams St.*, between Cedar and Gaul Sts., brick shed, 38' x 260'; Hero Glass Co., owners.

Twenty-eighth St., s e cor. Highland St., three-st'y dwell., 34' x 36'; Toureson Bros., contractors.

North Fifteenth St., between Venango St. and Erie Ave., two-st'y dwell., 16' x 40'; Joseph Hartland, owner.

Wishart St., w s, bet. Frankford Road and Emerald St., 6 two-st'y buildings, 14' x 49'; A. T. Richards, owner, 1512 Oliver St.

Federal St., w of Twelfth, three-st'y dwell., 17' x 49' 6"; J. C. Haldeman, owner.

Columbia Ave., s s, w of Broad St., three-st'y dwell. and smith-shop, 20' x 77'; Jacob R. Garber, contractor.

Laurel St., s s, between Front and Second Sts., addition to ice-house, 18' x 38'; Chas. C. Carmen, contractor.

Germantown Ave., between Chestnut and Sunset Aves., church, 41' x 60'; Jacob While, contractor.

Thirteenth St., w s, between Washington and Ellsworth Sts., four-st'y stone house, 31' x 44'; Rea & Riley, contractors.

Orkney St., n of York St., 7 two-st'y dwells., 13' 3" x 39'; John Sheeler, owner, 307 Thorp St.

Ella St., between Amber and Coral St., three-st'y dwell., 16' x 30'; Robert Beatty, contractor, 413 East York St.

Marshall St., No. 2304, two-st'y dwell., 16' x 44'; Jos. P. Gerkes, owner.

Frankford Road, No. 1754, two-st'y stable, 18' x 30'; Jas. Macauley & Sons, contractors.

Jas. H. Windrim, architect, is preparing plans for a six-st'y building, at s w cor. of Eleventh and Market Sts., 160' x 180', for the Trustees of the Girard Estate.

New York.

ARMORIES.—The plans of Mr. Jas. E. Ware have been accepted for the Armory of the Twelfth Regiment by the Armory Commission, the building will have a frontage of 325' on Sixty-second St.; 200' on Ninth Ave.; and 175' on Sixty-first St.; the cost will be about $300,000.

For the Eighth and Twenty-second Regiment Armories, five architects are competing on each building.

CHURCH.—For St. Lawrence Roman Catholic Church a new edifice is to be erected on the s w corner of Fourth Ave. and Eighty-fourth St.; from designs of Mr. Wm. Schickel.

COLLEGE. — The plans for the College of Physicians and Surgeons previously reported as to be erected on Tenth Ave., bet. Fifty-ninth and Sixtieth Sts., are being drawn by Mr. W. Wheeler Smith.

MARKET-HOUSE. — On the open Gansevoort St. Market, an enclosed building is to be erected for the city; from plans of Mr. Douglass Smyth.

BUILDING PERMITS.—*Third Ave.*, w s, 390' s One Hundred and Seventieth St., one-st'y frame stable gravel roof; cost, $3,000; owner, Harlem Bridge, Morrisania & Fordham R. R. Co., Henry Spratley, president, Third Ave. and One Hundred and Sixty-ninth St.; architect, W. W. Gardiner.

East Seventeenth St., No. 604, rear, three-st'y brick office, tool-house and dwell., tin roof; cost, $2,500; owner, John Blaurock, on premises; architect, Fred. Jenth; builder, Joseph Hauser.

One Hundred and Twenty-eighth St., n s, 150′ e Lexington Ave., six-st'y brick factory, tin roof; cost, $30,000; owner, J. J. Nestell, exr., 152 Broadway; architects, A. B. Ogden & Son.

Forty-eighth St., s s, 300′ w Tenth Ave., five-st'y brick factory, tin roof; cost, $30,000; owner, Chas. Lesinsky, 13 East Eighty-third St.; architects, Berger & Baylies; builder, Gustav Staiger.

East Seventy-fifth St., No. 421, five-st'y brick tenement, tin roof; cost, $18,500; owner, Eva Mueller, 416 East Seventy-sixth St.; architect, John Brandt.

Broadway to Seventh Ave., 80′ s Fifty-third St., one st'y brick building (skating-rink), tin roof; cost, $16,000; lessee, Fred. R. Fortmeyer, 495 West Twenty-second St.

Second Ave., e s, Seventy-sixth to Seventy-seventh St., 8 five-st'y brown-stone front tenements and stores, tin roofs; cost, two, each, $22,000; six, each, $11,000; owners, Higgins & Keating, 300½ East Seventy-ninth St.; architects, A. B. Ogden & Son.

Seventy-sixth St., n s, 88′ e Second Ave., five-st'y brown-stone front tenement, tin roof; cost, $22,900, owners and architects, same as last.

Seventy-seventh St., s s, 88′ e Second Ave., five st'y brown-stone front tenement, tin roof; cost, $18,000; owners and architects, same as last.

Oak St., No. 47, four-st'y brick tenement, tin roof; cost, $12,000; owner, Sarah Welsh, 53 Oak St.; architect, Emile Gruwe.

Fifty-sixth St., n s, 150′ e Eleventh Ave., three-st'y brick storage building, tin roof; cost, $ —— ; owners, A. H. Hart Co., John Hinde, president, 418 West Seventy-ninth St.; architect, A. Spence, builder, John Van Dolsen.

One Hundred and Eighteenth St., s s, 90′ e Fourth Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $20,000; owner, Henry Chenoweth, Ninety-second St.. architect, John C. Burne.

Seventy-eighth St., s s, 250′ w First Ave., five-st'y brown-stone front flat; owner, James Carroll, 1489 First Ave.; architect, John F. Wilson; done by day's work.

Sheriff St., Nos. 63 *and* 65, 2 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner and architect, Anthony A. Hughes, 2063 Fifth Ave.

Old Slip, bet. Front and Water Sts., two st'y and attic brick and stone building (for Hook and Ladder Co.), slate roof; owner, City New York Fire Dept. 155 Mercer St.; architects, N. Le Brun & Son.

Alterations.—*Duane St., No.* 176, repair damage by fire; cost, $5,000; owner, Lorillard Estate, J. M. Jackson, agent, 3 Mercer St.; builders, John Porter and H. M. Berry.

Broadway, Nos. 616 *and* 618, repair damage by fire; cost, $3,400; owner, Mutual Real Estate Co., Julius Levy, treasurer, 472 Broadway; builder, Henry Wallace.

Fifth Ave., No. 499, one-st'y brick extension, rebuild front wall, tin roof; also internal alterations; cost, $15,000; owner, Alex. A. Hume, 148 East Ninety-second St.; architect, Wm. H. Hume; builder, not decided.

West Seventy-third St., No. 473, internal alterations; cost, $6,500; owner, Dr. Charles F. Hoffman, 652 West Fifty-third St.; architect, John B. Snook.

St. Louis.

Building Permits.—Forty-seven permits have been issued since our last report, thirteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

St. Louis Cable R. R. Co., two-st'y brick stable; cost, $20,000; sub-let.

Henry Shaw, two-st'y store; cost, $3,000; Barnett & Son, architects; sub-let.

G. G. Williams, double three-st'y dwell.; cost, $8,-200; Barnett & Son, architects; F. O. Brechner, contractor.

St. Agatha Church, one-st'y brick church; cost, $27,000; A. Druiding, architect; Joo Stander, contractor.

Fred. Reitz, two-st'y store and rooms; cost, $2,-900; J. C. Brockmeyer, contractor.

Mrs. M. Reed, two-st'y dwell.; cost, $2,500; W. A. Reid, contractor.

Thos. Sparks, two-st'y dwell.; cost, $3,800; Goesse & Remmers, contractors.

H. F. Schrader, 3 adjacent two-st'y tenements; cost, $4,500; H. F. Schrader, contractor.

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Ferdinand Meyer, double two st'y brick dwell.; cost, $6,500; T. Mueller, contractor.

Ferdinand Meyer, double two-st'y brick dwell.; cost, $6,500; T. Mueller, contractor.

Henry Hoormann, two-st'y brick dwell.; cost, $3,-000; L. Stecker, contractor.

Jno. E. Shorb, three st'y store and dwell.; cost, $4,000; A. E. Cook, contractor.

Henry Pettker, two-st'y tenement-house; cost, $4,-800; A. Beinke & Co., architects; H. Schilte, contractor.

Robt. B. Brown Oil Co., two-st'y brick stable; cost, $2,500; W. Merrill, contractor.

Phil Rieckers, two-st'y tenement; cost, $2,500; C. F. May, architect; P. Richers, contractor.

H. Hasen Kamp, two-st'y tenement; cost, $2,800; C. F. May, architect; P. Rickers, contractors.

Schultz, one-st'y dwell.; cost, $2,800; C. F. May, architect; P. Richers, contractor.

Dr. C. Ludwig, two-st'y business house; cost, $5,-000; N. H. Melcher, architect; sub-let.

Toledo.

Building Permits.— *Twenty-third St.*, cor. Madison St., brick dwell., for Mr. H. S. Walbridge. The contractor for enclosing only, E. Fruend; cost of this portion about $4,500; N. B. Bacon, architect.

Raymond St., frame dwell., for R. J. Wheeler; cost, $4,000; Brown & Symington, contractors; N. B. Bacon, architect.

Woodruff Ave., frame dwell., for Mrs. L. C. Reed; cost about $2,600; Richard Hattersley, contractor; N. B. Bacon, architect.

Woodruff St., cor. Parkwood Ave., frame dwell. for Mr. Jas. L. Rodgers; cost, about $7,500; J. Alexander, architect; Jno. W. Lee, builder.

Ontario St., cor. Jefferson St., engine-house, City of Toledo; cost, about $11,500; Carl Schumhi, builder; N. B. Bacon, architect.

Prescott St., cor. Parkwood Ave., frame dwell., F. H. Hoag; cost, about $6,500; J. H. Tappan, builder; N. B. Bacon, architect.

Parkwood Ave., brick dwell., E. W. Baumgardner; cost, about $7,000; Jas. B. Hassett, builder; N. B. Bacon, architect.

Superior St., cor. Oak St., three-st'y brick manufacturing building, 100′ x 110′, for D. R. Locke ("Nasby"); cost, about $20,000; Geo. E. Whipple & Co., builders; N. B. Bacon, architect.

General Notes.

Catonsville, Md.—W. T. Wilson, Esq., is to have erected a two-st'y and attic stone and frame dwell., 48′ x 64′, to cost $9,000, from designs by J. A. & W. T. Wilson, architects, Baltimore.

Kansas City, Mo.—A. R. Hardesty, repairing building on Lot 87, Swope's addition; cost, $2,500.

E. S. Young, wooden residence on Lot 3, Block J, Ransom & Talley's addition; cost, $3,000.

W. G. Thomas, brick residence, at Lot 22, Block 3, Merriam Pl.; cost, $2,500.

Minneapolis, Minn.—J. W. Clark, one-st'y addition to roller-rink, cor. Tenth Ave. and North First St.; cost, $20,000.

L. L. Chadwick, two-st'y frame dwell. and barn, n e cor. Third Ave. and Thirty-second St.; cost, $2,000.

John Carlson, two-st'y frame dwell., e s Fifth St., between South Twenty-fifth and South Twenty-sixth Aves.; cost, $2,000.

John Stene, double two-st'y brick stores and flats, cor. Cedar and Riverside Aves.; cost, $4,000.

C. F. Stafford, 8 two-and-one-half-st'y dwells., n w cor. Vine Pl. and South Fourteenth St.; cost, $16,000.

St. Paul, Minn.—Lauer Bros., one-st'y mill-building, Chestnut St., between Levee and Washington Sts., cost, $6,000.

Charles W. Hartman, two-st'y frame dwell., between Plum and Maple Sts.; cost, $2,450.

John M. Carlson, two-st'y brick-veneer double tenement, s s of Irvine Park drive, Lot 7, Block 35; cost, $5,000.

H. C. Peterson, roller-skating rink, n e cor. Oak Lake St. and North Sixth Ave.; cost, $9,000.

W. H. Carey, two-st'y frame double dwell., e s of Arundel St., between Dayton and Marshall Sts.; cost, $3,600.

Stony Point, N. Y.—The Knapp Homestead is to be enlarged, and important alterations made from designs of Messrs. C. W. Romeyn & Co., of New York, for the owner, Mr. W. K. Hammond.

COMPETITION.

AMERICAN ARCHITECT COMPETITIONS.—NEW SERIES.

As the busy season for this year has nearly passed, the younger men who have in past years evinced an active interest in the little competitions we have held from time to time, may be ready to test once more their skill in design in competition with their fellows. Therefore we take pleasure in inviting their attention to the following

PROGRAMME.

Most people who live in the country, or in the suburbs of a large town, and have sufficient means, usually feel obliged to "set up their carriage," and of course a carriage implies horses, and a building in which the entire establishment can be housed. Therefore we propose as the subject of the present competition a barn such as the dweller in a house that has cost $5,000 would consider an appropriate adjunct of his establishment; but as this may be somewhat ambiguous, seeing that some men think more of their horses than they do of their families, we will say that the proprieties would be best observed if the cost of the barn should range between $1,000 and $1,500.

The barn must furnish accommodation for two horses and a cow; the carriage-room must be large enough for two wheeled vehicles and a sleigh; and proper provision must be made for harness, feed and hay, and the stableman must not be overlooked. Water and ventilation must also be kept in mind.

Required:—A perspective drawing of the barn, elevations of the sides not shown in the perspective, a plan or plans, and a reasonable amount of detail; all to be included on a single sheet, 21″ x 33″ within the framing lines. A short description and the result of a *bona fide* estimate must also be furnished. For the best three designs we will pay equal prizes of thirty dollars each.

Conditions: — Drawings must be received at the office of the *American Architect*, on or before Saturday, December 20, 1884.

The three prize drawings are to remain the property of the publishers.

All designs submitted are subject to publication in the *American Architect* at the pleasure of the editors.

All designs must be sent in signed only by a motto —*not a graphic symbol*—the name and address of the author being sent enclosed in a sealed envelope, endorsed with a duplicate motto.

The jury of award will be composed of three architects.

PROPOSALS.

STEAM-HEATING APPARATUS.
[At Memphis, Tenn.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 17, 1884.

Sealed proposals will be received at this office until **2 p. m., on the 8th day of December, 1884,** for supplying and putting in place complete in the Marine Hospital building at Memphis, Tenn., a low pressure return circulation steam-heating apparatus, in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
466 Supervising Architect.

POROUS TERRA-COTTA TILE FOR ROOFS.
[At Buffalo, N. Y., and Toledo, O.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 7, 1884.

Sealed proposals will be received at this office, **until 2 p. m., on the 22d day of November, 1884,** for furnishing the porous terra-cotta tiles for the roof of the custom-house, etc., buildings at Buffalo, N. Y., and Toledo, O., estimated as follows: —

4,500 superficial feet at Buffalo, N. Y. 13,000 superficial feet at Toledo, O., in accordance with drawing and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent at each building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. H. G. JACOBS,
465 Acting Supervising Architect.

IRONWORK.
[Near Charleston, W. Va.]

U. S. Engineer Office, 378 St. Paul St.,
Baltimore, Md., October 30, 1884.

Proposals for ironwork in the foundations of a movable dam, at Lock No. 6, on the Great Kanawha River, W. Va., about four miles below Charleston, will be received at the U. S. Engineer Office, Charleston, Kanawha County, W. Va. **until noon of December 2, 1884,** and opened immediately thereafter.

Blank forms, specifications, and any desired information can be had upon application to Mr. A. M. Scott, Assistant Engineer at that office.

WM. P. CRAIGHILL,
465 Lt.-Col. of Eng'rs, U.S. Army.

TIMBER, BOLTS AND STONE.
[Near Pt. Pleasant, W. Va.]

United States Engineer Office,
Cincinnati, O., October 23, 1884.

Setled proposals in duplicate, will be received at this office **until noon** (local time) **on Monday, the 8th day of December, 1884,** for furnishing material and building two ice piers in the Great Kanawha River near Point Pleasant, West Va.

Approximate quantities of material required: —
204,472 feet B. M., oak timber.
9,536 lbs. iron drift bolts.
2,486 cubic yards rip-rap stone.

Specifications and blank forms for proposals will be furnished on application to this office. Letters asking specifications should be marked "Official Business" on the envelope. WM. E. MERRILL,
466 Lt.-Col. of Engineers.

TIMBER.
[At Chicago, Ill.]

United States Engineer Office,
25 Honore Building,
Chicago, Ill., November 8, 1884.

Sealed proposals in triplicate, will be received at this office, **until 12 o'clock, noon, Tuesday, December 9, 1884,** for furnishing pine and hemlock timber for breakwater construction at Chicago, Ill. The total amount required will be about two millions one hundred and sixty-seven thousand (2,167,000) feet B. M., to be delivered between the opening of spring navigation and September 1, 1885.

Parties who are not prepared to furnish the entire lot may submit propositions for a portion only, but not for less than two cribs.

For specifications, blanks for proposals, and all information, apply at this office.

WM. H. H. BENYAURD,
466 Major of Engineers, U. S. A.

MARBLE TILING.
[At Kansas City, Mo.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 1, 1884.

Sealed proposals will be received at this office **until 2 o'clock, p. m., on the 22d of November, 1884,** for furnishing and laying all the marble tiling required in the custom-house and post-office building at Kansas City, Mo., in accordance with the drawings and specification, copies of which and any additional information may be obtained on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
464 Supervising Architect.

COURT-HOUSE FRONT.
[At Woodstock, Va.]

Sealed proposals will be received at the office of the Clerk of the County Court of Shenandoah County, **until Monday, November 24, 1884, 10 o'clock, a.m.,** for furnishing the materials and performing the necessary labor for the erection of a court-house front at Woodstock, Va.

The building to be of brick, with stone facing, 46′ x 75′, two-st'y, with mansard roof and tower, with the clerk's offices (Circuit and County) on the lower floor fire-proof.

Plans and specifications may be seen at the County Clerk's Office, or at the office of T. F. Schneider, Architect, 933 F St., n w Washington, D. C.

Each bid must state the time required for the completion of the building, and a proper bond will also be required of the person who is awarded the contract.

The Board of Supervisors reserve the right to reject any and all bids.

By order of the Board. L. S. WALKER,
465 Clerk Board Supervisors Shen. Co. Va.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

WE believe that our subscribers will welcome with the same cordial pleasure that we have in making it the announcement that during the coming year the value and interest of our illustrations will be increased by the regular issue of gelatine prints (heliotypes), from the natural object. As there are probably many who do not understand what is meant by a heliotype — we have encountered many who suppose our regular photo-lithographic illustrations must be heliotypes, since they are printed by the Heliotype Printing Company — we will explain that by "heliotype" is meant such prints as those of Trinity Church, Boston, the Farragut Statue, New York, the Fairbanks House, Dedham, Mass., the Town-Hall and Library of North Easton, Mass., which, with others, we have published from time to time, and we call their attention to the illustration of the Young Men's Christian Association Building in Boston, which is published in this issue. It is such prints as this, that we will next year issue, once each month, to those that are willing to pay for them. It is our sincere hope that a large portion of our subscribers will give their support to this new departure; for if it results as favorably as we now anticipate, — and present indications show that our hope already has a very substantial basis in fact — we can in the following year increase the number of heliotypes to the manifest increase of the value of the journal to our subscribers. In fact, in view of our facilities, there is no reason why the *American Architect* should not become the leading architectural journal of the world, so far at least as illustrations are concerned. The harvest within reach is inexhaustible, and all that is needful is the pecuniary support of our subscribers, to enable us to garner it into our pages.

WE trust it has not escaped the notice of our subscribers that we have recently permanently increased the number of our illustrated pages, and that they perceive in this an implied promise that as the journal grows and prospers, so shall it increase in volume and value to its subscribers. Any one who will look over a complete volume of the *American Architect*, and then compute how much he would have to pay for the same amount of matter made up into books of the ordinary form and size, will get an idea of how disproportionately small the subscription price is to the real value of the year's issue. One of the most peculiar foibles of human nature is the feeling that one of the most reasonable economies a man can practise is to stop his daily or weekly paper, but the falsity and wasteful unwisdom of such economy can probably be seen by any reasonable person who stops to think over it. It is pretty certain that in the case of an economical architect, for instance, although he might lay down fifty-one successive issues of an architectural journal in weariness and disgust, with the feeling that there was "nothing in them," yet he would probably find in the fifty-second something he would not have missed for many times the subscription price: something that may keep him out of a lawsuit, or help him in one he had begun; some fact which would prevent his building from falling down; some notice of a new competition, or some hint he could borrow from a brother architect's work, which would help him win. It really seems to us — as men and not as editors — that giving up one's daily or weekly paper is the last, and not the first, economy an active-minded man should practise.

IT is a gratification to us that we receive so many letters expressing satisfaction with the publication of "photo-caustic" prints — not unqualified and indiscriminate praise to be sure, but warm enough to satisfy us that we were right in not abandoning the process at the first onslaught of hostile criticism. We repeat that we do not use this process for the purpose of showing every detail of a building: that is beyond the possibilities of the process at present, and can be left to be shown in heliotypes, which will give all detail perfectly; but we do use it that our subscribers may gain a speaking acquaintance, as it were, with buildings which they may have heard of but never seen, or which they may desire to see more of, after having in this way gained an introduction. We should like to hear from the most competent authorities what they consider the relative architectural value of, for instance, the photo-caustic print of the Church of St. Nicholas at Ghent, and of Cotman's etching of St. Ouen, at Rouen, published in our last issue. We think the comparison would be a fair one, for we believe that few will deny to Cotman a very high rank as an architectural draughtsman. The increase of the number of illustrations has this personal interest to contributors: namely, that they will not have, hereafter, to wait so long for the appearance of accepted contributions, and will not have to take up the journal week after week only to find that "some other fellow's" design had been published instead of theirs — not because it was better, but simply because it had reached us sooner.

WE take sincere pleasure in learning of the complete success of the movement for establishing a western association of architects. The preliminary meeting, called in accordance with a suggestion made by the *Inland Architect* some months ago, took place in Chicago on Wednesday, November 11, and was attended by about one hundred and twenty-five of the best-known architects in Chicago, Milwaukee, St. Paul, St. Louis, and many other cities. A committee of Chicago architects received the visitors, providing generously for their comfort, and doing everything that could be done for the speedy transaction of the important business to come before the meeting. We publish elsewhere a report of the proceedings, and will not here anticipate it; but the feeling of the gentlemen present seems to have been unanimously in favor of the establishment of an association working in concord with the American Institute of Architects, but representing more particularly the interests of the profession in the West. Although the American Institute has had no more valued or useful members than many of the Western architects, its influence has been unquestionably too remote to give that moral support which professional men need. Even Eastern architects find the authority of the Institute less substantial, so far as regards its effect upon their individual business, than that of their local societies, and to their brethren in Chicago and St. Louis the quarterly meetings of the Trustees in New York are of still less practical service, so that the formation of a professional body in the West, which should unite the direct influence exerted by home associations with the authority conferred by a large membership, was, if not yet absolutely necessary, at least most fortunate; and the spirit in which the members of the Convention began their work of organization, as evinced in the admirable address of Mr. Burnham, the President, promises the best results in the future. We shall hope, long before the time of the next meeting, to note the good effect of the establishment of the Association upon professional interests in the West.

THE committee which has had in charge the matter of erecting in Boston a statue of Paul Revere has at last adopted a model, and will now begin the task of collecting the money necessary for carrying it into execution. Our readers will remember the competition for models which took place six or eight months ago, and unsatisfactory as were the terms offered to competitors, we are glad to be able to say that in the end the committee has proved loyal to the understanding implied in its programme, and has retained Mr. Dallin, the winner of the first prize in the competition, as the sculptor for the statue, only requiring of him such modifications of his original design, which was probably a hasty conception, as seemed necessary to give it the character desired. The City of Boston has promised, we believe, to contribute five thousand dollars toward the cost of the monument, but it will be necessary to raise twenty thousand more among private individuals, and it is more than likely that some years will elapse before the full amount will be obtained. Meanwhile, we hope that Mr. Dallin, who has his artistic reputation still to make, will be able to prepare himself adequately for an opportunity such as falls to the lot of most sculptors only two or three times in the course of their lives. His subject is a good and inspiring one; his field is a comparatively fresh one, for only one other equestrian statue exists in Boston, and he will have, in the people of the city, an audience as generously appreciative of original and meaning work as he need desire.

THE people who live near the line of the elevated railway in New York will rejoice to learn that a movement is now in progress for applying electricity as a motive power to the trains of the railway. Some two years ago a promising device for the purpose was introduced by Mr. Field; and later, Mr. Leo Daft has succeeded in operating an electric railway in New Jersey; but the managers of the elevated lines have hesitated to adopt any experimental system. Now, however, the Siemens electric road in Berlin, nine miles long, has been for some time in successful operation, and is to be extended to thirty miles in length; and another line, known as the Bentley-Knight road, is doing good service in Cleveland, so that the moment seems to have arrived for doing away with the steam and smoke which have so long annoyed the New York people, to substitute the new motive power. In order, however, not to lose the benefit of the most recent inventions, the railway directors have arranged for a sort of competition, in which all the makers of electric railways are to give tests of their inventions upon the elevated tracks, before a commission of experts, who will compare them and decide as to their respective merits; and the best system, in the opinion of the commission, is to be adopted, unless unforeseen circumstances should prevent, to replace steam power for moving all the trains belonging to the elevated railway corporations. One feature of this competition is, however, novel. Instead of handing over all the profits of the affair to the lucky winner of the first prize, leaving the others to hide their diminished heads and their lightened pockets in some safe seclusion, the electric-railway contractors are in any case to share the rewards of their efforts, and, after the competition has been decided, a company is to be formed, including all the contractors, which is to control all the patents for electric railways now in force in the United States; and this company, stock in which will be allotted by arbitration to the different members, is to remodel the elevated roads to suit the particular system adopted. The remodelling will be a simple process. Between the rails of each present track a third rail will be laid, insulated by supports of glass, which will serve to transmit the current, generated by a dynamo-machine at a central station, to the motor attached to each train. Passing through the motor, which is not a complicated machine, the current will give the necessary impulse to the wheels, and will finally escape to the two outer rails, through which it will return to its starting-point. Experience shows that the movement of the trains is as readily controlled on this system as on any other, and the advantage of employing it for a railway, the tracks of which are laid within a few feet of the second-story windows of many miles of streets, is obvious.

MR. DANIEL D. BADGER, the first person in this country to use iron on a large scale for building purposes, died last week at his home in Brooklyn, N. Y., at the ripe age of seventy-eight years. Mr. Badger was born on Badger's Island, in the harbor of Portsmouth, N. H., in 1806, and after his short school life was completed, began work in a blacksmith's shop in Portsmouth. A few years later he entered business for himself as a manufacturer of saws in Woburn, Mass., and prospered, until a fire destroyed his factory, and he removed with his savings to Boston, where he established a foundry and rolling mill, which was very successful, and brought its owner in a few years a considerable fortune. Always enterprising and ingenious, he conceived the idea that iron might be used as a building material much more extensively than was then the case, and in 1842 he erected in Boston the first building in the world with exterior columns and lintels of iron, under a guarantee, which was exacted from him, that if the iron so used proved unsuited to the purpose, he would substitute other materials at his own expense. It is hardly necessary to say that he was not called upon to put granite piers and lintels in place of his light iron columns, but was soon employed instead, to the utmost capacity of his foundry, in applying the same novel idea to other buildings. Soon after he was obliged, in order to supply the increasing demand for his work, to remove to New York, where he first built a foundry in Duane Street, and afterwards another one, occupying an entire block, between Thirteenth and Fourteenth Streets, and Avenues B and C. His business was then transferred to a corporation under the name of the Architectural Iron Works, which erected iron buildings in almost every large city in the United States, in Egypt, and in Cuba. In 1873, having raised the Architectural Iron Works to the highest pitch of reputation, he retired from active business, just in time to escape the troubles which soon came upon his associates through the competition of the rivals whom their previous success had raised up about them, and bearing with him the veneration of all members of the trade, with a deserved public reputation for the skill and enterprise shown in such undertakings as the Grand Central Railroad Station in New York, the contract price for the iron-work in which was, if we recollect rightly, more than a million dollars, and which presented the problem of the widest roof of a single span in this country, and the widest but one, at that time, in the world. The train-house portion of this great building was erected with extraordinary rapidity, by means of a travelling stage, upon which the arched girder trusses were successively built and placed in position. A short time afterwards the Manhattan Market, a building covered with an arched girder roof of a span nearly as great as that of the Grand Central Station, and even more elegantly designed, was erected in the same skilful manner. Second only in importance to these are the many buildings with cast-iron fronts erected by him in various parts of New York, which, although presenting no difficult engineering problems, are remarkable for the ingenuity with which a complete structure of iron is substituted for the masonry until then universally used. To us, who have seen the results of his work, an iron building is an every-day affair; but to begin, as he did, with a brick and stone structure, and replace every detail, even to the sidewalks and curbstones, with a new material, showed a patience and discernment which may well be called extraordinary.

THE New York *Evening Post* publishes a long editorial in relation to the copper industry of this country, which contains a great deal of useful information and suggestion. We imagine that few people realize the immense increase in the domestic production of copper which has taken place within the last few years. In 1880, the total output of the metal in the United States was estimated at twenty-seven thousand tons, of which the Lake Superior mines furnished twenty-two thousand, or about eighty-two per cent. In 1881, the Lake mines increased their production to twenty-four thousand tons, but those of other districts gained still more, and the Lake copper was only seventy-six per cent of the whole. In 1882, the Western mines had gained still more, and in 1883, the whole production of the country was fifty-eight thousand tons, or more than double that of 1880, and the Lake copper was only fifty-two per cent of the total. This year it is estimated that seventy thousand tons will be brought to market, of which the Lake mines will furnish thirty-four thousand. In other words, while the Lake mines have in four years increased their output from twenty-two to thirty-four thousand tons, or about fifty-five per cent, the other portions of the country will furnish this year more than seven times as much copper as they did in 1880. The cause of this important change in the copper mining industry is, of course, the discovery of new and productive mines. It is hardly two years since a small group of mines was opened in Montana, which will this year furnish alone at least twenty thousand tons of the metal, or nearly as much as the whole production of the Lake Superior mines in 1880. In Arizona, also, several very rich mines are worked, turning out about twelve thousand tons during the year, and there are mines in several other states and territories.

THE WESTERN ASSOCIATION OF ARCHITECTS.

FOUNTAIN NUREMBERG GERMANY.

FOR the past six months the *Inland Architect and Builder*, of Chicago, has voiced editorially the expressions that have come to it, favoring and recommending the forming of a Western Association, composed of architects of the West and South. The following is a brief summary of these editorials: —

"The history of all trades and professions points to united effort, through organization, as the only means of establishing desired reforms, and of elevating and improving those trades and professions; and if the profession of architecture is to take a higher plane, and be more respected in the West, its only hope is in active organization. The American Institute has for many years sought to enlist the interest of the profession in the West, but has failed to do so in any general or active sense. Seeing this, and realizing the benefits of organization, many Western architects have by letter and in person expressed to the *Inland Architect and Builder*, the belief that an association distinct from, but in harmony with the American Institute, Western in spirit, with headquarters centrally located, and with annual meetings held where they could be attended without long journeys, involving large expense and much loss of time, would have the active support and co-operation of the West. This feeling becoming widespread, led the *Inland Architect and Builder* to announce the call for a convention of architects of the West and South, to be held at Chicago, November 12th, 1884, for the purpose of forming a Western Association of Architects. In response about two hundred have signified their intention of being present, and many more have expressed sympathy with the movement, stating that they would support such an organization. There need be no conflict between an independent Western association and the American Institute, both having kindred aims, one would aid the other. With two distinct organizations a lively interest would be awakened and a healthful emulation be fostered, the West striving to outdo the East in the good work of establishing needed reforms."

On November 12th, there assembled at the rooms provided for the purpose in Chicago, some one hundred and twenty-five architects from Cleveland and Cincinnati westward, and from as far south as Tennessee.

The meeting was called to order, and a temporary Chairman and Secretary elected. A Committee on Credentials was appointed, who continued in session during the Convention.

At the opening of the afternoon session Chairman D. H. Burnham, of Chicago, delivered the following address: —

The advanced civilization we live in demands of us a line of action differing somewhat from what has gone before. Almost up to the present century an architect's work has been confined to some one building or set of buildings. In the earliest times the architect was the master-builder, and often finished but one piece of work during his career. This has been true until within the last two or three hundred years. It was easy for him, comparatively speaking, to do his work to the satisfaction of his client, and to leave a monument finished in every detail.

To-day a man in active practice is expected to design everything, from a cottage to an ornamental public building. From Bazaleel, who was designated by God to erect a tabernacle in the wilderness, down through Phidias and Vitruvius, John of Gloucester, Irvin of Steinbach, and Robert de Beverley, to Michael Angelo, an architect's work has been confined in narrow channels, and it may well be doubted whether these masters could have left a name had they been obliged, as we are, to turn from a temple or palace to a dozen other totally different problems all in one year. The times have changed, and we of to-day are loaded with such emergencies as were unknown to the ancients. This should give courage to him who is dissatisfied with his work. If, in spite of the multiplex problems laid out for him, he succeeds in evolving one satisfactory building, he will have done quite as much as the architect of old. It is of importance to us who make up that latest product of time, the architectural profession of the West, to recognize the great changes which have come over the practice of our business. We ask ourselves why ancient buildings were good. M. Viollet-le-Duc has shown, and I think justly, that the beautiful temple called the Parthenon was the result of constant and minute criticism of entire educated Athens. This shows the law of our nature, working toward a distinct end. Where there is a gathering of men, all intent on one purpose, the result must be the perfect expression of the work of them all.

Society to-day calls on us for a much wider range of thought than was formerly expected of an architect. On account of the condition of our life, we are in a measure cut off from that peculiar help the old architects had from each other. We now principally need the restoration of the spirit of brotherhood which has been lost. We certainly are capable of doing more than those who went before. We have their work before us, both in general and detail. We have photographs of their monuments as a whole, the colored prints of their interiors, and the scaled measurements of their most delicate parts. We have their writings, with the conclusions of their lives. With all these and our own facilities for perfect intercommunication, which the men of old most sorely lacked, why is it we do so little which is thoroughly satisfactory, even to ourselves?

Haste, resulting from feverish push, is responsible for much. We are asked for complete results in a period which to the ancient would have been too short for his first conception. Were it not for other things, there could be no satisfaction to the mind of an earnest man in doing his work, but in spite of our being so hurried by the rush of modern life, we have a chance to guard ourselves against mistakes if we will but analyze our position. We all need kindly criticism. No man can be a law unto himself, and the best effort of the brightest intellect must be inferior to what it might be if the designer would submit his work to the scrutiny of others in his profession. We look to this convention to inaugurate an era of good feeling among the architects of the West. Recognizing our standing in the advance of civilization, we feel that combined effort would save to us and to posterity the best thoughts of us all; that working merely as individuals, entertaining a narrow, jealous disposition toward others, we cut ourselves off from those corrections which are absolutely essential to prevent such glaring flaws as inevitably come from haste.

It is not intended to claim extra brilliancy of intellect or warmth of heart to us of the West, but the conditions which invariably produced perfect styles in the past are now once more active among us. What made the architecture of Athens? I have quoted from a celebrated French author to show that the results came from freely-expressed criticism of the populace, but this itself arose out of what was far more potent. Athens was a commercial city; to it came men of all nations; at its port were seen the dresses of all tribes, and there were heard the tongues of the civilized world. From the very nature of things the Athenians were the brightest spirits of the times, and probably the best informed men then on the globe. The restless activity of their minds and their adventurous feelings had brought them from far divergent lands; they were animated to overcome all difficulties, to seek the great commercial cities of their day. The city was filled with individuals from the various countries around the Mediterranean, who were well posted on science, art and manufactures. Picture to yourself a humdrum countryman in Athens for a day or two. Must he not have been astonished at the quickness of mind of all about him — at the extent and precision of knowledge among sailors, soldiers, merchants and philosophers? Again, a few years later we find a similar set of circumstances producing the same result. Carthage arose like a queen from the sea; her towers and palaces were spoken of by the ancients only in terms of deepest wonderment. Again, Rome rose in all her magnificence, and drew the choicest men and materials from the entire world; rare gems, colors in purple and fine linen, a manuscript of the past; but, above all, in her streets were found the subtle-minded Greek, the Gaul of scientific turn, and the sweetest poets of all countries.

To-day we have this conglomeration of men who make up our great West. More than the Athenians, the Carthagenians or the Romans, do we feel a spirit of enterprise; in a greater degree do we draw to our centres the thinkers of all countries. Here come determined, bold spirits, who, filled with ambitious dreams, have left their older homes in Germany, France, Italy, England, in the Orient, and in the older States of our own country, all imbued with the same restless activity, the same readiness to give up the old when the new is better, the same fearless examination of everything laid before them.

We are without doubt all, in a certain sense, adventurers. Each man brings some knowledge peculiar to the land of his birth. Each one has the disposition to look upon things in accordance with the nature of his blood and the education of his province, and the community as a whole is thus constantly enriched with the thought of this steady stream of keen, incisive, thoroughly living men.

If we recognize this fact, and all of us determine to make the most of it, we must show a progress that will surpass anything which has gone before. In short, we possess the whole past in a living form, ready to actively assist each and all of us in the struggle to eliminate crudities and to secure what is in accordance with the unchanging laws. No man among us can possibly possess more than a fragment of the knowledge of all, and if we would do the best with our lives we must do the best for the community and the times we live in. This can be brought about by each one acknowledging his shortcomings and being willing to frankly and kindly accept the help of others, and still more, to give it in the same spirit himself. If there is a man amongst us who has an ambition to leave an honorable name — and I hope this is true of every individual — he may be sure he will fail of his object if he works for himself alone. There are many things, undoubtedly, which will come up for discussion in the convention, which are peculiarly its province. I will therefore only mention a few, as, for instance, the schedule of fees, the code of professional ethics, and that frequent source of trouble, competitions. Remember that our science is a union of all sciences, and this to a degree that cannot be said of any other profession, and that the great man is both a theorist and at the same time thoroughly practical; that we should be ingenious and apt to learn.

Recognizing this, it is hoped that an impetus will be given here which will carry us on to success and make our work better. It is not to be hoped, perhaps, that the name of each shall go down to posterity, but it may be hoped that the united efforts of us all will leave impressions which shall stamp a pure American spirit on the ages to follow.

Shall we teach the lesson of united effort in an honest, manly cause? The famous scientist whose philosophy crowns the thought of this century said, in his few words of warning to Americans: "The duration of your institutions will depend, not on your education, but upon your character." Does not every one of us see that it is so, and hope with Spencer that the blood of our hearts may warm us toward the common good, and the thought of our brains be toward the accomplishment of our work as a whole, and not primarily toward the fleeting success of the individual, be it in finances or in popularity.

A Committee was appointed to frame a Constitution and By-Laws, with instructions to report the following morning.

A Committee was appointed to draft resolutions in the matter of fees and competitions.

The *Inland Architect and Builder* was appointed the official organ of the Association.

The afternoon was spent in visiting points of interest.

In the evening the Chicago architects entertained their brethren at a banquet, given at the Grand Pacific, as a pleasant termination to the convention, and in honor of the formation of a new association.

The first toast of the evening "The New Organization," was responded to by Mr. John C. Cochran, of Chicago, as follows: —

Mr. President and Brother Architects: — I think I can truly say that this is the proudest day of my life. I regard this compliment to respond to the first toast as the greatest that I have ever received. The notification came rather late this evening, and I have prepared no speech and I hardly know what to say. I have jotted down some heads of ideas as I came here that struck me as proper to bring out on this occasion; and to premise I would say that I feel very proud to welcome this body of architects, not only of architects, but of representative men, for of all men in the world of any profession I regard the architect as a representative man. I feel proud to recognize such a handsome body of men. I refer to Mr. Hodgson. I have been wondering why I have been called upon; I think I see the reason. Knowing that I couldn't make a speech, they had a scheme here — others would follow me and would so easily eclipse me. That is the only solution that I can assign. But the sentiment of our organization is a grand sentiment—the Western Association of Architects — and I, having been in the West so long, have felt very much the want of such an association. I have felt very much the want of the sociability which this has brought out. I have felt very much the want of the support it gives in the performance of my duties as architect, the advice it affords; and this I hope is the commencement of an association that will last forever. I am surprised this evening to see so many architects here. It did seem to me, as we came filing in here this evening, that our western country was even larger than we had thought it, and I hope this Association will not be short-lived, and that it will be of great aid to us in our profession in every way.

Secondly, the teaching of this Association. This Association should be the means of teaching us not only in our professional duties, but in our duties as men, as honest men. For if any man should be honest it is the architect; for how many men trust their all to the architect in the preparation of plans for the erection of a home!

In the next place what shall constitute an architect worthy to be a Fellow of this institution? To begin with, he should be a scholar, versed in mathematics; he should be an artist; he should be a skilled business man. He should be a lawyer in one sense, for I know myself that usually an architect can make a better contract than any lawyer, because he understands all the points that need to be brought out in a contract. A member of this Association should be a gentleman; to be a member of this Association should be an entrée into society — it should be his all-sufficient credentials of manners.

Next I would say that the Association should be for the advancement of knowledge and for the instruction of its members. It should have its annual conventions, as you propose. At these conventions, lectures should be given and papers read.

And the next thing I would suggest would be the establishment of schools; not permanent ones, but annual schools, to meet say for one week each year, and at these schools the instruction should be practical and up to the times; papers by the best talent should be read to young men, and lectures should be given. And when young men attending these schools for a certain length of time can pass an examination by its board of directors or a committee appointed to examine them, they should have a certificate to practise.

The next thing I would suggest would be a library. I think that the Association should have such a feature at headquarters, and I would suggest that a library be started and books and papers collected where every member of the Association can have an opportunity to examine them. Also an art-gallery. If every architect here would give a picture, what a gallery we could furnish. To me it would be full of interest. I think we could have one of the largest art galleries in the United States in a very short time. Our friend, Henry Lord Gay, who has established an exhibit here, has set a good example, and a few of us have contributed a few designs there for the edification of our visiting friends.

The next is fees and competition. Here is a very delicate matter to touch, and I would say to the Association that it must go slow in this regard, because I am of opinion that whatever fee we establish, whatever percentage, every member of the Association must live up to it, or else get out. For myself, I have always maintained a fee that would satisfy the *American Architect*, and I believe I stand by it to-day, and I want to say for the edification of younger brethren that it is better in the end than to cut rates.

I suppose the visiting architects have enjoyed the afternoon in visiting the buildings, boulevards, etc., and to them I want to say one thing in reference to the officers of this institution. We have had heretofore a Chapter of the American Institute of Architects; we have tried to carry that along, but it has been a perfect failure — a perfect failure— and I have rejected it as detrimental to the architectural profession; for this reason, that the majority of our architects did not attend. I attributed that to the fact that the American Institute of Architects really seems to be an Eastern institution. I feel that we have not been treated fairly in the West. I feel that we have not been represented in the West, and I don't blame the American Institute of Architects, for they have been a head centre of architecture in this country.

I would recommend, in electing officers, that we old fellows stand behind and elect young men — ambitious men, who can give time to the cause; especially the Secretary, who needs to be a live man, who will attend to the duties involved. In reference to the location of the officers, the Convention will have to decide. I have heard several opinions on that subject.

The second toast was "Architectural Literature," response by R. C. McLean, of the *Inland Architect*, of Chicago, who said that one of the earliest Inland Architects and Builders was the beaver, who was followed quickly by the Indian; then by the pioneer with the log hut; then the shingle palace, and finally such ten-story fire-proof costly structures as are to be seen to-day in progress in the immediate vicinity of this banquet-hall, etc. An interesting address, which we regret has not yet been fully reported.

The third toast was "The American Institute of Architects," the response to which, by Mr. W. L. B. Jenney, of Chicago, was published in our last issue.

Among other toasts was "The Dwelling," response by John W. Root, of Chicago. Of this very interesting speech we can give but an outline.

Of the earliest dwellings no records exist. We have no knowledge of the plans and style of the house in which our first parents lived, when they were raising Cain, but we feel sure that the element of *Madame* in the planing of the dwelling is of very modern introduction.

The architect at work is startled by the rustling of silk, and the odors of sweet scents. A lady enters, unfolds a sheet of delicately-tinted gilt-edged paper, and displays a plan; just what she desires for her house.

There are large numbers of closets, and many rooms; figured usually about 25 feet square. A space 18 inches by 4 feet is devoted to the stairs.

There are to be towers and turrets, bay-windows, loggias, verandas, stone steps, hard-wood floors, fine mantles, a grand staircase, timber ceilings, recessed sideboards, and cabinets, stained-glass, etc.

The cost of all this magnificence is to be $4,000. The lot 25 feet wide, the plan called for 63 feet, etc. The architect condenses, cuts down, omits, and after long labor produces a house, but a small part of what was wanted, and yet to cost much beyond the $4,000.

The poor architect is of course to blame for exceeding the instructions as to cost, and for not giving *Madame* the half she told him she must have.

Mr. Root's description of the modern architect's struggles with *Madame*, his female client, were exceedingly amusing, and kept the audience in an uproar.

The other toasts were "The Office," "The Store," "Fees and Clients," responses respectively, by W. D. Falls, Chas. R. Ramsey, St. Louis, and C. H. Lee.

At midnight the party dispersed, to re-assemble Friday morning for the completion of some unfinished business. The most important being the report of the Committee on Fees and Competition, John P. Root, Chairman; and Messrs. Charles H. Lee, E. O. Fallis, and Charles K. Ramsey, the report reading as follows: —

Resolved, That in his relation to clients and contractors, the architect should be an impartial arbitrator; and under no circumstances should he act as a special pleader for either party.

Resolved, That the relations between architects and clients should be confidential, and that no architect is worthy of employment who is unworthy of trust.

Resolved, That it is the sense of this Association that the architect should in all cases superintend the work designed by him.

Resolved, That in cases where for special reason the architect does not superintend the work designed by him his responsibility ceases with the delivery and acceptance of the plans, unless by expert testimony it can be proved that the plans were defective.

Resolved, That the President, Secretary, and Treasurer of this Association constitute a board of arbitration, whose duty it shall be to adjust all questions in dispute between members of this Association and their clients which shall be submitted to this board.

Recognizing the desirability of uniformity throughout the country in the matter of fees, and having implicit confidence in the action of the American Institute of Architects in this respect.

Resolved, That this Association adopt the schedule of fees recently adopted by the American Institute, and that the Secretary of this Association mail to each member a printed copy of this schedule as soon as practicable.

Resolved, That no architect should enter a competition for any building or other work, unless the decision of the competition shall be made by recognized experts.

Which after long discussion was adopted.

A permanent committee was then appointed to draft a By-Law on the subject, the same to be printed, and a copy sent to each member. Action to be taken at next annual meeting.

The Convention concluded its session by the election of the officers of the Western Association of Architects for the ensuing year, as follows: —

President: C. E. Illsley, of St. Louis; *Secretary:* Henry Lord Gay, of Chicago; *Treasurer:* D. Adler, of Chicago.

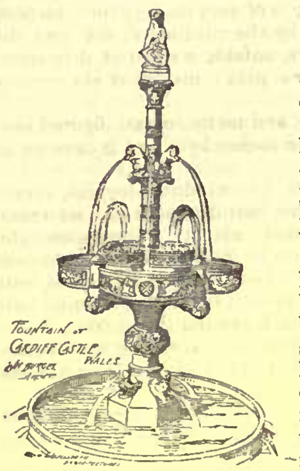
Mr. Illsley spoke a few words of thanks: —

Gentlemen of the Convention: — My friend, Mr. Ramsey, told me to have a speech ready, but I did n't really think there would be a chance for it, and I thought it would be spoiled if I got it ready. I would n't be so egotistic as to think that this is an honor tendered to me, but with your permission I will take it as a compliment to St. Louis. I used to be in Chicago, and I will consider myself as a sort of connecting link between the two cities. When I come up to Chicago I think the time not distant, if indeed it has not already arrived, when the great glory of this lake will be, not in its size, but because Chicago is on it. Now we hope the time will come, after a while, when it will be said of the Mississippi, not merely that it is the longest river on the globe, or the greatest river, if you please, as the chief thing said about it; but that it is the river on which St. Louis stands. Gentlemen, one of the principal things, after all, that make a city is the quality of the buildings which its architects put up. That is the thing above all others that draws me up to Chicago every time I can get here. Now, when you come down to St. Louis, we expect to get the benefit of a good deal of the inspiration that we have received from you here, and that will give us great help in our work of making St. Louis the great city we expect it to be. I have no speech ready to make. I thank you in the name of St. Louis for this honor.

The meeting adjourned to meet one year hence in St. Louis.

The Convention was an undoubted success; the attendance was not less than one hundred and fifty architects, probably more. The utmost harmony and good fellowship existed throughout, the members of the Institute and others exerted themselves whenever the opportunity offered to obtain an expression of good feeling, and the hope was expressed that sooner or later some method might be arranged, whereby the new local Association could be united to the National one. Such expressions were always well received, and we may hope that this Convention will result favorably to the profession.

ON THE STATUE OF BACCHUS RECENTLY DISCOVERED AT THE VILLA OF HADRIAN.



THE excavations which have been prosecuted at Rome, within the walls, since it became the capital of united Italy, and which have so entirely transformed the aspect of several localities which many of us love to recall as we knew them in the days of many an abolished abuse, have yielded much interesting topographical knowledge, inscriptions historically valuable, and a certain number of works of art. None of these last, however, take very high rank. The lover of ancient art for its intrinsic beauty does not care to be put off with simple information, however valuable; he watches proceedings with the eager hope that sooner or later he may hail the recovery of one more work of sculpture which he may recognize as a permanent bequest from ancient genius to the entire world. Such a hope was gratified even beyond most sanguine expectation, when the explorers of Olympia exhumed the Hermes with infant Bacchus of the Heræum, a work of such consummate excellence as to challenge assent to the strong presumptive evidence that we possess in it an authenticated original by one of the most renowned sculptors of antiquity. In this respect this work of Praxiteles places him before the modern world as no other ancient artist is placed except Phidias, a still greater name, by the sculptures of the Parthenon. Neither the recovered sculptures of the Mausoleum, nor the pedimental compositions of Olympia are such as to strongly assert their connection with such great names as their reputed authors, Scopas or Alcamenes; and it is perhaps, in some respects, as well that critics should sometimes have to appreciate works of art in compelled freedom from the bias of doubtful inscriptions. Such are the circumstances under which we are called to welcome the statue which is the subject of the present notice. It is an admirable and well-preserved statue of Bacchus (Dionysus), discovered in 1881 on a site which has been rich in such treasures: the villa of Hadrian, close to Tivoli. German archæologists of course will not be balked of a right to conjecture, to dogmatize, as to its school and its date; but even their adventurous self-confidence does not pretend to be able to give even a guess as to the name of its author.

The statue may be truly described as well-preserved, though in fact it was found under a flight of stairs, broken into several pieces. When fully set up, it appeared only to have lost the right forearm, with the hand, and some attribute which broken attachments show that it held. The finely-wrought surface is unimpaired, the delicate features are perfect, and the left arm, which hangs free, is perfect even to the tips of the free, and easily and naturally curving fingers. The height is given as 1.77 metres, equivalent to five feet nine inches, and having regard to the attitude and the age represented, which is that of earliest developed manhood, it may be considered as fully life-size. It stands upon an oval basis with Attic mouldings, which is not larger than will just accommodate it with the tree-stump which is attached to the right leg and secures the figure from breaking by its own weight. It is remarkable that in a work of such complete finish the sculptor should have not cared to clear away a few of the small knobs or prominences which bear the marks of having been employed in the "pointing off" of the statue from the original model. Four of these are observable in symmetrical positions about the hair and one on the leg. These might almost seem to be left as depreeatory hints that the artist had not finally wrought out his idea, in the same modest sense which was implied in the use of the imperfect tense upon inscribed works — not "Glycon made it," but "Glycon was making (that is, was engaged in making) it." Michael Angelo left a few square inches of the flesh of even the elaborately-finished "Moses" unsmoothed, perhaps in the same spirit, though indeed the appropriate inscription on many of his works would have been, not that he was making, but that he was beginning them; so much is left so merely and roughly blocked out.

Our statue is the subject of a detailed dissertation by Professor Michaelis of Strasburg, in the last report of the Archæological Institute of Rome, with illustrations from photographs of a cast of the statue in four aspects. These are taken from the front and back, from the right side and left, and so far enable us to appreciate its leading characteristics. It is only unfortunate that they were not taken with more sensitive adjustment to exactly the points of view which the sculptor chiefly valued, and that has only been hit in one case accidentally.

At the first glance the spectator is struck with the peculiar union of feminine and masculine character in the treatment of the flesh and forms, still more expressively than in the abundance and arrangement of the hair. The figure is by no means of the class that has been styled *androgynous*, or even hermaphrodite. It is neither a man-woman nor a womanish man, but a special creation to which either sex is contributory of some suggestions, with a result which is as remote from a purely effeminate as from an Amazonian type. So it is that it is known at once that we have before us a Bacchus, a Dionysus, the god upon whom the ancient poets and mythologists, both Latin and Greek, exhaust their invention in phrases and epithets expressive of a combination of attributes in mind and person borrowed from both sexes. It is probable, from the position of an attachment, that the right hand held a canthàrus; but quite as decisive is the nebris or fawn-skin which, knotted over his right shoulder, clings to him, scarf-like, the skin of the legs, weighted with the hoofs, hanging down vertically in front. This is a frequent attribute of the Dionysiac company of fauns and satyrs; but that it is no faun, but the god himself, whom we have before us, appears by the absence of the pointed ears or fantastic tail, as well as by dignity of expression.

The god rests upon his right leg; the left is retired and slightly bent, the foot easily touching the ground with its ball. His head is gracefully declined, and turned as if attentive to the action of his bent right arm or to the object which he is holding. The action is thus as slightly demonstrative as can be conceived; it is sufficiently so to inform the attitude with a sentiment of definite purpose, while still it leaves the effect which the artist aimed at realizing, to be gathered from the general expression of the special typical conception. The nearest parallel to this ideal in collections of ancient art appears to be a torso which is restored as an entire statue in the Vatican. The enthusiastic description of this by the great connoisseur, Visconti, might be taken to be derived from our statue. The smoothness and softness of female forms is united with more liberal mass than is feminine; the neck has nothing of the usual masculine configuration; the hair has a central parting; a few delicate locks escape by the temples, but otherwise it is rolled over luxuriantly on either side, and carried behind to fall down the back, where the full fillets are tied together by a band, leaving the ends to unite in a thick bush. It is observed that the parting in front is not central to the forehead and line of nose; such is the case, also, with the hair of the Venus of Melos. It is one of the studied irregularities which the ancient sculptors admitted. that tell even when and partly because not distinctly observed, to keep in check an appearance of unnatural formality. We may trace such a stratagem in the variation of the sides even of their youthful and beautiful faces; in more developed and in aged head, as, for example, in that of the Townley Homer, the diversity at once declares itself, and yet is so managed as to enhance expression.

There is more diversity in the types of Dionysus that have come down to us in sculpture than of any other god or goddess of the Hellenic Pantheon. He is represented of all ages, from infancy to youth, mature manhood, and as a bearded senior, entirely nude or heavily draped. It is only in his followers that the abuse of his gift of wine becomes grotesque or degrading. The mythology connected with Dionysus had a serious side in his relation to the most venerated of Greek mysteries, and this preserved the dignity of even the livelier phases of the wine-god's nature. Sportiveness and exhilaration blend away under his influence into consolatory cheerfulness, into enthusiastic religious elevation and excitement; so it is that the magnificent bronze bust which was recovered from Herculaneum was claimed by the less instructed archæologists as Plato, was admitted by more as, if not Plato, worthy to be Plato, and is even circulated by photography in connection with a still higher name. It is in the peculiar manner in which legend associated Dionysus with outbursts of religious fervor among women that the true significance is found of the blending of feminine characteristics in such an idealized representation as the statue now under consideration. The head of the youthful Dionysus in the museum of the Capitol at Rome long passed for feminine, was now named a Leucothea and now an Ariadne, till a more sharp-sighted and erudite critic drew attention to the decisive indications of sprouting horns under the tresses, and attached the descriptive line of Ovid: "apart from your appearance with horns your head might be a virgin's."

Professor Michaelis objects that the strengthening tree-stump which is attached to the right leg and hip of the statue, is so introduced as to interfere injuriously with the lines of the figure, from one point of view especially. The complaint proceeds upon a mistaken assumption. The proper inference is that the aspect in question is one which the sculptor was desirous should not be rested in. There is no greater mistake than the supposition that the ancient sculptors of statues in the round intended their figures to produce a fine effect from whatever side they could be seen. True it is that in some instances they do succeed in realizing fine effects from very numerous points of view; but even so it is found that one or two have been considered and favored preferentially; other instances may be cited — the Venus of the Capitol is one — where for the sake of a supreme effect from a single point of view, all others are sacrificed without compunction. Had this been duly considered, the present statue of Dionysus would not have been photographed for a front view in quite such a random way. As it is presented, there is an offensive parallelism of the hanging fawn-skin, the tree-stump and the statue's leg. This should have been taken at once as the sculptor's warning to turn the figure somewhat round towards its right, when the stump would be partially obscured and otherwise would give contrast to the line of the leg, while the outline from above the hip downwards would have given that clear and decisive outline in the contemplation of which ever resides so much of the delight of admirable sculpture.

There are some other points in the Professor's criticism to which objection might be taken; but let this at present suffice. This latest statue recovered from the ruins of an empire, from the catastrophe of an entire system of civilization, is one of such distinguished merit as to claim to be represented by a cast in all the art museums of both worlds. Professor Michaelis has a further objection to make to the effect that the sculptor has not succeeded in a perfect fusion of the characteristics of the sexes, such as the poetic ideal assumes; it appears to him that the masculine and feminine qualities are rather juxtaposed than combined, the masculine being predominant in some parts, the feminine in others. We will assume that the problem of complete homogeneousness of effect under the conditions, difficult as they are, is not impossible; it will still remain a question, having regard to some other ancient works, whether the artist really aimed at it. This was far from being always the case. Perfect homogeneousness of type is as certainly aimed at as admirably achieved in many of the great statues of antiquity; it is the rule in the Parthenon statues, and among works of later date, from the Hermes, the faun, and the Apollo Saurectonus of Praxiteles, to the Farnese Hercules and the Apollo Belvidere, self-consistency, pure and simple and single, is the governing norm. But this self-contained unity of expression and systematic coherence made a great demand upon powers of originality and imagination; with the less endowed there was a liability to lapse into tameness and monotony when a novel experiment was tried, or into the mere mannerism of imitation, which was as little capable of exciting interest. The temptation was then inevitable to try the stimulant effect of more declared contrasts. In the various copies of the Discobolus of Myron and in the athletic Apollo — the Choiseul Gouffier Apollo — of the British Museum, we have types of athletes who are athletes every inch, and athletes of special and simple type; but when we turn to the Strigil-user of the Vatican, we shall be likely, if we frankly admit our impressions to ourselves, to be startled by a sense that the lower limbs are distinctly out of proportion or out of character. A similar contrast is presented by the Venus de Medici; here, however, it is more skilfully qualified or veiled, and it is by no means at a first glance that we are struck by the fact that the proportions of the lower figure are by no means such as we should have independently inferred from those of the fully developed shoulders and bust.

Distinctive character of any kind is of course given in art by special associations of qualities which are in their nature different, and may, if uncontrolled, be antagonistic; it is the function of poetic imagination, as of artistic genius, to determine and realize the precise adjustments which will conciliate wild tendencies and reduce them to a harmony. It is thus that they are pressed into co-operation for compassing effects unattainable by either alone; and thus it is that the union becomes characteristic and expressive of character. But all depends, as will be seen, on the aptness and perfectness of combination. Contrast is essential to art, but harsh contrast, which is painful discord, is destructive of it. The question of success or failure at last depends, as in all other arts so in sculpture, upon whether contrast of associated qualities is so treated as to heighten sentiment, or whether it is subservient chiefly to the excitement of a startling effect, a vulgar surprise, and so becomes degraded from refined sentiment to coarse sensation. W. Watkiss Lloyd.

A NEW-MEXICAN PUEBLO.

The Pueblo of Acoma, situated ninety miles west of Alberquerque, is one of the most remarkable communities in New Mexico or the United States. To reach it, take the Atlantic & Pacific Railroad to McCarthy Station, and then transfer to an Indian pony and ride eighteen miles south-by-east. When near your journey's end you descend almost imperceptibly into the valley, six miles in width, in the middle of which stands a butte, and on the top of this is Acoma. Eight hundred people are living there, and they and their ancestors have gathered there the sum of their possessions for nearly three centuries. This butte is one of many that are the remnants of a mesa that has been worn away by the erosion of the ages and survives only in flat-topped mountains here and there. The valleys between are fertile, and untold generations of men have seen them covered with waving grain and flocks of sheep.

Some time in the seventeenth century, the Laguno or valley Indians made war upon the Acomas, for the possession of the country, and the latter, being the weaker, occupied this butte as a defensive position believed to be impregnable. Their judgment has been abundantly vindicated. It has proved a Gibraltar of strength and safety. The comparison is not inappropriate, and in approaching it from the north I was struck with the resemblance to the pictures I have seen of that grim fortress that frowns over the Straits to the Mediterranean. The height above the valley is nearly four hundred feet, and the walls in several places nearly perpendicular. There are two means of ascent; one by a flight of steps cut into the face of the wall and rising at an angle of forty-five degrees, and the other by a fissure in the rocks leading up into the heart of the mountain. Both ways have been trodden by human feet until the steps are hollowed out like shallow troughs. Either one is exceedingly difficult, and neither is tolerably safe. We chose the one along the fissure. To give an idea of the laboriousness of the task, imagine a stairway starting at Mr. Grosvenor's office and rising to the top of the spire of the Methodist church, then continuing on an easier angle for one hundred feet, and then rising again by a steeper grade than ever to an elevation higher than the weather-vane on the university, and this stairway a precarious footing along the sides of a gash in a rugged mountain, and you may know how we reached Acoma! With all the danger and fatigue, it is a laughable sight to see a person — some other person — make the ascent. One has to stride over the fissure, one foot on the right-hand side and the other on the left, and at the same time press the hands alternately against the rocks for support. An Indian will throw a live sheep around his neck, and go up quite rapidly without touching either hand to the rocks; but I am satisfied I could never do it.

They told us of a pathetic incident that occurred on the outer stairway several generations ago. Several men started up, each with a sheep on his back. When nearly to the top, the sheep carried by the foremost man became restless, and the shepherd, in trying to hold it fast, lost his footing and in falling swept his companions over the precipice, and they all fell on the rocks at the foot in a lifeless heap. The Indians have carved a representation of the accident on a rock near where it occurred, which scarcely serves to steady the nerves of those who go by that route.

The top of the elevation is level and contains an area of sixty or seventy acres. At one side stands the pueblo, a blunt pyramid of adobe and stone honeycombed with rooms, at the other the church and graveyard, and near the centre a pond of pure water thirty feet in depth and several rods in extent.

The priest was made acquainted with the object of our visit, and the ringing of the church-bells brought the inhabitants of the village around us. When they understood that the title to their lands was in question and we had come to take testimony, they showed great interest, and discussed the various points involved with remarkable intelligence, considering their limited opportunities for a knowledge of law. As nightfall came on, a number of the men who had been at work in the valley came up, bringing delicious peaches and grapes, which we were glad to accept in view of the meagre preparations for supper. We slept in the church, wrapped up in our Navajo blankets, and never felt more secure or happier in our lives. When the gray dawn peered through the little mica window-panes, it revealed great roof-beams more than a foot in diameter and thirty or forty feet long, and through the open tower a bell that was cast in 1710. How these immense timbers and this bell were brought up to the top of this cliff no one living knows. The Indians shake their heads and the priest shakes his, but no one ventures an opinion. The timbers are there, however, as witnesses, and morning and night, as the seasons come and go and generations pass away, the bell speaks for itself in the silvery tones that pleased its founder in far-off Spain when King George was on the throne. The adobes — or the earth of which they were made — were brought up from the valley, also, for the top of the butte was a bald rock in the beginning. And the earth for the graves came the same way, requiring forty years, the priest said, to complete the graveyard. It is the only completed graveyard I have ever seen. The old priest seemed very happy in the charge of his flock, and his flock seemed happy in possession of him.

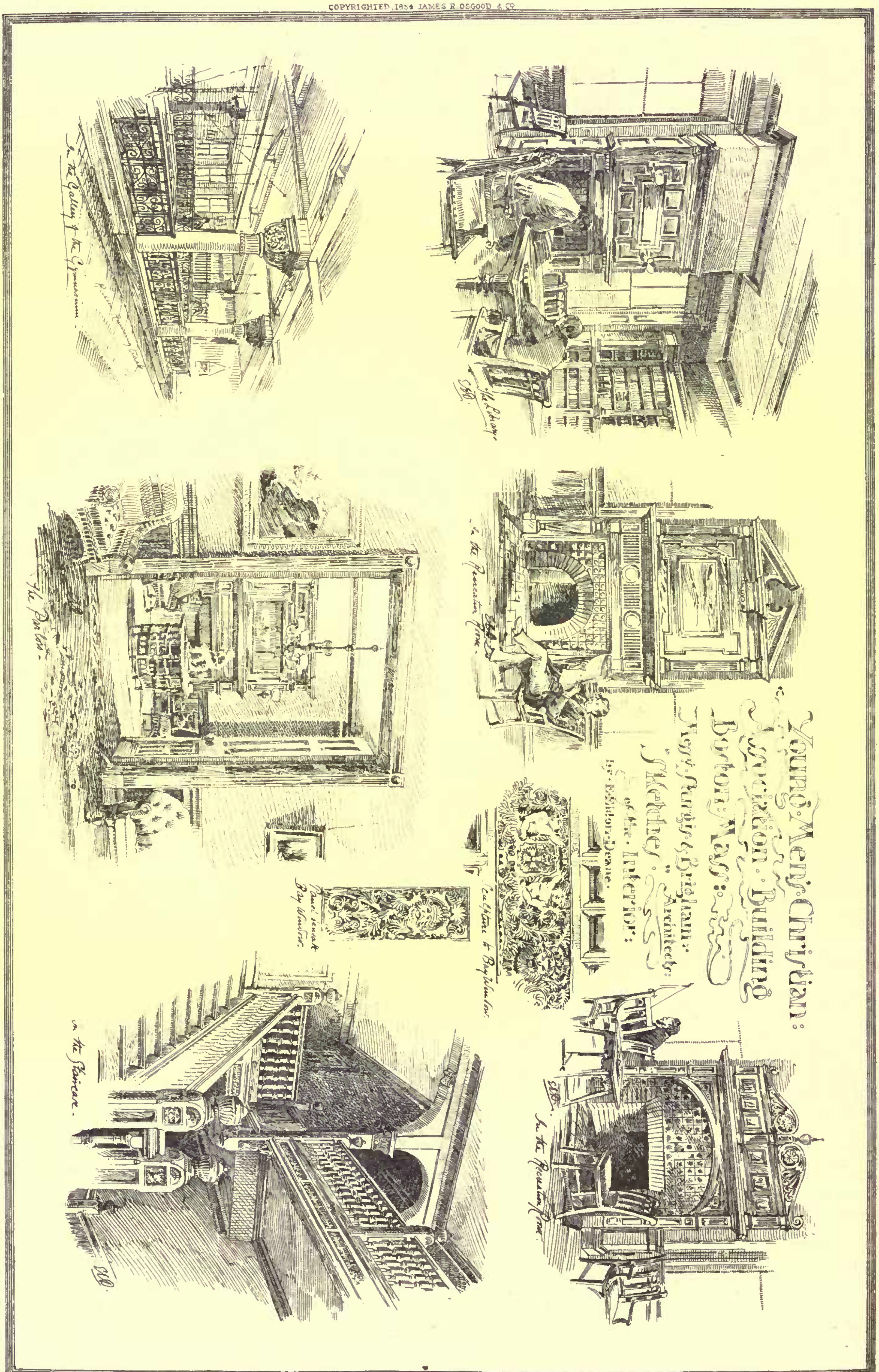
When the time for our departure came, there was hand-shaking and a gracious blessing from the old man, and a message to Father De Fouri, and we climbed down from the city in the air and rode back in silence to the railroad.— *Lawrence, (Kans.) Journal.*

THE ILLUSTRATIONS.

THE CITY THEATRE, BROCKTON, MASS. MR. J. A. FOX, ARCHITECT, BOSTON, MASS.

In planning this theatre, care has been bestowed rather on its structural elements than on its decorative features, and attention has been chiefly turned, perhaps, to making it fire-resisting. The several departments of the building, the stage, the dressing-rooms, the auditorium, the lobbies and the passages are all enclosed by and separated from one another by stout, brick walls. The proscenium wall has but two openings in it, the stage opening and one small door, and the decorative features about the proscenium arch are of galvanized-iron. The stairs have wooden treads, pugged between the carriages with mortar, and the soffits plastered in three-coat work on wire lathing. The doors are all metal-covered, sometimes with an ornamental covering outside of the metal-work, and swing outward. The entire building is lighted by the Edison electric lamps, supplied from a central station in the city; the lights in the passages and lobbies being independent of all others. All floors are protected by asbestos felting between upper and lower boarding, and whatever could be done to ensure safety from fire, without incurring excessive expense, has been done. Besides these things, the stage is supplied with standpipes, hydrants, and hose connected with the city water-supply, and portable fire-extinguishers are distributed through the building. Safety is still further assured by placing the steam-boilers outside of the theatre-building, and the heating of each department of the building is independent of the others.

The whole cellar under the auditorium is covered overhead by a network or gridiron of steam-pipes, and the fresh air taken in at the rear of the lobbies circulates over them and enters through openings left in the upright risers of every seat-step, thus distributing the heat where it will be of most service and avoiding draughts. This system is supplemented by radiators placed against the exposed north wall on Ward Street side and under the north proscenium-box. The lobbies



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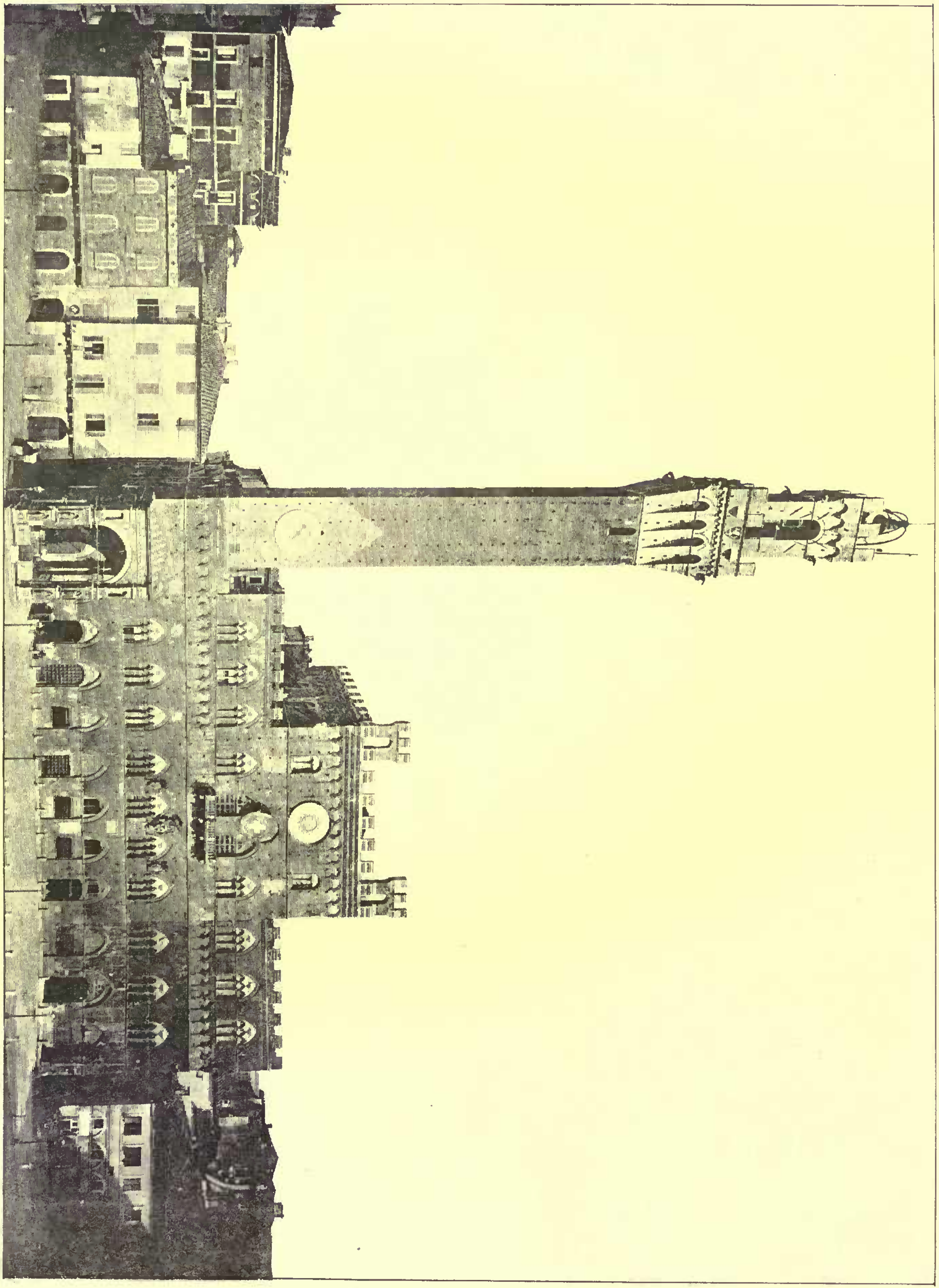
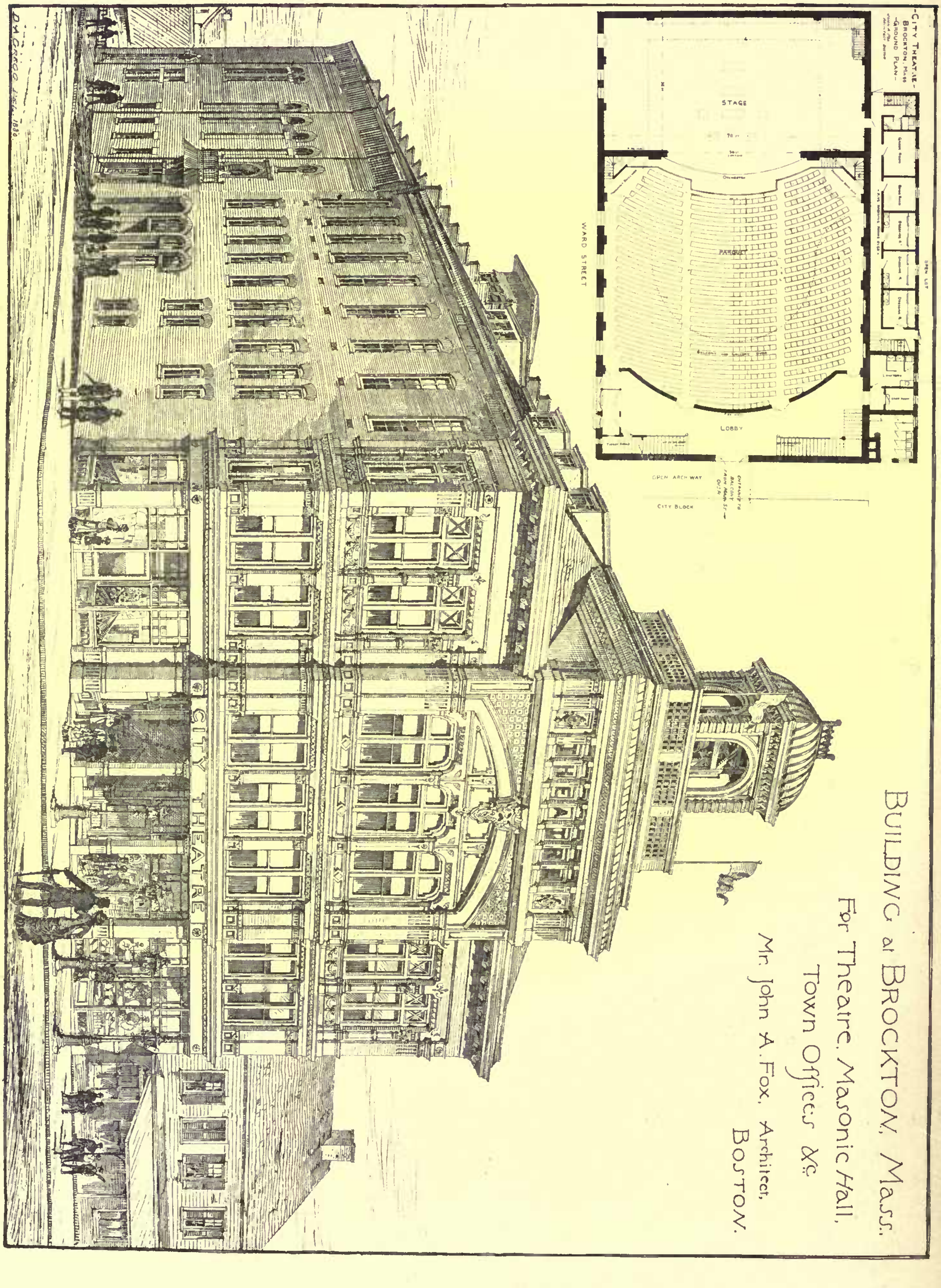
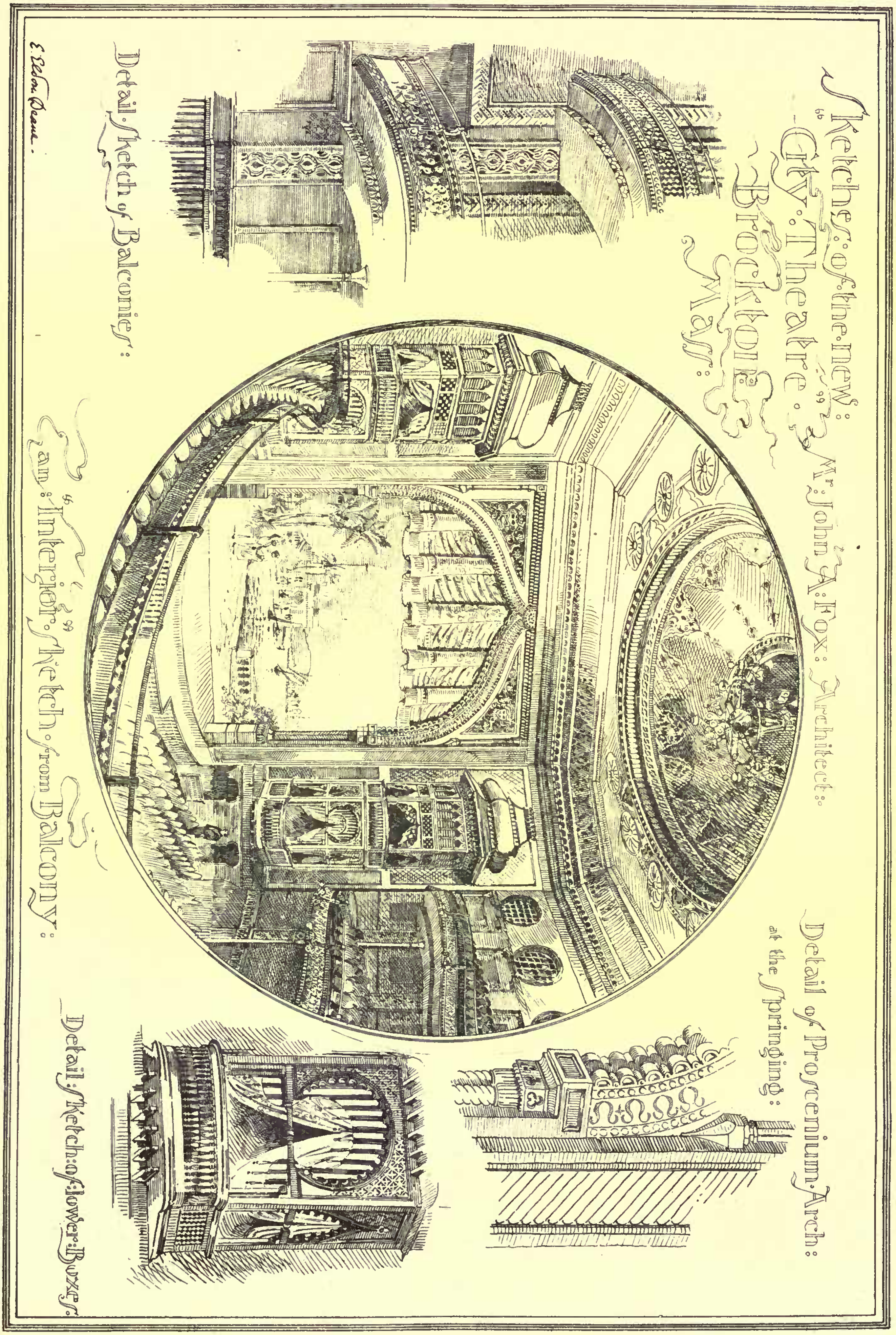


Piazza del Campo, Siena, Italy

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.



BUILDING at BROCKTON, Mass.
For Theatre, Masonic Hall,
Town Offices &c.
Mr. John A. Fox, Architect,
Boston.



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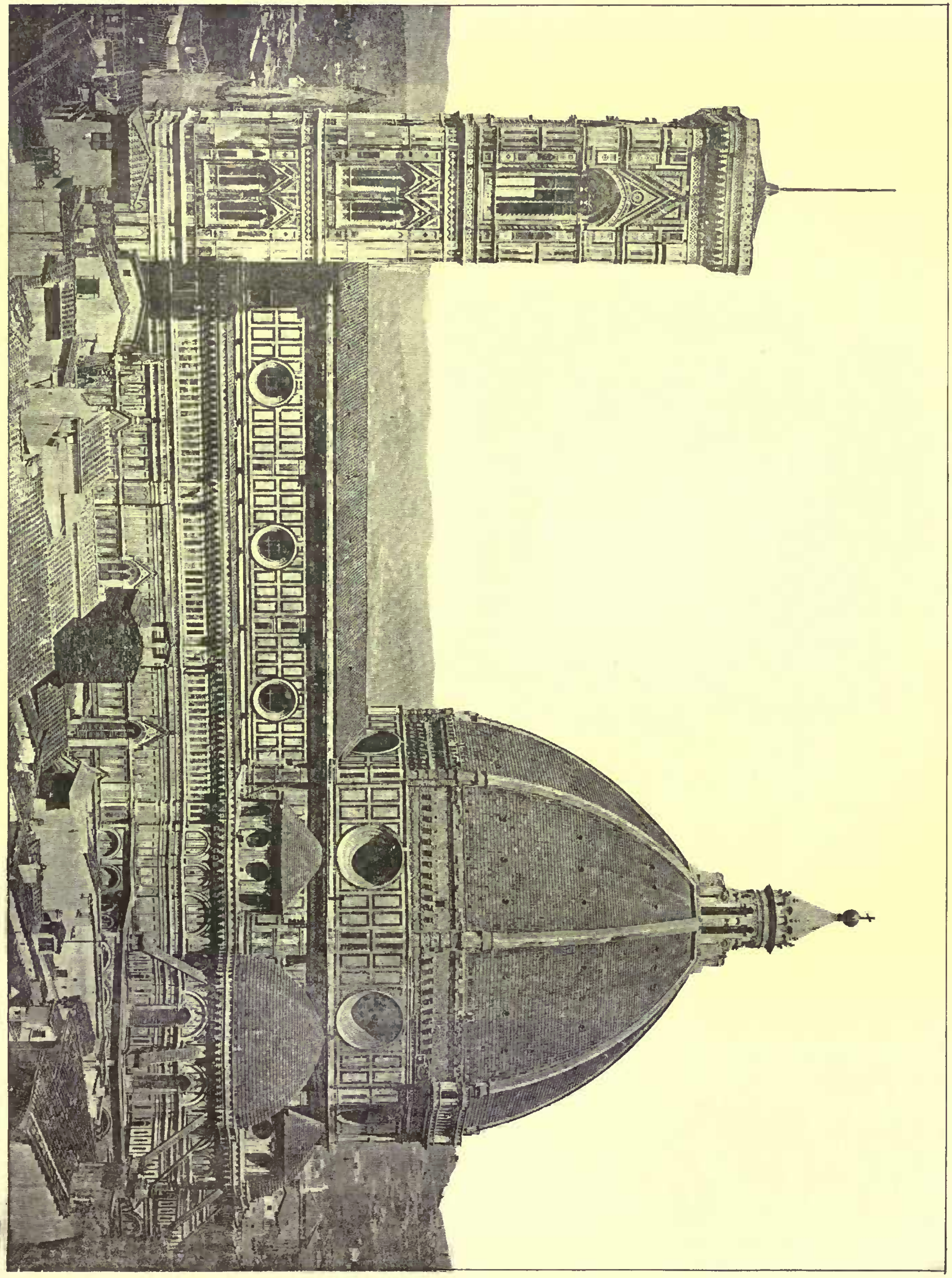
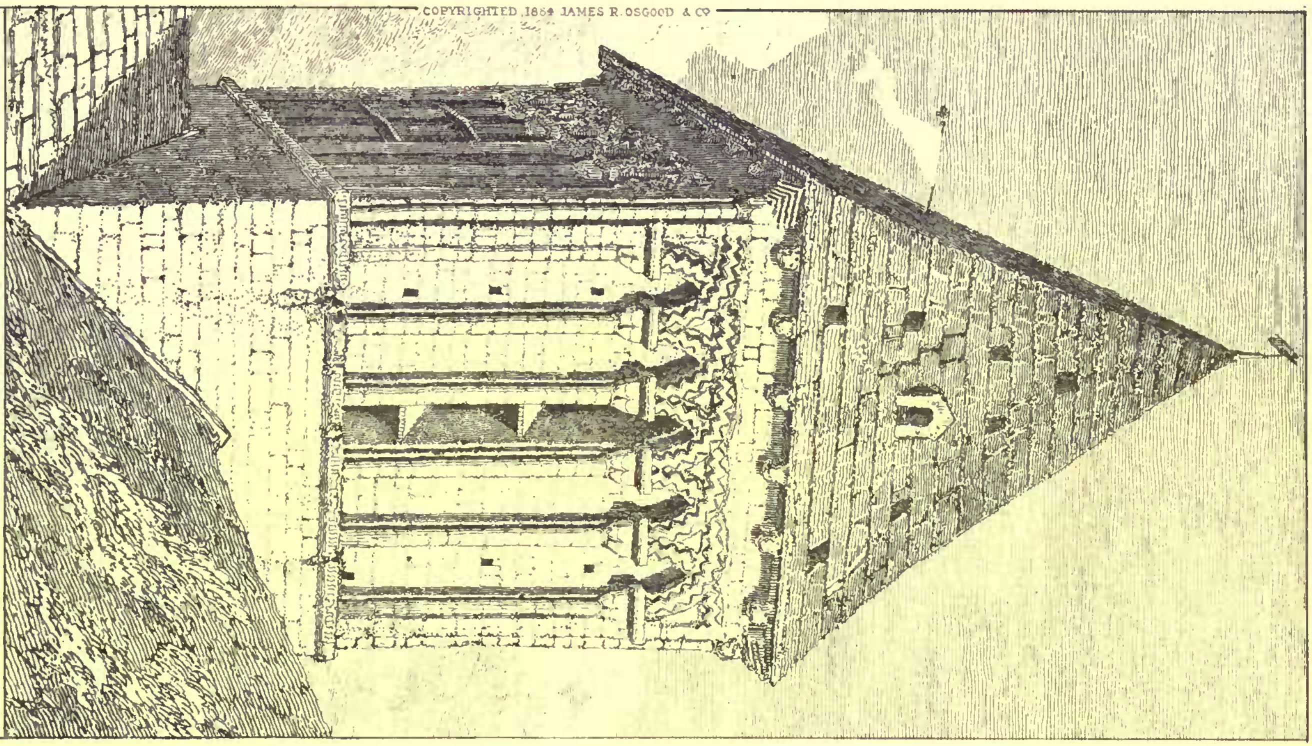
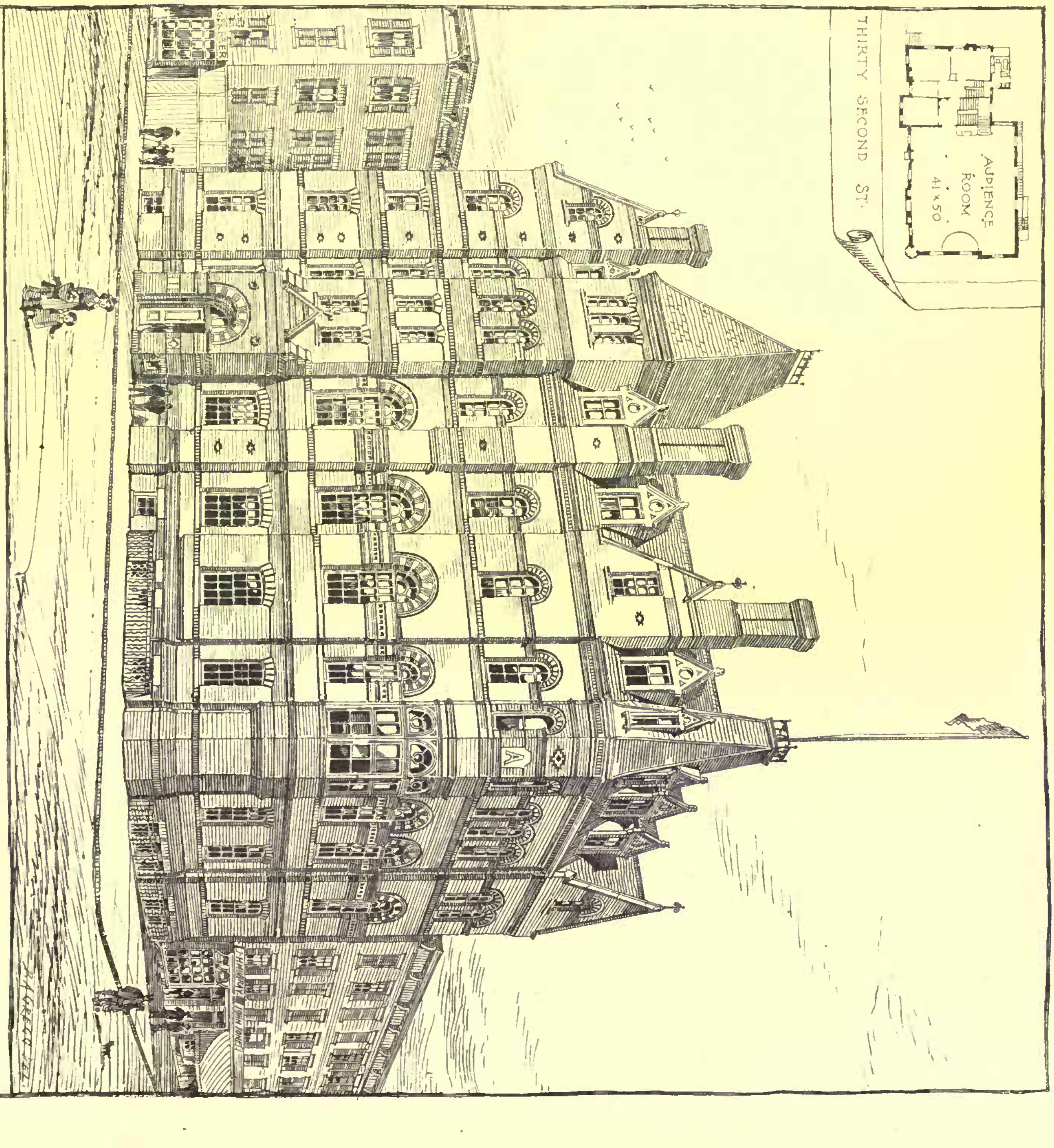


THE CATHEDRAL, FLORENCE, ITALY.

PHOTO-CAUSTIC. HELIOTYPE PRINTING CO. BOSTON.



TOWER OF THE CHURCH OF HAUTE ALLEMAGNE
NEAR CAEN.



BOYS' LODGING HOUSE AND SCHOOLS – SEVENTH AV. – N.Y.
FOR THE NEW YORK CHILDRENS' AID SOCIETY – VAUX & RADFORD. ARCHTS.

and lavatories are heated by direct radiators, placed to intercept and temper all incoming currents of cold air. The main foul-air outlet is the large louvre ventilator, placed in the flat roof directly over the eye of the dome. This is extended down to the dome lantern by a tight shaft, which is connected under the roof with three smaller shafts, carried to perforated ceiling-ventilators in the rear of the gallery ceiling, and these again draw through openings in the seat-steps and ventilating openings under the balcony directly from the dead air under the latter and in rear of the parquet. These ventilators and also the dome lantern are of perforated iron plate, in decorative patterns. An upward current is created in the main shaft by coils of steam-pipe and stacks of cast-iron radiators, which are intended for use for this purpose both in summer and winter.

A study of the plan will reveal most of the features of the arrangement, while the sketches of the interior serve to show the eclectic character of the architecture of the building. The general tone of the interior color is more "on the yellow" than anything.

The auditorium has a depth, from curtain-wall to lobby, of sixty-eight feet, and a width from wall to wall of seventy feet and four inches. The full height from the lowest part of the parquet floor to the eye of the dome is fifty-one feet. The parquet has twenty-four rows of seats, the balcony seven rows, and the gallery six rows. The pitch of the parquet is rather steeper than common, and the height of the stage front lower, to suit the level floor of the stage.

Each level of the auditorium is backed by a lobby sufficiently large to give standing room for all the occupants of seats in that division. These lobbies are separated from the auditorium by self-closing doors, and each of the three has ample cloak and coat rooms and lavatories. Two broad and heavily-built staircases, with rails on both sides throughout, lead from the gallery and balcony to the street level, and the balcony section has a direct exit through City Block to Main Street. The parquet lobby has, in addition to its principal exit on Ward Street, another to the arched passage under the rear of City Block, and opening at one end on Ward Street and the other on an open yard. Besides these regular exits there are outer doors and stairs from the balcony and gallery lavatories to the flat roof of the dressing-room annex, and glass doors to an open wrought-iron balcony on Ward Street.

The great arch has a height from the stage to the crown of thirty-six feet, and a clear span of thirty-nine feet and four inches.

The drop-curtain has this peculiarity: as the height of the building would not allow its being raised, sash-like, in the now accepted method, it was divided horizontally into two divisions; the lower part, the drop-scene, rising behind the upper part, which depicts painted drapery. The motion of these portions is regulated by the speed at which their respective drums revolve.

TOWER OF THE CHURCH AT HAUTE ALLEMAGNE, NEAR CAEN.[1]

OF the history of the parish of Allemagne, nothing is known. The portion of its church here figured, has been selected for engraving, as an instance of a Norman tower of unquestionable antiquity, and in the highest preservation.

The pyramidal roof, similar to that of the Church of St. Michel de Vaucelles, at Caen, appears quite to be in its original state. Even the small lucarne window in it looks coeval with the rest. The row of intersecting is beautiful and peculiar.

BUILDING OF THE YOUNG MEN'S CHRISTIAN ASSOCIATION, BOSTON, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

[Gelatine print.]

WE regret that it has not been placed within our power to publish either plans or a description of this building.

NEWSBOYS' LODGING-HOUSE, NEW YORK, N. Y. MESSRS. VAUX & RADFORD, ARCHITECTS, NEW YORK, N. Y.

THE CITY-HALL ON THE PIAZZA DEL CAMPO, SIENA, ITALY.

THIS building was built by Agostino and Agnola da Siena in 1295–1309.

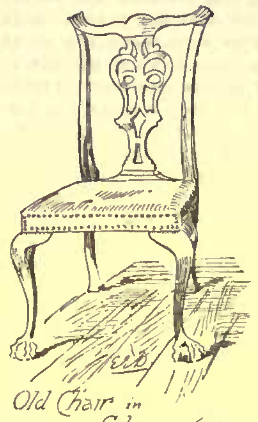
THE CATHEDRAL, FLORENCE, ITALY.

THE Church of Santa Maria del Fiore, dominated by Brunelleschi's dome, and flanked by Giotto's campanile, is too well known to require description here.

ART LOSSES AT COPENHAGEN.— We hear from Copenhagen that the principal losses among the artistic treasures of Christiansborg (called Christianborg by most of our newspapers) are the following: Thorwaldsen's splendid marble freize, the "Triumph of Alexander," still hangs on the naked walls of the Riddersal, but calcined and utterly ruined. Jerichau's colossal marble group of "Hercules and Hebe" was saved in the most spirited way by a troop of sixty artillery soldiers; but the "Adam and Eve" and the "Panther Hunter" of the same sculptor, the latter his masterpiece, stuck on the staircase, and had to be abandoned. A series of important historical frescoes by Lorenzen, including a "Battle of April 2, 1801." and a "Return of Thorwaldsen," perished. As is known, however, the great majority of the collections were saved, the pictures being carried, covered in cloths, into the huzzars' barracks. Much of every kind has been saved, but it is impossible yet to tell exactly what, as the objects were hurried into all available places of shelter. The losses seem to be principally of sculpture, but the saving of the Thorwaldsen Museum makes all minor destruction seem of little importance.—*Pall Mall Gazette.*

[1] From Cotman's "*Antiquities of Normandy.*"

THE EADS SHIP-RAILWAY.



Old Chair in Salem's (Mass.) First Church

MR. JAMES B. EADS has placed on exhibition at the Union Switch and Signal Co.'s building in Pittsburgh a $10,000 model of his marine-railway. It is no less than a perfect working-model of the proposed ship-railway over the Mexican isthmus.

It is four years since Mr. Eads proposed his present plan. Since that time Mr. Eads has been engaged in having surveys made, perfecting the details of his scheme, and in bringing the matter before the Congress of the United States, in order that his own Government might have the opportunity of aiding it in the interest of American commerce. The Committee on Commerce of the United States Senate, after having taken considerable amount of evidence and after having very carefully considered the whole question in all its bearings, made by a unanimous vote a favorable report to the Senate recommending that the bill should be passed in the interests of the country.

A concession was obtained from the Mexican Government by Mr. Eads in 1881, which extends over a period of ninety-nine years from its date. This concession authorizes the construction across the Isthmus of Tehuantepec of a ship-railway, an ordinary railway and a line of telegraph. There are other important provisions, such as exempting ships and merchandise in transit from government duty, granting the concessionaire 1,000,000 acres of public land, and guaranteeing protection during the construction and subsequent operation of the works.

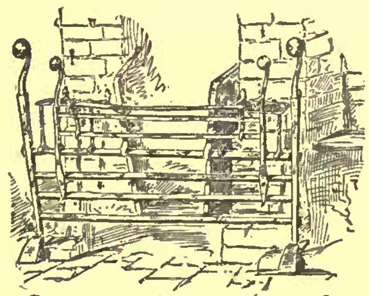
The proposed railway will be about 134 miles in length. Commencing from the Atlantic side, the route will start from the Gulf of Mexico, and the Coatzacoalcos river will be utilized to Minatitlan, about 25 miles distant from the Gulf, in which the tide has a rise and fall of 18 inches only. From Minatitlan the route extends over an alluvial plain, on quitting which the line enters an undulating tableland, presently following a succession of broad valleys between which there are wide-spreading table-lands, the whole forming an extensive interior basin, bordered on its eastern and western sides by irregular mountain ranges, spurs of the main Cordilleras. The line descends thence by easy grade to the Pacific coast. The maximum gradient is only one per cent. Bocca Borra will probably be the terminus, as there is only a tide of five feet there.

The details of the ship-railway are perfectly illustrated by the model at the Switch & Signal Works. A perfect ship, seven feet long, is raised up out of the water, put on its car, run across an imaginary isthmus and put safely down in the Pacific ocean. Practically the ship is elevated from the sea level to that of the railway by means of a large floating dock or pontoon, which may be described as a huge iron box. In practice, this pontoon would be about 450 feet long, 15 feet deep and 75 feet wide. It is arranged to float or sink in a basin, in which its vertical movement is guided. On each side of the basin there will be twenty or thirty iron rods, arranged vertically, and secured to the bottom of the basin. These rods will be capable of holding the pontoon so as to prevent it rising above the level of the railway when the ship and cradle have been taken from off it. The deck of the pontoon is laid with rails which will correspond exactly with those on the permanent land line when the pontoon is floated. When in this position a cradle on wheels and capable of carrying the ship, is run on to the pontoon, which is then submerged by admitting water into it through sluice gates, which are regulated from the top of two quadrangular water-tight towers attached to the deck of the pontoon, and between which there is sufficient width for the cradle and ship to pass. When the pontoon has been submerged to a sufficient depth for the bottom of the ship to clear the supports upon which it is intended she shall rest, the vessel is floated in from an adjacent basin, and secured over the top of the carriage or travelling cradle. The pontoon is then pumped out by means of a powerful pump, and its deck rises up to a given hight above the water, its farther progress being stopped by the heads of the vertical rods before alluded to. The rails on the deck of the pontoon now range precisely with those on the land, and while the pontoon is in this position locomotives are backed up and attached to the traveling cradle, and it is started on its journey across the isthmus. On reaching the end of the line the traveling cradle is run on to another pontoon, which is submerged, and the ship floated off into another basin on its way to its destination.

The traveling cradle has a bottom composed of hydraulic rams, all connected, and on these the ship rests. Their being connected allows the ship to rest evenly upon all of them as if in water itself. The tops of the rams are large steel plates on toggle joints which adapt themselves to the sides of the ship. The cradle is mounted on about 360 wheels, each wheel being flanged on both sides. Each of the platform girders is supported by 12 strong spiral springs resting on the bearing of 12 of these wheels, and as each girder carries but 100 tons of the dead load, each spring transfers to a wheel eight and a half tons. Each spring requires 20 tons to close it up, and has a range of five inches. When the rams are withdrawn the weight of the platform rests on these springs, and of course, partially closes them, leaving still $2\frac{1}{2}$ inches or 3 inches of play in each spring to allow the wheels to pass over any inequality of the rails which may happen to exist. The wheels are hung independently — that is, each is separate from its fellows, having its axle protruding on each side sufficiently far to furnish a proper bearing. The breakage of any one wheel, therefore, would not affect any other wheel, and if even a dozen were to break the great number that would be left would possess such an enormous surplus of strength, compared with the broken ones, that derailment may be considered as practically impossible. The chances of derailment are still further reduced by the circumstances that the railway will have no curves, and the speed will be limited to ten miles an hour. Mr. Eads considers that besides the equal distribution of the load over the wheels, the avoidance of all curves in the road is absolutely necessary to render ship railway transportation practicable. In order to avoid having curves, and at the same time the necessity of making enormous excavations to preserve the straight direction of the road, floating turn-tables are introduced wherever it is necessary to change the direction of the route. This is another remarkably simple and clever device, and it not only serves the purpose, but it constitutes a shunting place, where ship-carriages coming from opposite directions may conveniently and rapidly pass each other.

As the road is not intended to carry such vessels as the Great Eastern, but is to be constructed for profit, its probable cost will be but $75,000,000. If in the future the transport of such large vessels should be required and promise to be profitable, it would be practicable to carry them by increasing the width of the road bed, the size of the cradles, and the flotation power of the pontoons and turntables. Ships of 5,000 ton gross weight will include 90 per cent of the present tonnage of the world, and the ship-railway will be constructed to accommodate these as the maximum sized vessels. The single track is considered to be capable, with only the five turn-tables that are necessary to change the direction of the road in difficult parts of the line, to permit ten or twelve ships starting from each end of the line to pass each other daily, and to accomplish the trip in fifteen or eighteen hours without difficulty. If these vessels averged but 1,500 tons each day they would amount to at least one quarter more than the Suez Canal is accommodating to-day. The above estimated cost is based upon the most careful computations by Mr. Eads upon the entire project, including harbors, docks, roadway and general plant and machinery for transporting vessels of 5,000 tons gross weight. — *Pittsburgh Commercial Gazette.*

LIMOGES.



GRATE STILL IN USE AT THE WOODMAN INN, BIRMINGHAM ENG. FROM THE METAL WORKER.

WHEN we first saw Limoges, in 1857, says Mr. E. A. Freeman, in an article in the *Guardian*, its great church was still a fragment. It had something of the air of Köln. About one-half of a great French church rose high in the air, and at some distance to its west rose a tall and slender tower of a most singular air. But the tower did not, as at Köln, suggest imperfection as well as the unfinished body. There was no crane to show that there still was work to be done, and though, as we come to learn more of the history of the building, we find out that the tower has been shorn of a spire, yet no one at first sight would say that a spire was at all needed. That is to say, in 1857 the church of Limoges was altogether unfinished. All that was left of the Romanesque church was the lower stage of the tower. Far to the east of it a magnificent church of the later French type had been begun; the choir and transepts were finished; the whole nave had been traced out and begun, but only about two bays were ever finished. In the sixteenth century the thought of carrying on the work seems to have been given up, as then the church was in a manner finished inside by adding a great organ-loft, handsome after its own fashion. The Romanesque church, in short, had given way to a Gothic church which remained a fragment, and so a gap was left between the actual church and the tower. In 1857 there was talk of filling up the gap, and now in 1883 it is all filled up; in short, the nave is now nearly finished. The work reminds one of Bristol, only to finish the lofty nave of Limoges was a greater work than to build the far lower nave of Bristol. Also at Bristol there was no ancient tower standing near where the west end had been or was to be, whose existence could not fail in some measure to influence the finish of the new work. At Bristol the architect could design his west front how he pleased, and we may be allowed to doubt of the wisdom of adding western towers to so small a church, especially as their addition implied the destruction of a still surviving piece of the monastic buildings. At Limoges there was the more frightful danger lest the ancient tower should be doomed to give way to the modern architect's notions of a west front. There was some such fear in 1857; but happily it seems to have passed away in 1883. It must be allowed that the tower stands awkwardly in the way of the new work, as it is not in the same line, and will have to join on in some way at a corner; but the new building seems to be adapted to it so far as it may be. The contrast will be great, and the tower will lose a good deal of its seeming height by having so lofty a building attached to it. But the two must agree as they can. No one could wish the tower to be touched, and no one can quarrel with the completion of the body of the church.

The tower is a strange building enough. On a vast square base, which, if itself carried up as a tower, would bring down Wymondham and even Ely to utter insignificance, stands a much narower square stage, from which rises a slender octagon of three stages, set on in an unusual fashion — lozenge-fashion, if that word may be applied to an octagon, reminding one somewhat of the way in which the upper stage of the tower of Cartmel is set on the lower. This is the custom of Limoges; the towers of the other two surviving churches of the city have just the same character. Like some of the work at Angers, they keep the lines of the earliest Gothic; but their real date is late in the fourteenth century. The other two churches, those of St. Michael and St. Peter, keep their spires; the spire of St. Stephen's is gone.

These Limousin towers have a certain interest as examples of a very local form. We may doubt whether we really admire such singular height and slenderness and piling of stage on stage, very different from the artistic composition of such a tower as Bishop's Lydeard. But they are at any rate striking from their boldness and novelty. But the tower of the cathedral church has a far higher interest. To know what it really is we must go inside. The square base is masked by a casing, perhaps of the last days of the eleventh century; but within is the lower stage of the tower of the original Romanesque church, which, we can hardly doubt, stood as a detached campanile. The lowest story, after a fashion rare but not unique, stood open. Four large columns, with their round arches, supported a kind of cupola; but the design was ruthlessly disfigured when the tower was cased. The columns were walled up and pointed arches were inserted. But it is not hard to call up the original effect, which may be seen in a less changed state at Le Puy, where, however, square piers take the place of columns. The odd thing is that the lowest stage of these towers presents the exact design of a Byzantine church of the smallest scale, lacking only the eastern apse. Yet there can be no reasonable doubt that both these buildings were meant to be what they are, the lower stages of towers; only that at Le Puy has been carried up with great skill in a later form of the same style, while at Limoges the far later tower sits with some measure of awkwardness on its ancient base.

When we first saw Limoges, in 1857, there were still to be seen on the west face of this tower the traces of a church contemporary with the blocking of the columns and the introduction of the pointed arches. They have now given way to the necessities of the work of finishing the imperfect nave. They point to a church of considerable height, with aisles, very plain and simple, but using the pointed form in its constructive arches. Now, what is the date, first of the blocked columns, secondly of the work that blocks them? There was at Limoges an ancient basilica, attributed to Saint-Martial, the apostle of Limoges, in impossibly early times. Rome and Ravenna cannot show churches of the third century or earlier. But we need not doubt that a fellow to the churches of Rome and Ravenna lived on at Limoges till about 1012, when Bishop Hilduin began or at least ordered the building of a new and larger church. This is witnessed by the Aquitanian chronicler, Ademar of Chabennes. In 1095, Pope Urban consecrated this church or some other on the site. The present church was begun with funds left by Bishop Americ de la Serre, who died in 1272. Here are our dates. The tower in its oldest shape, if it stood along with the old basilica, must have been an addition to it. It would do very well for work of 1012; but Hilduin's church was barely begun, if begun, and its tower, if it had one, would be much later than that date. We are tempted to suspect that the four columns are older than 1012; that the blocking of those arches and the church of which we see traces against the recased tower belong to a rebuilding, begun perhaps in 1012, but carried on slowly, and perhaps not fully finished in its western part even at the dedication in 1095. In this way the appearance of the pointed arch — here, as in Italy, a sign of the Saracen — really becomes no great puzzle. Under the present choir is a crypt, which ought to throw some light on the Romanesque building. But as it can be seen only by lifting up a stone which takes six men to stir it, it is pretty well forbidden ground to the ordinary traveller.

We now pass from this tower, precious relic of an earlier time, to the later church, the church which is now hasting to meet the ancient tower. Here we find ourselves carried into another world of art and history. Limoges cathedral, or so much of it as is built, is one of the loveliest examples of the best French Gothic style. We say French advisedly; by the year 1273, the elder local forms of art had pretty well passed away. One general model prevailed through the whole of what had now become the kingdom of France. And within that kingdom few buildings can, for internal effect at least, outdo such a church as the still fragmentary St. Stephen's, of Limoges. It does not come in point of scale in the first class of French churches; it does not rank with Bourges, Chartres, or Saint-Ouen's; the dimensions on the ground plan even of the completed church would in England place it very low indeed, and even in France it does not cover anything like the same ground as the great buildings which we have just named, and, much smaller in extent, it is also, by all laws of proportion, by no means their rival in positive height. But its relative height is fully equal to theirs; it has all the loftiness which distinguishes a French church from an English one, and we fancy that it must be positively higher than any English church except Westminster and York. And though the arch of the vault is perhaps a little too low, there is no church of any scale or country in which the internal design is, on the whole, more skilfully managed. The leading design of the elevation is that of the lofty pier-arch and tall clerestory, with only a small triforium between them. It is a problem in such a case to design the triforium so as to make it a subordinate, or at least an intermediate feature, and yet not to make it insignificant. It should not be either so prominent or so unimportant that anybody could wish it away. We admire, perhaps without altogether approving, the glazed triforium at Saint Ouen's, and, on a smaller scale, in the choir of St. Peter's at Chartres. But this is not the purpose of a triforium; it suggests the retort that, if you want more glazed space you should make a longer clerestory, and the clerestory in both those churches is quite long enough. The Limoges triforium is, as it should be, an essentially internal feature, a modest feature, a feature not asserting any special prominence, but whose absence would at once form a blank. The transepts, too — a difficult part of the building to deal with in these churches without central towers — are dealt with here with thorough skill. The architect of Limoges cathedral tried the same experiment which was tried by the architects of St. Mary Redcliff and of Bath Abbey. He made his transepts considerably narrower than the nave and choir. At Limoges, where there was to be no central tower, it was open to the designers to make the transepts narrower if they chose. At Bath it had the absurd effect of making the central tower oblong, as it doubtless would at Redcliff, if the tower had ever been finished. But even in the other cases the experiment was a daring one, and we cannot help thinking that the experiment at Limoges succeeded better than the experiment at Bristol. The transepts, somewhat like the triforium, are after all a secondary feature, especially when there is no central tower. They must be not insignificant, and yet they must not be so prominent as to overshadow the eastern and western limbs.

At Limoges, where there can never be any real west front, we might have approved of a great façade to the transept better than in some other places; but the narrowness hindered anything like the great fronts of Chartres. The designer adapted himself to his conditions: instead of a rose-window, to which there was not breadth enough to do justice, he made a very noble pointed window with a prominent spherical square. Within, the narrowness at once marks the transept as subordinate, and at the same time gives it a character of its own. The effect of height is of course greater than in the wider parts of the church. The experiment in short has succeeded. We do not, as in some French churches, wish the transepts away on the ground of insignificance, nor yet do we feel, as in some others, that they have taken to themselves an importance which belongs only to the east and west ends of the building. And the discretion of the Limousin builders seems to have lived on through many generations. The church went on building, with some interruption, from 1273 to 1554, and the difference between the work of different dates is plain enough. Yet all is thoroughly harmonious. We see that there is work of different dates, not by any change in the general effect, but wholly by the details, mainly by the change in the tracery of the windows, which in the western part of course becomes Flamboyant — good Flamboyant, be it observed. There is no building in which one can better sit and gaze and muse — looking, of course, eastward or else across — than in St. Stephen's, at Limoges. The effect of some of the vaster churches is more overwhelming; there is none which is more thoroughly satisfactory, none which is at once more pleasing to the eye and more thoroughly commends itself to a critical judgment. If there is a fault, it is that the vaulting arch is a little too flat; but its flatness is not so great as to have the same killing effect as in the metropolitan church of Rouen.

COPPER ROOFS.

PHILADELPHIA, PA.

To the Editors of the American Architect: —

Dear Sirs, — An article has lately appeared in the *Mining Gazette* in reference to the advisability of architects, builders, etc., using copper roofs, and urging their use on account of durability, and the present low price of manufactured copper, basing the statements on the price of ingot copper, and the cost of manufacturing it into sheet copper at three cents a pound, without regard to the thickness of the sheets manufactured. This article has been copied by many of the leading journals devoted to architecture and building throughout the country, and has no doubt attracted much attention from those interested in the subject. We have read it carefully, and it is so misleading in its statements, so inaccurate in its deductions, and such absurd prices as to the cost of manufactured copper are given, that we take the liberty of correcting some of these statements to show why in our opinion copper roofs generally in this country cannot take the place of other material, not altogether because of the great expense, but because, unless put on so as to avoid the great expansion and contraction, the roof will be utterly useless for the purpose for which it is intended. Although this firm is not engaged in the roofing business, it has within the past ten years, we believe, supplied a very large portion of the sheet-copper that has been furnished for the different Government and State buildings, besides large quantities of sheet-copper for gutters, valleys, etc., to the trade in general; hence we do not write this letter without some knowledge of the facts of the case.

We do not doubt all that is said in regard to *durability of copper roofing*, nor is there any question in our minds as to the vast number of inferior roofs, which have been and are being put on at the present day. We do not hesitate to assert that the fault lies not only with owners of property, who are not willing to pay a good price for a good roof, but with architects, who when specifying tin plates, simply specify "IC or IX Best Charcoal Roofing," which in reality means nothing. The great expansion and contraction of sheet-copper is such, that if a copper roof is put on in the ordinary way a tin roof is, say of 16-ounce copper, it cannot be secured by solder, nails, or screws that will hold any length of time, and make a secure roof. The Government formerly used 16-ounce copper on all public buildings, and though these roofs were put on at the time by competent firms, we have it from a reliable authority that the expenses of repairs on Government roofs up to the present time will show a loss to the Government of so much money that the public at large would not believe it; in fact, it has been asserted that in some cases, the weight of the solder used in patching these copper roofs to keep them from leaking would amount in weight to almost the original weight of the sheet-copper put on. The Government has after a series of experiments come to the conclusion to use no copper heavier than 10-ounce for the body of the roof. Amongst all the patents, of which there are many for putting on copper roofs, we believe there is only one, so far, that can practically make a first-class copper roof, by which the edges of the sheets are positively fixed at frequent intervals, and the sheets of 10-ounce copper being light, will buckle between the fixed points, and not be dragged backwards or forwards over the whole roof. By this patent, the expansion is thus distributed over the whole roof, and between any contiguous fixed points is so slight, that it is scarcely appreciable. The size of the sheet used should not be more than 24 inches wide, and 48 inches long, about 3 inches off the width is required for grooving.

We understand that by this patent, it would cost about 10 cents per square foot to lay this roof, over and above the price of the material; or take 10-ounce copper at the market price to-day, and we hardly think it possible to lay a roof at less expense than 31 cents per square foot, or over double the amount stated by the *Mining Gazette.* This would be nearly four times the cost of using the heaviest coated tin roofing-plate in the market. While it is true that even an extra-coated plate must be painted from time to time; yet even taking into consideration the cost of painting every few years, the interest alone on the original amount expended for a copper roof over tin, would in the course of many years be a very important item. Our figures for putting on a copper roof are based on plain copper, while the Government uses copper tinned on both sides, which adds a cost of five cents per square foot; but we do not believe that there is any necessity of tinning a roof, unless used in such States as Texas and other places where they are more or less dependent for water caught from the roof. Though sheet-copper is largely used for gutters, valleys, etc., we think that you will find upon investigation that great difficulty is experienced by the most competent houses in making durable jobs of sheet-copper, in fact it is almost impossible to make long lengths of some gutters without breakages soon occurring. We have in our city quite a number of buildings that have been roofed many years with sheet-copper, but we are informed that there are constant repairs needed on these roofs. There is no question in our mind, as to the durability of copper, and that a copper roof properly put on is the most lasting one. Under the patent referred to, we have no doubt that a perfect roof can be had; yet as to the question of cheapness as regards other roofs, it has only been our intention in this letter to point out why the statements made by the *Mining Gazette* are misleading to architects and builders.

We have given the subject of copper roofing our personal attention for many years, and if any of the statements made by us are incorrect, we trust that those who have had a practical experience in this line, will give you their views on this subject.

Yours truly, MERCHANT & Co.

APARTMENT-HOUSE PLANNING.

BOSTON, MASS., November 22, 1884.

To the Editors of the American Architect: —

Dear Sirs, — In a paper read by Mr. T. M. Clark, before the Society of Arts, he speaks of apartment-houses being built within *a year or two*, in which the parlor, dining-room, etc., were on one floor, and the chambers and bedrooms on the floor above, and the two floors connected by a private staircase. I built an apartment-house of this kind for Eben Wright, in the Town of Brookline, in the summer of 1875.

The arrangement has always given satisfaction so far as I know.

Yours truly, O. F. SMITH.

NOTES AND CLIPPINGS.

TUNNELLING UNDER THE STRAITS OF MESSINA.— Signor Gabelli, civil engineer, has published in a recent official report his ideas on uniting the Island of Sicily with the Italian Peninsula by means of a tunnel. The first thing to be considered, according to Signor Gabelli, is the conformation of the sea bottom at the Straits, and he states that it is beyond all doubt that in a southeasterly and northwesterly course, starting from Pizzo, on the coast of Calabria, and ending at Sant. Agata on that of Sicily, exists a submarine chain of mountains separating the basin of the Mediterranean from that of the Adriatic. The sides of these mountains are very steep; in fact, while the crest of this ridge is only 110 metres under the surface of the sea, at two km. away from it the depth attains 260 metres, in front of Messina it is 340 metres, and in the offing of Reggio 657 metres. The course of the contemplated tunnel is, therefore, clearly established from these hydrographical conditions. It only remains to be seen whether the nature of the soil is sufficiently solid and compact for the purposes required. It was necessary to ascertain the exact formation of the rock to be pierced, and on this point geologists differ. The tunnel, according to Signor Gabelli, would be 13,546 metres from end to end, cost seventy million francs, and would take, if everything went smoothly, five years to complete.—*The Iron Age.*

Church Bells for Civil Uses.—There was a warm controversy some months ago in France over church bells and the expediency of the legislative decision that the right to use them should no longer be exclusively vested in the parish priests, but should be shared by the mayor of the town or commune. In general, since the Chambers authorized the prefects, or mayors, of France to ring the bells whenever it pleased them, the privilege has not been abused, but the prefect of the Haute Marne appears inclined to exercise his privilege in and out of season. He has issued a circular to the mayors of his department advising the civil authorities to set the bells of churches ringing to call children to school, to announce the dinner-hour and the hour for resuming work to field laborers, to notify the time for closing cafés and cabarets, to indicate the opening of the municipal sittings, to call grape-pickers to work during the vintage, to announce the arrival of the tax-collector, and on sundry other occasions which need not be enumerated. Supposing the prefectoral circular to be obeyed to the letter, church bells will be ringing almost incessantly in the Haute Marne, and will be so much monopolized for civil uses that they will hardly be available when required for religious purposes.—*London Standard.*

The Assos Sculptures.—A distinguished European archæologist, in a private letter, writes to the New York *Evening Post* as follows: "I really cannot believe that the Boston men will be silly enough to drop the matter about the Assos epistyle. I thought, and still think, that Americans have got a little backbone of their own, and do not allow a set of ruffians like the Turks to take away from them what they legally possess. I, for my sake, don't care about it, as New York is still farther off from me than Constantinople; but if the matter is dropped, the Turks will see that they can do anything against Europeans and civilized men in general without the least fear of getting a lesson. If the Boston men began a regular action against Hamdi Bey and the Turkish Ministry of Public Instruction, no tribunal in the world could give them wrong, because: 1st. The excavations at Assos were begun under the régime of the law of 1874, which enacts that indivisible sculptures shall not be divided, but valued and given up to the finder in exchange for their estimated value; 2d. In allowing Bonndorf, in 1882, to carry away the frieze of the Göl-Bagtché Mausoleum, the Turks formally acknowledged that a frieze formed an indivisible whole; 3d. In allowing the Germans, in 1884, to take away their discoveries from Pergamon after the promulgation of the new law (February, 1884) forbidding the exportation of antiquities, the Turks acknowledged that excavations begun under the régime of the former law of 1874 remain subjected to the clauses of that now abolished law. The Assos case, therefore, is quite an *abus de pouvoir* on the side of the Turks, and an *abus de laisser aller* on the side of the Bostonians. The money for excavating at Assos was raised by private means; the subscribers have a right to see that they get something for their money. If your Minister in Constantinople made a row at the Porte, and said what we all think about Hamdi's impudence and encroachments, the missing fragments of the epistyle and all the architectural specimens would be returned to their rightful owners."

The Electric Light in the Mechernich Mines.—The electric light installation at the Mechernich Mines in its once volcanic Eifel district in Rhenish Prussia has now had a fair trial for more than three years, and has proved a complete success. The expectation that it would both facilitate the operations and increase their security has been fully realized, and an extension of the plant is now being carried out. Messrs. Siemens & Halske, of Berlin, undertook the work, which was superintended on their behalf by Mr. Boeddinghaus. An open working 2000 feet long, 1000 feet wide and over 300 feet deep, in which 300 men and 20 horses are continually occupied, was first to be supplied with the electric light. This part of the mine is excavated in steps, the horizontal terraces being provided with rails. Ordinary lamps in globes on poles were out of the question, as blasting operations continue throughout the day, and the shots would soon have made havoc of the lamps. After several trials, two powerful lamps of three thousand candles each were erected at the upper margin of the pit, where they were fairly out of the reach of the projected stones, and reflectors were fixed to throw the light down upon the steps. To find the proper positions for these powerful lamps and to avoid too dark shadows caused some difficulty. But the illumination was finally rendered most efficient, and the open pit with the light playing on the whitish gray rock affords a fine spectacle. As any interruptions, even for short periods, such as those occupied in renewing the lamp carbons, would be dangerous, the whole plant is double, each lamp receiving its current from a D_2 dynamo. No hitch of any kind has occurred; and the safety of the miners has decidedly been augmented. It was formerly not always possible for the superintendents to see whether the loose mass resulting from the blasting operations had been properly removed, and frequent minor accidents arose from the débris falling down upon the miners engaged on the step next below. The work can now be controlled much better than before, when petroleum lamps and hand lamps were in use. The cost shows a saving of about 4d. per hour in favor of the electric illumination. The satisfactory results obtained in the open working induced the company to introduce the electric light down in the subterranean galleries. The ore forms little concretions of sand and galena scattered all through the rock; the whole mass had, therefore, to be brought to day to be disintegrated and sifted, and the mining proceeds in parallel and cross galleries, which are constantly being widened until they become 90 feet in width and 70 feet in height, by sometimes 300 feet in length. The operations in themselves would not require much light, if there was not always danger threatening from loosened pieces of rock. Pitch torches were formerly employed to examine the bore-holes and fissures round them after each explosion. It was a question whether the arc-lamp would answer for this purpose in the smoky atmosphere. For the first experiments, arc-lamps of three thousand and one thousand candles were used, with the positive carbon in the lower holder. The effect was brilliant, yet the light did not penetrate the white smoke cloud which collects at the upper wall immediately after the shot. But, as the smoke settles within ten minutes, it was thought advisable to acquiesce in this interruption of a few minutes, and to use smaller lamps of three hundred and fifty candles, which proved quite efficient. Of these there are ten in use with about ten thousand feet of lead cable, the cable being partially elastic, as the lamps with their wires have to be removed when the blasting is to take place. The lamps were originally supplied with hexagonal lanterns with obscured glass to protect the eyes of the miners. The glasses were, of course, soon broken, but no complaints are said to have been made about the naked electric lights. The proprietors of the mine have decided upon an extension of the installation.—*Engineering.*

A Comparison of Imperfect Heat Conductors.—Mr. J. J. Coleman has read a paper before the Glasgow Philosophical Society on the heat-conducting power of materials, with special reference to the porous, loose substances commonly used as non-conducting coverings. The experiments conducted by Mr. Coleman were simple, and involved low-temperature tests only, consisting, as they did, of observations of the melting of ice. A number of ten-inch cubical boxes, of thin tin plate, were filled with ice, and placed inside eighteen-inch cubes, also of thin tin plate, the intervening space being filled with the substance to be tested. The boxes thus arranged were kept in a room maintained at an equable temperature of about 60° F., and the quantity of water obtained per hour from the melting ice was drawn off and measured, thus affording data for the calculation of the quantity of heat penetrating to the ice. The materials used were slag-wool, hair felt, charcoal, wood shavings, breeze, wood and air space, sawdust, cotton wool, sheep's wool and infusorial earth, thus fairly exhausting the non-conducting substances in common use. From the mean of the experiments, it appeared that the heat-conducting power of the various substances stands in the following order: Slag-wool, 100; hair felt, 117; cotton wool, 122; sheep's wool, 133; infusorial earth, 136; charcoal, 140; sawdust, 163; breeze, 230; wood and air space, 280. All these observations were made after the vessels had been in the constant temperature of the room for eighteen hours, to allow equilibrium to be established. All the materials were dried by being kept in a well-ventilated room, warmed by a fire, for several weeks before the commencement of the experiments. It is remarked that considerations of cost and strength to withstand shaking must largely qualify the experimental results when it is a question of using the materials on a large scale. Thus, although one thickness of slag-wool is as good as 1.4 thicknesses of charcoal, or 2.3 of coke breeze, the cost of either of the latter would be much less in practice.—*Manufacturer's Gazette.*

Bricks from Glass-works Sand.—M. Hignette, in the *Bulletin Technologique des Ecoles Nationales d'Arts et Métiers*, describes a new ceramic product from the waste sands of glass factories, which often accumulate in immense quantities so as to occasion great embarrassment. The sand is subjected to an immense hydraulic pressure, and then baked in furnaces at a high temperature, so as to produce blocks of various forms and dimensions, of a uniform white color, which are composed of almost pure silex. The crushing load is from three hundred and seventy to four hundred and fifty kilogrammes per square centimetre. The bricks, when plunged in chlorhydric and sulphuric acids, show no trace of alteration. The product has remarkable solidity and tenacity; it is not affected by the heaviest frosts or by the action of sun or rain; it resists very high temperatures, provided no flux is present; it is very light, its specific gravity being only 1.5; it is of a fine white color, which will make it sought for many architectural effects in combination with bricks or stones of other colors.—*Chronique Industrielle.*

The San Francisco Garfield Statue.—The bronze statue of Garfield, executed by Prof. Lenz, of Nuremburg, on an order from San Francisco, is completed, and has been placed on exhibition at Hamburg. It is of heroic size, the figure being ten feet high. It represents the late President standing erect, with his head uncovered, and clothed in ordinary civilian dress. On the sides of the pedestal are figures representing war trophies and the American eagle. The front face of the pedestal bears in large raised letters the name, "Garfield." The model of the statue was made by Herr Happersberger, a sculptor born in America, but now residing in Munich.—*Boston Star.*

A Time Limit to a Balloon's Flight.—A famous æronant says that no balloon has ever gone over a second sunset. The moment the sun goes down the gas condenses, and you get through the night better than the day. But the next day, in the presence of the sun, the gas expands, and you mount to great elevations; but every mount the balloon makes cripples its power, and it is only a question of hours, if not minutes, how long you can keep up. If an æronant could have forty-eight hours of night, he could travel a great distance. The highest rate of speed he had ever attained, even with a strong wind blowing, was eighty miles an hour.—*Exchange.*

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During the year 1885 a series of Gelatine Prints, (Heliotypes) photographed from the natural object, will be published in the AMERICAN ARCHITECT AND BUILDING NEWS.

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BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

308,048. BURGLAR-ALARM. — Benjamin S. Barckdall, Indianapolis, Ind.

308,055. SASH-FASTENER. — Isaac N. Buck, Elgin, Ill.

308,057. SHUTTER-WORKER. — Henri Camus, St. Louis, Mo.

308,066. COMPOSITION-PAINT FOR SHIPS' BOTTOMS, DRY-DOCKS, ETC. — Jas. H. Dilks, Jersey City, N. J.

308,073. FURNACE. — Alfred Hopkins, Bridgeport, Conn.

308,111. ART OR PROCESS OF AND COMPOSITION FOR MAKING ARTIFICIAL STONE. — Jas. H. Trickey, Hamilton, Ontario, Can.

308,125. DOOR-HANGER. — William Barry, Syracuse, N. Y.

308,128. SHUTTER-FASTENER. — Isaac Brooke, Pottstown, Pa.

308,134. MITERING-MACHINE. — Paul Cashin, San Francisco, Cal.

308,143. FRESCO-PAINTERS' SIZING. — Hubert De Rossi, New York, N. Y.

308,145. TRY-SQUARE. — William B. Edwards, Unionville, Conn.

308,164. DECORATIVE PAINTING ON GLASS. — Emile J. Irlande, New York, N. Y.

308,177. STAY-ROLLER FOR SLIDING-DOORS. — Emil Laass, Syracuse, N. Y.

308,179. FIRE-ESCAPE. — Henry T. Linnenbrink, Rochester, Pa.

308,184. WOOD-FLOORING. — Dudley J. Marston, Salisbury, Mass.

308,186. SELF-CLOSING FAUCET. — Timothy McHugh, Boston, Mass.

308,194. SHUTTER-WORKER. — Miles E. Peterson, Chilton, Wis.

308,197. CIRCULATING-PIPE FOR THE TRANSMISSION OF HEAT. — Berhard Rober, Dresden, Saxony, Germany.

308,213. MITER-MACHINE. — Jared Stilly and John H. Lowery, Lebanon, Pa.

308,228. CASING FOR PIPES. — James F. and John F. Wood, Wilmington, Del.

308,246. SCREW. — John Frearson, Birmingham, County of Warwick, Eng.

308,247. SCREW-DRIVER. — John Frearson, Birmingham, County of Warwick, Eng.

308,251-253. MANUFACTURE OF SPIKES AND MACHINE THEREFOR. — Howard Greer, Chicago, Ill.

308,279. FIRE-ESCAPE. — Henry Rensch, Quincy, Ill.

308,287. TAPE-MEASURE. — Frank M. Slagle, Alton, Iowa.

308,288. HOT-AIR GENERATOR. — George S. Sperry, New Richmond, Wis.

308,303. BRICK-MACHINE. — Charles L. Carman, Chicago, Ill.

308,307. STOPPER IN WASH-BOWLS, SINKS AND BATH-TUBS. — Mathew F. Deegan, Chicago, Ill.

308,317. CHIMNEY-COWL. — Martin Ludwig, James S. and John S. Barber, Beloit, Kans.

308,323. CABLE FIRE-ESCAPE. — John J. Oros, Chicago, Ill.

308,332. RABBET-PLANE. — Justus A. Traut, New Britain, Conn.

308,334. LADDER. — Edward P. Wright, Portland, Oreg.

SUMMARY OF THE WEEK.

Baltimore.

CLUB-HOUSE. — Frank E. Davis, architect, has prepared plans for the Maryland Bicycle Club, for a three-st'y brick building, with bluestone facings, 24' x 80', cor. Mount Royal Ave. and Reservoir St., and to cost $12,000; H. C. Smyser, builders.

MONASTERY. — The corner-stone of the Passionist Monastery of St. Joseph, two miles west of this city, was laid November 16.

WAREHOUSE. — Henry Brauns, architect, has prepared plans for Virginius Gaddess, Esq., for a four-st'y brick, stone, and terra-cotta building, 26' x 65'; to be erected on South Charles St., near Camden St., and to cost $6,000; J. W. James, builder.

BUILDING PERMITS. — Since our last report fourteen permits have been granted, the more important of which are the following: —

Fred. Stums, 5 three-st'y brick buildings, w s Druid Hill Ave., com. n w cor. Laurens St.; and 8 two-st'y brick buildings, n s Laurens St., bet. Druid Hill Ave. and Etting St.

John F. Nelker, 3 three-st'y brick buildings, n w cor. New and Jasper Sts.

Jacob Suger, three-st'y brick building, e s Pennsylvania Ave., bet. Orchard and Biddle Sts.

Wm. I. Davis, three-st'y brick building, n s Montgomery St., bet. Williams and Johnson Sts.

U. S. Electric Light Co., one-st'y brick building, 27' x 36', n e cor. Holliday and Centre Sts.

John Hubner, 5 three-st'y brick buildings, w s Fremont St., s of Lafayette Ave.

Bauernschmidt & Marr, 2 two-st'y brick buildings, n s Cross St., w of Ridgely St.

Boston.

BUILDING PERMITS. — *Bennington St.*, Ward 14, for R. Hodson, Jr., wood stable, 15' x 15', pitch; A. J. McLaven, builder.

Houghton St., near Raymond St., Ward 23, for E. W. Taylor, wood dwell., 28' x 30', pitch; H. P. Oakman, builder.

Gilbert St., near Raymond St., Ward 23, for T. Klueba, wood storage, 15' x 18', pitch; J. Linppold, builder.

Leeds St., near Savin Hill Ave., Ward 24, for S. M. McNeil, wood dwell., 24' 6" x 60', pitch; McNeil Bros., builder.

West Cottage St., cor. Brook Ave., Ward 20, for W. W. Dromey, wood dwell., 24' x 60', flat; W. W. Dromey, builder.

Centre St., opp. Pond St., Ward 23, for W. A. French, wood dwell., 29' x 34', hip.

Copley St., No. 1, Ward 23, for Mrs. O. H. Ernst, wood dwell., 26' 4" x 27' 2", pitch; S. D. Gavey, builder.

School St., No. 145, Ward 23, for Mrs. O. H. Ernst, wood dwell., 26' 4" x 27' 2", pitch; S. D. Gavey, builder.

Chester St., near Gardner St., Ward 25, for Chas. Haley, wood dwell., 12' 6" x 17' and 17' x 35', pitch.

Pynchon St., Nos. 217, 219, 221, and 223, for Mrs. Hannah Dudley, 4 wood dwells., 20' x 40', hip; McDonald & Tobin, builders.

Ballard St., near Custer St., Ward 23, for Jno. Gardner, brick dwell., 22' x 30', pitch.

Porter St., No. 41, Ward 16, for W. Holmes, brick apartment-house, 18' x 55' 6", flat; Holmes Bros., builders.

Main St., near Eaton St., Ward 4, for City of Boston, brick ladder and hose house, 20' x 83', flat; R. R. Mayers & Co., builders.

Brooklyn.

BUILDING PERMITS. — *Stagg St.*, n s, 200' e Graham Ave., 4 four-st'y brick tenements, tin roofs; cost for all, $40,000; owners, H. and H. Reiners, Stagg St., near Graham Ave.; architect, E. F. Gaylor; mason, Matthew Smith; carpenter, not selected.

Decatur St., s s, 310' w Lewis Ave., 3 two-st'y brick dwells., gravel roofs; cost, $4,500; owner, Nellie McLain, 962 Macon St.; architect and carpenter, T. S. McLain; mason, S. Ramsdel.

Seventeenth St., Nos. 211 and 217, 2 two-st'y and basement brown-stone dwells., tin roofs; cost, each, $4,000; owner, Thomas Pitbladdo, 213 Seventeenth St.; architect, B. S. Brown; builders, Wm. and Thos. Corrigan.

North Second St., s s, 75' w Graham Ave., three-st'y frame tenement, tin roof; cost, $5,000; owner, John P. Conselyea, cor. Graham Ave. and North Second St.; architect, E. F. Gaylor; builders, Jacob Schoch and Howard Boyce.

Sandford St., No. 102, w s, 110' s Park Ave., three-st'y frame tenement, tin roof; cost, $3,000; owner, Mrs. Cunningham, 104 Sandford St.; architect, A. Herbert; builder, John Wilson.

Hancock St., Nos. 206 and 208, s s, 210' w Marcy Ave., 2 three-st'y brick dwells., tin roofs; cost, each, $10,000; owner and builder, Geo. H. Stone, 301 Jefferson St.; architect, G. A. Schellengar.

Central Ave., e s, 40' n George St., 3 three-st'y frame tenements, tin roofs; cost, $13,800; owner, Hubert Fischer, 260 Hewes St.; architect, Fr. Holmberg; builder, not selected.

Dean St., s s, 328' w Franklin Ave., two-st'y frame stable, tin roof; cost, $4,500; owner, Budweiser Brewing Co., 946 Dean St.; architect, J. Platte; builder, J. Rauth.

St. Mark's Ave., s s, 220' e Kingston Ave., three-st'y brick dwell., tin and slate roof; cost, about $40,000; owner, Wm. Eggert, 1015 Lexington Ave., New York; architect, G. Damen; builder, P. McGuinn; carpenter, not selected.

South Fourth St., n e cor. Seventh St., 2 four-st'y brick stores and tenements, tin roofs; cost, each, $9,000; owner, Frederick Haack, 154 North First St.; architect, E. F. Gaylor; builders, Thos. Gibbons and Samuel Hough.

Chauncey St., s s, 175' e Patchen Ave., two-st'y brick dwell., tin roof, wooden cornice; cost, $6,000; owner, Jacob Fritz, 106 Hudson St., New York; builders, Ernest Sutterline and Jacob Pirrung.

Sixth St., n s, 147' 10" w Sixth Ave., 6 two-st'y brick dwells., tin roofs; cost, each, $4,000; owner, architect and carpenter, Thos. Butler, 371 Sixth St.; mason, Thomas Nash.

Marcy Ave., e s, 25' n Heyward St., 5 two-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner, John H. Shult; builders, W. & T. Lamb and Jenkins & Gillies.

Marcy Ave., n e cor. Heyward St., three-st'y brown-stone store and dwell., tin roof; cost, $8,000; owner, etc., same as last.

Washington Ave., e s, 145' n Douglass St., two-st'y brown-stone dwell., tin roof; cost, $5,000; owner, Mary E. Fowler, 8 Verona Pl.; builder, Levi Fowler.

Rockaway Ave., s e cor. Hull St., three-st'y brick store and dwell., and 4 two-st'y brick dwells., felt and gravel roofs; cost, each, $3,000; owners, Cozzens & Barton, 177 Stuyvesant Ave.; builder, L. E. Brown.

South First St., n e cor. Eighth Ave., four-st'y brick tenement, tin roof; cost, $11,000; owner, Mrs. John Baldwin, cor. Grand and Eighth Sts.; architect, E. F. Gaylor; mason, Jacob Bisson.

Chauncey St., n s, 525' e Stuyvesant Ave., 3 two-st'y brick dwells., tin roofs; cost, each, $3,000; owner, Daniel Lauer, 1534 Fulton St.; architect, Amzi Hill; builders, Weeks & Lauer.

Hamilton Ave., s w cor. Columbia St., on w s Hamilton Ave. and e s Columbia St., one-st'y building for stores, felt and gravel roof; cost, $3,000; owner, Joseph J. Day, 19 Manhasset Pl.; architect and mason, J. F. Nelson; carpenter, Joseph Taylor.

ALTERATIONS. — *Chauncey St.*, Nos. 9 and 11, one and two-st'y brick extension, etc., tin roof; cost, $8,000; owner, H. Neiland, 1098 Pacific St.; builders, J. J. Bentzen and H. J. Smith.

Chicago.

BUILDING PERMITS. — N. Behrens, two-st'y flats, 128 North Twenty-first St.; cost, $3,000.

Mrs. B. Philbin, three-st'y dwell., 91 Sedgwick St., cost, $5,000.

The Board of Education, three-st'y school-house, cor. Lincoln and Division Sts.; cost, $51,000; architect, J. J. Flanders; builder, Geo. Peterson.

Jas. Novak, three-st'y store and flats, 808 Ashland Ave.; cost, $7,300.

H. H. Kohlsaat, two-st'y dwell., 2976 Prairie Ave.; cost, $20,000; architect, S. M. Randolph.

J. Downey, 6 two-st'y dwells., cor. Honore and Adams Sts.; cost, $30,000; architect, M. L. Beers.

M. Cummins, two-st'y dwell., 2520 Sanger St.; cost, $3,000; architect, J. F. Doerr.

Annie L. Gartside, two-st'y dwell., 46 Groveland Pk.; cost, $10,000.

C. W. Partridge, 3 two-st'y dwells., 3435-3439 Michigan Ave.; cost, $18,000.

L. Butler, three-st'y school-house, 507-509 North Franklin St.; cost, $10,000; architect, O. Vigeant; builder, Geo. Lehman.

G. H. Marshall, two-st'y dwell., 58 Laflin St.; cost, $6,000; architect, W. G. Williamson; builder, C. A. Moses.

H. Elnmel, two-st'y dwell., 560 West North Ave.; cost, $5,000; architect, H. Sierks.

L. C. Platt, 2 two-st'y dwells., 670-672 West Adams St.; cost, $8,000; architect, J. J. Flanders.

E. Sands & W. H. Hoyt, 2 two-st'y dwells., 767-769 West Jackson St.; cost, $8,000.

Geo. Edwards, 5 two-st'y dwells., 367-373 Maxwell St.; cost, $15,000.

Chas. Thiele, two-st'y dwell., 371 Wells St.; cost, $2,500, builder, Chas. Thiele.

W. M. Hoyt, one-st'y addition to flats, North Water St.; cost, $2,500; builder, L. J. Daegling.

C. W. Woodman, two-st'y flats, 448 West Fifteenth St.; cost, $5,000.

New England Insurance Co., five-st'y store, 18-26 Van Buren St.; cost, $55,000; architects, Cobb & Frost.

Wm. Woerle, two-st'y dwell., 444 Dayton St.; cost, $4,000.

J. M. Love, 12 two-st'y dwells., Vernon Ave.; cost, $48,000; architect, W. M. Clay.

A. W. Waldo, two-st'y dwell., 281 Webster Ave.; cost, $3,000.

The Board of Education, four-st'y school-house, cor. Fifteenth St. and Wabash Ave., cost, $65,000; architect, J. J. Flanders.

J. Oleson, three-st'y dwell., 85 West Huron St.; cost, $5,000; architect, C. O. Hansen.

Denver, Col.

BUILDING PERMITS. — W. H. Lawrence, Pearl St., two-st'y brick dwell.; cost, $4,500; F. E. Edbrooke & Co., architects.

E. & S. J. Anthony, Curtis St., three-st'y brick dwell.; cost, $5,000; E. Anthony, architect.

Chamber of Commerce building, Lawrence St., three-st'y brick dwell.; cost, $26,000; H. B. Seeley, architect.

School District, No. 2, Eleventh St., two-st'y brick school-house; cost, $21,000; Wm. Quayle, architect.

H. L. Chapin, Welton St., three-st'y brick dwell.; cost, $4,000; Varian & Sterner, architects.

Jackson, Ehmann & Co., Broadway, two-st'y brick block of 9 dwells. and 5 stores; cost, $25,000; Fred. A. Hale, architect.

J. G. Anderson & Sons, Stout St., three-st'y brick dwell.; cost, $5,000; E. P. Brink, architect.

Thos. S. Clayton, Sherman Ave., two-st'y brick dwell.; cost, $8,000; F. E. Edbrooke & Co., architects.

United States Custom-House, cor. Arapahoe and Sixteenth Sts.; M. E. Bell, architect.

J. A. Shreve, Larimer St.; three-st'y business block; cost, $14,000; W. H. J. Nichols, architect.

H. R. Fraser, Dalley St., two-st'y brick dwell.; cost, $4,000; Fred. A. Hale, architect.

H. E. Luthe, California St., two-st'y brick dwell.; cost, $6,000; R. S. Roeschlaub, architect.

Madame Jennie Rogers, Holladay St., three-st'y brick apartment-house; cost, $11,000; Frank Edbrooke & Co., architects.

J. A. Cooper, Grant Ave., two-st'y brick dwell.; cost, $12,000; M. Kenzie, architect.

S. C. Shepard, Grant Ave., repairs to dwell. and brick barn; cost, $2,500; Fred A. Hale, architect.

New York.

Plans have been filed for a new passenger-depot, to be erected just east of the Grand Central Depot, in Forty-second Street, by the New York Central & Hudson River and the New York & Harlem Railroad Companies. The building will have a frontage of 91' in Forty-second Street, its depth will be 693', and its general construction will be similar to that of the Grand Central Depot, the front being made of brick and cast-iron, with stone trimmings. The estimated cost is $200,000.

BUILDING PERMITS. — *One Hundred and Sixty-third St.*, n w cor. Union Ave., three-st'y frame dwell., tin roof; cost, $3,000; owner and builder, John W. Decker, 841 Forest Ave.; architect, Adolph Pfeiffer.

One Hundred and Sixty-third St., n e cor. Tinton Ave., two-st'y frame dwell. and store, tin roof; cost, $3,000; owner, architect and builder, same as last.

Stanton St., No. 33½, five-st'y brick tenement, tin roof; cost, $17,000; owner, Johanna Noelke, 311 Fourth St., Jersey City; architect, Wm. Graul.

Forty-fifth St., n s, 100' e Ninth Ave., 5 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner and builder, Wm. Rankin, 338 West Forty-seventh St.; architect, M. Louis Ungrich.

Broome St., No. 385, five-st'y brick store, tin roof; cost, $15,000; owner, Patrick Skelly, 409 West Fourteenth St.; architect, John B. Snook.

One Hundred and Forty-third St., n s, 265' w Brook Ave., 2 three-st'y frame dwells., tin roofs; cost, each, $3,500; owner and builder, W. L. Goetchius, 263 West Thirty-ninth St.

Park Ave., No. 259, two-st'y brick stable, asphalt roof; cost, $8,000; owner, T. G. Thomas, 294 Fifth Ave.; builder, J. H. L'Hommedieu.

West Thirty-fifth St., Nos. 126 and 128, 2 five-st'y brick flats, slate and tin roofs; cost, $40,000; owner, A. M. Hegeman, 1321 Broadway; architect, Daniel Burgess; builders, D. & E. Herbert.

Building of the Young Men's Christian Association, Boston, Mass.

STURGIS & BRIGHAM, Architects.

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THE pedestal for the great statue of Liberty is in process of slow construction, and eight courses of granite have been laid above the foundation, bringing the pedestal to a height of something more than sixteen feet. On account of the approach of winter, work on the ground has been discontinued; but quarrying will still go on, and materials will be accumulated for active operations in the spring. Money is still lacking for the completion of the pedestal, and about one hundred and forty-eight thousand dollars will be needed to pay for the work required to fit it for the reception of the statue, but this seems a small sum, compared with the total cost as first estimated, and it is much to be hoped that it may be easily secured. The French Government has detailed a war vessel to receive the statue and transport it, some time next May, to New York, and if contributions come in freely, the pedestal may still be ready for the reception of the statue on its arrival. The setting of the figure in position, with the interior bracing, will occupy two or three months more, but it is hoped that everything may be in readiness for a public inauguration early in September.

THE consequence of the extension of the copper-mining industry in this country, and the consequent extinction of the monopoly under which the managers of the Lake Superior mines for many years fixed the price of the metal to suit themselves, has been a reduction in the price. One would suppose that the owners of the mines, seeing the value of their product so diminished, would combine to reduce their output, but the contrary has been the case, and the Chilian and Spanish mines, as well as those of the United States, are increasing their production every day, curtailing their expenses at the same time, in order to gain a little profit even from sales at a low price. The danger which now confronts them is, however, that the limit of demand for the metal will be reached, and that they will be unable to sell their copper at any price. Considering the small number of purposes for which copper is now used, this does not seem a very remote contingency. The American output is now about one-half that of the whole world, and if the world is now supplied with all the brass goods, copper kettles, cartridge cases, and telegraph wires that it can consume, it will be useless to furnish more of these, even at a somewhat cheaper rate than before. The real hope of the copper miners is in the substitution of copper for iron for certain purposes. More than a hundred pounds of iron are now used in the world for every pound of copper; and if one per cent of the iron at present consumed could be replaced by copper, the entire production of the copper mines now existing, together with as many more just like them, would be absorbed. We think it is not too much to say that with intelligent effort on the part of manufacturers this substitution, or something approaching it, could be effected, much to the advantage of every one except, perhaps, the iron-workers. To take a single instance, there is hardly any use to which Russia sheet-iron is now put that could not be better fulfilled by copper, and in the end copper, at ten or eleven cents a pound, would probably be cheaper than the iron at five or six. We have seen stove-pipes made of copper, which are not only very handsome in appearance, but must be as strong as those of iron, as well as less likely to crack at the seams, while they are practically indestructible by rust. For the exterior casings of stoves and furnaces, also, it seems as if copper might be extensively used, as, indeed, it already is in some degree for gas-stoves, while boilers, which are now sometimes made of it in small sizes, might perhaps be economically cased or tubed with it in the larger sizes. Every one does not know that water, owing to the high conducting power of copper, boils more readily in a copper vessel than in one of iron; and it is not unusual for plumbers, in cases where house ranges fail to supply hot water enough, to take out the cast iron water-fronts, and substitute new ones of brass or copper, by means of which a larger quantity of water can be heated in a given time. The general application of copper to roofing purposes, which is strongly advocated, seems to us, although desirable, not very likely to occur. To say nothing of the first cost of such a covering, even at present prices, the practice of roofing with sheet-metal of any kind is rather diminishing, on account of the perfection with which roofs of asphalt or composition are now applied, and copper for such purposes must compete, not with tin or lead, but with tarred felt, worth three or four cents a square foot, instead of fifteen or twenty. To these possible outlets for the supply of copper might, if the copper manufacturers could take advantage of the cheap processes for the production of aluminium of which we hear so much at the present time, be added another, in the shape of the manufacture of household articles of the beautiful and unchangeable aluminium bronze. With the addition of five or six per cent of aluminium, copper is converted into the best material yet discovered for making house hardware, gas-fixtures, lamps, and other objects of the kind. The price of such things generally bears very little relation to the weight, and a new kind of brasswork, which would never tarnish or need polishing, would not fail to be appreciated in every family.

THE New York *Times* gives an account, which, if true, is of great importance, of a new process for producing metallic aluminium, which is likely to reduce the cost of the product very materially. The process is due to a Philadelphia chemist, a pupil of Wöhler, and has been partially described before. It consists substantially in the substitution for the metallic sodium employed in the old process, of sodium vapor, formed by heating carbonate of soda in a retort with carbon or some other reducing agent, and as carbonate of soda costs about one cent a pound, instead of three dollars, which is the price of metallic sodium, the expense of the process is much diminished, and a better quality of aluminium can be obtained at a dollar and a quarter a pound than the old method produced at fifteen dollars. The process is no longer an experiment. Many thousands of ounces of metal have been produced and sold, and a collection of raw material and manufactured articles has been sent to the New Orleans Cotton Exhibition. Although a dollar and a quarter a pound seems a high price for any but the precious metals, it must be remembered that aluminium weighs only about one-fourth as much as lead, iron, or silver, and that, for instance, a metallic plate of a given size and thickness, which would be worth in copper ten cents, would cost only about thirty-five cents in aluminium; and as the latter metal does not tarnish in air, or even in sulphuretted hydrogen, and is not affected by nitric or sulphuric acid, it has a value for many purposes superior to that of any metal except silver or gold. Notwithstanding its great cost at present, its lightness renders it particularly valuable in certain applications. Drawing instruments, for example, are sometimes made with it, in place of brass or German silver, and it is said that soldiers' buttons and buckles are made of a composition of aluminium and copper, which are so much lighter than the ordinary brass that the men whose clothes are supplied with them can carry thirty or forty more cartridges than before.

THE last of the great Alpine tunnels, that of the Arlberg, has been completed with so much less trouble than the two which preceded it, that comparatively few persons, probably, knew that it was in progress before the announcement of its inauguration, which took place last September, in the presence of the Emperor of Austria. The Arlberg tunnel is much the most easterly of the three roads under the Alps, the Mont-Cenis being the most western, and the Saint-Gothard nearly midway between. The original occasion of its construction was rather military and political than commercial. Two of the provinces of Austria, the Vorarlberg and the Tyrol, had, until the tunnel was built, no means of communication with each other except over the pass of the Arlberg mountain, or, if rapid and convenient transit was desired, by means of the Bavarian railways, which connected from the north with both provinces. There was serious danger that in case of war, with perhaps the blockading of the Bavarian roads, the Vorarlberg might be cut off from the rest of the Austrian territory, and it was finally decided to begin the tunnel at the public expense; but as the line through it will make a saving in distance over the old routes between Paris and Belgrade, Trieste, Salonica and Constantinople, of sixty to nearly two hundred miles, it is likely to be a profitable enterprise in the end.

THE length of the tunnel is something over six miles, the grade rising from each end to a summit under the middle of the mountain. The formation traversed was mostly hard rock, passing from gneiss to mica-schist. The method of tunneling, like that used in the Mont-Cenis, was that known as the English plan, a pioneer excavation being driven some distance in advance of the main tunnel, and in line with the base of the finished work. As fast as the pioneer tunnel was carried forward, permanent gutters were formed in the bottom, to carry off water that might collect in the excavation, and pipes were laid for conveying air to the drilling-machines and for ventilation. In the Belgian method, which was employed at the Saint-Gothard, the pioneer tunnel was driven at the upper part of the intended excavation, but the advantage of being able to establish at once permanent waterways and air-supply pipes seems to give the other a decided superiority. At the Arlberg, moreover, short shafts were carried up at intervals of eighty to two hundred feet, which, when the main excavation was carried out, came in the floor of the upper drift, which was excavated a little in the rear of the pioneer tunnel, and were found very useful for dropping material excavated from above into cars, which were immediately brought in on temporary rails laid on the bottom of the pioneer tunnel. Power for driving the drills was obtained from the mountain torrents; one, the Rosanna brook, at the Tyrolese end, giving a force of fifteen hundred horses during the summer, and of about half that in winter, when the channel was choked with ice. At the other end, by collecting five small rivulets, a force of five hundred horses was obtained. The Rosanna power was utilized by turbines, but the other was applied directly through pipes to hydraulic drills, in which the drill was held firmly against the rock by a piston moving in a cylinder filled with water under pressure, and was at the same time turned by endless screws at the rate of five to twelve turns a minute. In soft rock this instrument would advance at the rate of three or four inches a minute, but the average was much less than that, and the blades of the drill, which were movable, required changing every few feet. The drills at the eastern end were operated by compressed air, and acted by percussion upon the rock, as in the case of the common hand-drills. The character of the rock at the two ends being quite different, it was impossible to compare fairly the work done by each form of drill; but both seem to have done excellent service, and the entire tunnel was completed and opened for service in less than four years from the time the mountain was first attacked.

WE are glad to find that there are other people in the world, besides the editors of the *Scientific American* and ourselves, who find it hard to believe in the Keely Motor. The last number of the *Schweizerische Bauzeitung*, in speaking of the so-called "tests" of the etheric cannon at Sandy Hook, remarks, rather disrespectfully, that the celebrated motor is obviously "nothing but an ordinary American humbug." This opinion is shared, according to the New York *Times*, by Lieutenant Zalinski, of the United States army, who was deputed by Colonel Hamilton to accept in his place a pressing invitation to inspect the motor in the inventor's workshop in Philadelphia. The Lieutenant, having been accepted by the Keely directors as a substitute for Colonel Hamilton, proceeded to Philadelphia, armed with a ten-thousand-pound pressure gauge, which seemed, from the accounts, to be the only ordinary scientific instrument applicable to the interatomic force. On reaching the laboratory, he found a "reservoir" filled with interatomic force, in readiness to be connected with an engine. Recurring to the claim that the mysterious force could be produced in a few seconds, by blowing into tubes, tapping boxes with "vibrators," and so on, the visitor suggested that he would like to see the operation of manufacturing the ether, and would be pleased if the pent-up force could be allowed to escape, and the reservoir recharged in his presence. The great inventor objected to this, on the ground that the reservoir had been carefully "negatized," and it would take two hours to refill it. The request was not pressed, and the incantations, or whatever they may be called, proceeded. By-and-by Mr. Keely announced that he had got fifty thousand pounds pressure to the square inch, but immediately remarked that he had broken all his pressure gauges. Lieutenant Zalinski then bethought himself of his standard gauge, and mentioning that he had one with him which registered up to ten thousand pounds, said that he would be glad to have it applied and broken. No reply was made to this offer for a time, but at length the great inventor remarked that "he didn't believe in pressure gauges, anyhow." Unfortunately, the experiments failed of tangible result, on account, as Lieutenant Zalinski was informed, of "an accidental break in a pipe," so that he was obliged to return without witnessing any convincing exhibition of "interatomic force."

A CURIOUS chemical process has just been introduced on a commercial scale in France by the brothers Brin, who, finding that there is a demand for pure oxygen gas, for medical and other purposes, have constructed machinery for separating the gas from air by the agency of caustic baryta, a substance somewhat resembling lime. The caustic baryta has, however, the property, which lime does not seem to possess, of absorbing a certain portion of oxygen in addition to that which it already contains, and of yielding up again this absorbed oxygen when heated and placed in a vacuum. The process for utilizing this property is a simple one. A certain quantity of baryta is placed in each of a series of iron retorts, which are heated, and air, freed from any trace of carbonic acid by passing through lime-water, then forced in. The compressed air, brought in contact with the heated baryta, gives up its oxygen, and the nitrogen is allowed to escape. After the peroxidation is complete, the retorts are heated more strongly than before, and are disconnected from the condensing-pump, and attached to an air-pump of the ordinary sort. This exhausts the nitrogen remaining in the retorts, and oxygen is then evolved from the baryta, and continues to escape until all that previously absorbed has been given off. Nothing more is then necessary than to put the oxygen into shape for sale, which is done by forcing it, under considerable pressure, into bottles or receivers of other kinds. The experimental apparatus now in use is capable of producing a thousand cubic feet of oxygen per day. As the demand for the pure gas is limited, the manufacturers have devised a way of dissolving it under pressure in water, in the same way that the so-called soda-water is charged with carbonic acid, and the sparkling liquid thus obtained is said to be refreshing and wholesome.

BESIDES this principal manufacture the Brin brothers have in view the production of ozone from their oxygen. Ozone is, as every one knows, a form of oxygen, in which three volumes of oxygen are by some obscure electrical agency condensed into one volume of a pungent, corrosive gas, useful for bleaching, and for disinfecting organic substances. This change can be effected on a large scale by means of the electrical appliances which are now in use, and ozone is now within the reach of all who can devise ways for utilizing it. The separation of oxygen from the atmosphere liberates great quantities of nitrogen, which air contains in much larger proportion than oxygen; but, although nitrogen in combination is one of the most useful substances in nature, it has as a simple gas little value. The inventor of the new oxygen process have, however, as they claim, discovered a way of inducing the nitrogen which is now set free as a waste product to enter into combination with other substances, especially with hydrogen, which when united with one-third its weight of nitrogen forms ammonia, the great source of plant nourishment. As described, the formation of ammonia from the nitrogen is a very simple matter. A retort is charged with a mixture of carbon and caustic baryta, and heated to a point somewhat above the temperature of boiling water. Nitrogen is then forced through water, so as to charge it with aqueous vapor, and is in that state led into the warm retort. Here the watery vapor decomposes, the oxygen uniting with the carbon and baryta, while the hydrogen is set free, and immediately combines with the nitrogen to form ammonia gas, which can either be drawn off pure, or carried into water or acid solutions, which fix it in a form for use and sale.

SALTPETRE EXUDATIONS UPON BRICKWORK.[1]—II.

F. MARTIN'S STATUE OF THE ABBÉ DE L'EPEE. PARIS.

IT is probably desirable that we should here describe more fully the numerous theories by which the process of nitrification has been explained. The alchemists assumed that because nitre is continually found as an efflorescence upon the surface of the nitrifying matrix that the salt was of ærial origin, and so plausible was this theory that it has more or less been held, even down to the present time. An examination of the nitre caverns of Ceylon induced J. Davy to conclude that the nitric acid was formed from the nitrogen and oxygen of the air. M. Longcamp elaborately enunciated this theory, and explained the production of the nitrogen by supposing that the carbonates of lime and magnesia, taken in a proper degree of comminution, and properly wetted, could absorb air, condense it, and transform it into nitric acid in the course of time; causing it to enter into combination with the lime and magnesia, forming the nitrates of those two substances, and more readily ennabling it to combine with the potassium, especially if it were present in the form of a carbonate. The theory that the combination of the atmospheric nitrogen and oxygen, dissolved in the water of moist porous bodies, oxidized to nitric acid during nitrification was also concurred in by Saussure and Proust. The presence of other matter undergoing oxidation is considered by Clöez to induce such a combination of nitrogen and oxygen, and this chemist states that he believes that this oxidation of the nitrogen of the atmosphere is one of the sources of nitric acid in the nitrification of soil.

It would be possible to extend the discussion of the different theories of nitrification to an almost indefinite length as regards soil, organic matter, etc., which do not come within the scope of this article. But whatever theory may be adopted as to its origin, there appear to be certain conditions which facilitate the production of saltpetre, viz.: a degree of humidity about equal to that of garden earth is very favorable; between 15° and 24° C. (about 60° and 70° F.) nitrification is the most abundant; at 0° C. (32° F.) it does not take place. It seems strange that with the serious objections which exist to saltpetre exudations upon brickwork that there has been found no remedy, and that no particular efforts have been made to obviate it.

The only invention which has been patented with a view to curing these defects, consists in so placing tarred felt as to form a thin wall between the facing and common bricks, and leaving cavities in the top and bottom flat sides of the front bricks, and connecting the pressed-brick wall to the common brick backing by pieces of galvanized sheet-iron, punctured so as to roughen them, and laid between the flat joints of the bricks.

A good method for preventing the saltpetre exudations upon terra-cotta designs consists in treating the back and other portions of the pieces with hot pitch. If the terra-cotta itself should be proof against yielding the saltpetre exudations, that which might otherwise evaporate through the pores of the terra-cotta would be prevented from depositing upon the surface.

During the autumn of 1883, the writer when one day passing by the south front of the new Pension Office Building in Washington, particularly noticed how free it was from efflorescence; but during the same night there was a warm, heavy rain, and in repassing the same front the next morning he noticed the brickwork, which had only attained a height a little above one story, and the elaborate terra-cotta frieze, which girts the building just above the windows of the first story, were greatly disfigured by the unsightly saltpetre exudations which had made their appearance. We do not profess to say that all such formations occur in the night time, or so quickly, but that light greatly retards nitrification is unquestioned. The terra-cotta frieze, girting the building to which reference has just been made has always possessed a peculiar interest for the writer; often has he walked around the building at a convenient distance, studying the whole continuous twelve hundred feet of designs. Some portions of the frieze depict infantry marching; cavalry, artillery, and wagon-trains in motion; sailors embarking on their ships; while other terra-cotta ornamentations of the building represent cannon, shot, and exploding shell. Before the saltpetre exudations appeared, the portions of the terra-cotta work which were in position were of a rich, buff color, and there was apparent animation in the designs. But after the unsightly whitish blotches appeared, no pleasure was to be derived from viewing the work, and for a long time the surface of the frieze seemed to be saturated with water, which made the designs appear dull and uninteresting.

In structures already erected there is probably no method by which saltpetre exudations upon the brickwork can be prevented. It therefore behooves architects and builders to study more closely in the future than they have in the past the nature of such phenomena as have been described in this article, and to seek to remedy them.

One first and important requisite is that there shall be a more exacting inspection given to bricks, stone, terra-cotta, etc., than is usually given to these materials. There is not the slightest room for doubt that a large quantity of such materials find their way into many unsuitable positions in buildings. Porous brick, stone and terra-cotta invite and assist the exudation of saltpetre, therefore such materials should be rejected. Bricks absorbing more than eight ounces of water should not be allowed in the foundation or exposed walls of buildings. A simple way to test the absorption is to weigh a brick and then place it in a bucket of water for five minutes or so; if it weighs, upon removal from the water, more than eight ounces in excess of its first weight, discretion dictates its rejection for the two purposes named. This test applies only to hard-burned bricks, not to salmon stock.

Damp walls, in addition to facilitating saltpetre exudations by drawing upon the mortar with which the bricks are laid, as was explained, also extract the salts from the mortar with which the interiors of buildings are plastered, and evaporating through the pores of the bricks, effloresce upon the surface.

Since dry structures cannot be built with bricks that are very absorbent, and as the extent to which bricks absorb water is of the greatest importance, it is therefore worth while to give a little attention to this subject in the different classes of brick-machines.

The common bricks produced by most of the dry-clay machines absorb much more water than do those made by machines which thoroughly temper the clay. There is too much ignorance displayed in regard to the material produced by this line of inventions, and which enters so largely into the construction of buildings, and this lack of knowledge is often shown by those who ought to know better. In the desire to get up a showy house, "something that will take, you know," mistakes are too often made, and which are usually paid for by the loss of health, and sometimes by the sacrifice of the lives of those who inhabit them. Is it difficult to call to mind houses that people call "unlucky places," in which an unusual number of persons die? These "unlucky places" are for the most part nothing more or less than damp houses, resulting usually from the employment of porous bricks in the construction of the walls.

Architects should remember also the acoustic effects which dampness of walls exerts upon public buildings, by conducing to a very great extent to reverberation, which confuses sound. It is not uncommon for buildings to be hastily constructed, and the internal coats of plastering put on one over the other in rapid succession, and the structures at once occupied for public purposes. But for many months such buildings commonly fail to give satisfaction to the extent that had been hoped from the pains which had been taken to make them acoustically good, although gradually, as such walls part with their dampness, acoustic defects disappear.

It is therefore of the utmost importance that bricks used in such walls be not so porous as to constantly absorb moisture, and for a long period, or permanently, retard the drying out of the walls, of halls for public speaking or for music, while they may answer in other respects, may prove acoustic failures. In this matter architects owe a duty to themselves no less than to their clients and the public. It does not come within the province of this paper to attempt an explanation of this phenomena, which are matters of common observation. In new building it has been recommended to hang up for a few months a little drapery, which may often retard reverberation and be a great aid; it can easily be removed when the moisture disappears from the walls, and the acoustic properties of the structure are assured.

For damp and exposed walls of buildings, bricks have sometimes been glazed or rendered water-proof by a composition which gives them a vitreous surface, and this is done by treating the faces with a flux which meets the silex of the brick; or it may be applied in solution, the liquid being afterward expelled by heat.

Resinous compounds have also been used to render the surface non-absorbent, and bricks have also been treated with soluble silicate of soda, which has been decomposed, leaving the insoluble silex in the pores of the brick. Cheap pigments may be added to the glazing compounds, which will give an ornamental appearance at a moderate cost.

In some cases a glaze which is sometimes employed when the bricks are laid in sanitary positions may be used, and it forms a glass enamel; the components being one hundred and thirty parts of flint-glass powdered, twenty and one-half parts of carbonate of soda, and twelve parts of boracic acid; the surface of the brick being first washed with water containing a small quantity of glue, after which the preparation is applied in solution and fluxed in an oven.

Before closing this portion of our paper, it remains for us to mention the manner in which saltpetre exudations are commonly removed from brickwork. The simplest and least expensive method, when the efflorescences are in positions where the sun and wind do not have free access, is to wash it off with diluted hydrochloric or common muriatic acid of commerce. This acid is very inexpensive; twenty-five cents' worth would be sufficient to clean a front twenty feet wide by sixty feet in height, if such a front was totally covered with the objectionable exudation.

About one-half pound of the acid is used with an ordinary pailful of water, the application being made with a sponge, which can be held in the naked hand or attached to a stick to reach the spots, as

[1] Continued from page 208, No. 462.

may be desired. When the efflorescences have been thus removed, it is perfectly useless, in the present state of knowledge, to attempt to stop a reappearance, for when circumstances are again favorable, the saltpetre exudations will promptly spread themselves over the walls.

It now only remains for us to close this article, after uttering a few words of caution in regard to terra-cotta. Because this form of brick passes through the fiery furnace, and issues from the kiln with a rich, pleasing buff tint, which is usually indicative of thorough firing and good quality, is no excuse for passing it without thorough inspection. The point of any steel instrument is a simple test of the texture of terra-cotta; it should not penetrate the surface, and if the point should strike fire through contact, the ware is all the better. A clear, sharp, metallic, bell-like ring, and a clean, close fracture, are good proof of homogeneousness, compactness and strength.

But there is a deception practiced regarding the obtaining of the above-described appearances in terra-cotta, by employing mixtures of inferior materials, that should be rigidly guarded against. Enormous quantities of architectural terra-cotta are manufactured at great distances from the best clays. In order to save cost of clay and freightage, some establishments on both sides of the Atlantic take advantage of the fact that by mixing ground chalk with ferruginous clays, which may be obtained in almost any location, they are enabled to cheaply produce terra-cotta of a rich buff color.

The material produced in this way is much more porous than that manufactured from the best terra-cotta clays, and consequently invites saltpetre exudations. An additional objection to the employment of such clays is that precision of the forms, which is highly essential, cannot be obtained. Well-manufactured terra-cotta should be uniform throughout its mass, and burnt to the full extent of its contractibility.

The chemical changes which take place in the burning of the best terra-cotta consist, first, of the destruction of the disseminated carbonaceous matter, the dehydration of the silicates of alumina destroying their plastic character; and the decomposition of the disseminated carbonate of protoxide of iron, converting it into anhydrous sesquioxide, to which the buff color of the material is due.

But as we have before stated, the presence of a large proportion of carbonaceous matter in the clay tends to bleaching, by the reduction of the coloring sesquioxide to lower oxide preserved as a silicate in a comparatively colorless condition. Then, again, the presence of lime and the other alkaline earths, which are disadvantageous fluxing elements, will check the coloring power of a large percentage of oxide of iron, by the formation of a pale double silicate of lime and iron. It is this point that is taken advantage of in the mixture of ferruginous clays and ground chalk, to which attention has been invited.

CHARLES T. DAVIS.

MUNICIPAL SUPERVISION OF LONDON BUILDINGS.

THE direction of matters pertaining to the supervision of building operations in the British Metropolis is principally vested in a body known as the Metropolitan Board of Works, which consists of forty-six members, who are elected by vote of the several Vestries, and hold office until death or resignation. The Chairman and a few of the executive officials of the Board have regular salaries, but the remaining members are not compensated in any manner whatever. The Board has a supervisory power over all the buildings of London, with the following exceptions: All buildings used by railway corporations are subject only to the provisions of the law which gave them their charters, and are not in any way under the jurisdiction of the Board of Works; all public Governmental buildings, jails, law-courts, and museums; all canal and dock companies' buildings; Covent Garden and Smithfield Markets; Greenwich and Bethlehem Hospitals; the Bank, the Exchange, Guild-Hall, and the Mansion-House are taken care of directly by the general government.

The Board of Works appoints district inspectors or surveyors, who personally supervise the erection of all new buildings, and make monthly reports thereof to the Board. In order to be eligible to the position of district surveyor an examination must first be passed before the Royal Institute of British Architects, which body alone has the power to recommend candidates. The surveyor receives no compensation from the Board, but by a provision of the Building Act, he is entitled to collect from the builder of each new building two fees, one when the roof is on, and the other after the completion of the work. The amount of the fee varies from fifteen shillings to five pounds, depending on the size of the building, but never exceeding the latter amount. In some districts the surveyor's position is quite lucrative, occasionally amounting to 3,000 pounds a year. Besides this, the surveyor is at liberty to do as much architectural work as he pleases, provided he fulfils his duty to the Board of Works, though naturally he is not allowed to supervise his own buildings. He is obliged to open an office at his own expense in the district for which he is surveyor. He holds his office for life, or until dismissed for cause by the Board. It will be seen that by this method the cost of the municipal supervision is borne entirely by those who do the building, instead of being distributed as a general tax on the community at large, as is the case in American cities.

The duty of the surveyor is to see that the buildings have good foundations and proper thicknesses of walls, and are built in a thoroughly substantial manner, and in conformity to the statutes of the Building Act. In the case of large public buildings, such as churches, theatres, and the like, the Board of Works exercises an additional power of advising in reference to the construction and planning, none of the buildings of this class being regulated directly by the clauses of the Building Act. The Board appoints for this purpose a superintending architect, and the approval of the Board must be obtained through him, before any such structure can be erected. All expense incurred in obtaining this approval is met by a fee which the builder has to pay.

The Board of Works is also charged with supervising the construction of all public highways and sewers, and the care of the Metropolitan Fire Brigade. It advises Parliament of any new streets or avenues needed, and upon the passage of the necessary Act, takes possession of the requisite sites, and opens the thoroughfare. The Board is empowered to issue bonds to cover the cost of any such improvements. Revenue for the payment of such bonds and interest thereon is derived directly from the general tax returns. It should be said, however, that in the City of London proper, the Board has no jurisdiction over streets or sewers; such matters being regulated by the Corporation Council.

The Board of Works, through its district surveyors is charged with supervision of old or dangerous structures, and a very sensible clause of the Building Act provides that after due notice has been given the district surveyor of any unsafe structure, he shall be responsible for any accidents which may occur. The surveyor has authority to order any dangerous buildings shored up or removed entirely at the expense of the owner.

The Board has no supervision of the sanitary appliances of buildings. These are controlled in the following manner. The various Vestries of the metropolis unite to elect a Board of Guardians which in turn appoints a health officer and local sanitary inspectors, all of whom are paid salaries. But the functions of the Board of Guardians, and its inspectors are limited entirely to the abatement of nuisances. That is to say, a man may put in his new house any kind of sanitary or unsanitary appliance he pleases, and the inspectors have nothing to say. But if such appliance becomes a nuisance, the Board through its inspectors has the power to condemn it, and order its removal. This seems very much to be a case of shutting the stable door after the horse has been stolen away.

When the Board of Guardians, or one of the Vestries, wishes to erect a work-house or asylum or structure of a kindred nature, the plans and arrangement have first to be approved of by the Local Government Board, a purely political body having a general care over the interests of the several local districts. This Board acts through its supervising architect, who is a permanent official. After approval by him, the proposed building is under the supervision of the Board of Works, as previously described.

All buildings pertaining directly to the general government, such as palaces, the Houses of Parliament, etc., and all crown lands and parks, are under the immediate care of the First Lord Commissioner of her Majesty's Works, who is a member of the Government. The real work is done by the permanent secretary, inspector, superintendent, etc., and their aids, who have entire charge of all repairs, additions, or changes which may become necessary. They are a law unto themselves, being accountable only to the Queen and the Parliament. They employ architects to prepare plans for, and superintend new buildings when necessary, though all other work is mostly laid out by draughtsmen regularly employed by the Commissioner.

The Acts regulating the construction of new buildings are very numerous, and scattered through a period from the time of Charles I to the present year. In the main, the provisions are essentially such as are in force in Boston or New York. There are some special clauses, however, worth noting as not often found in American laws. Thus, chimneys cannot be built higher above the roof than a height equal to six times the least width of the chimney-shaft, unless such shaft is built with and bonded to another not in the same line. Also it is specified that no timber-work shall be placed nearer than twelve inches to the inside of any flue; or under any chimney opening within eighteen inches of the surface of the hearth; or within two inches of the masonry of the flue, if the walls are eight-and-a-half inches thick, or less.

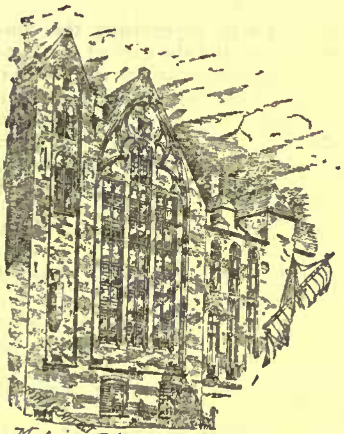
Separate sets of chambers tenanted by different persons, if in a building exceeding 3600 cubic feet contents, must be divided vertically by party-walls, and horizontally by party-arches or fire-proof floors. The law also prescribes that every warehouse or other building used for trade or manufacture containing more than 216,000 cubic feet, shall be divided by party-walls in such manner that the contents of each division shall not exceed 216,000 cubic feet.

The thickness of walls is carefully regulated, and a clause is added that this thickness must be at least equal to one-sixteenth of the height of the story, in ordinary buildings, or one-fourteenth in warehouses, though the additional thickness beyond what would be required for a low story may be put into piers, of which the collective widths must equal one-fourth of the length of the wall. The foundation footing-courses must have a depth, and offset on each side equal each to one-half the thickness of the wall at the base.

The Acts leave a great deal to the discretion of the surveyor, nothing being said about loads on floors, or the calculation of strains. He has it in his power to pass a great deal of poor construction if he is so inclined; but whether British surveyors are unusually conscientious men, or British builders little prone to offer bribes, certain it is that the municipal supervision seems to be very careful and thorough, and honest in all its details; and though the working machinery seems heavy and complicated, it suits London, and the architects and builders do not seem to feel the need of any change.

C. H. BLACKALL.

BUILDING STONES.



MONT DE PIÉTÉ ADJOINING NOTRE DAME, BRUGES, BELGIUM.

IN the selection of stone for building, it should be borne in mind that in some localities certain varieties of stone will not last, which in others would last for centuries. For instance, a stone containing much lime would soon crumble and deteriorate if placed in a wall subjected to the uninterrupted action of sulphurous fumes, or in thickly-populated sections where bituminous coal is used, the smoke of which, freely saturated with sulphur, coming in contact with the hydrogen of ordinary atmospheres develops sulphuric acid, and the lime inviting it soon loses its tenacity and the stone crumbles. Again, another kind of stone, not having lime, may be unfit for building in localities where the cold is intense at one time, the atmosphere moist at another, and warm at another; the stone may be porous, and as the moisture comes in contact it is readily absorbed, and when the weather moderates, after a severe cold snap, a gaping fissure is seen in some corner or coping stone, and often an entire wall is thrown out of true. Then a stone showing traces of organic matter will furnish a good foothold for mosses and lichens, and in a few years the tendrils completely fill all the interstices; eventually they yield to the pressure of vegetable growth, and a ruined stone results. Finally, a stone to be valuable for building purposes must possess properties of unequal expansion, contraction and pressure. When the weather is at zero, we warm our buildings; hence a stone bearing a weight of a hundred tons or more has one portion exposed to zero or below, and the other to a temperature of from 60° to 70°, and a good stone it is that will withstand this wrenching, pulling and crushing, without yielding somewhat at that particular point where these two forces meet.

Stone, then, being subjected to so many and often adverse influences, should be well understood by the one who pays the bills before the product of any quarry is adopted. Experience has proved that stone from the different strata of the same quarry will often present diversified chemical and physical features. Often the trace of magnesia, lime, etc., so plain and reliable at the opening of a quarry, will disappear during progression of the same strata. In laboratory practice a great variety of stone is submitted for examination, and as many questions asked. There have been some twenty-six varieties received by me during the past month, from the testing of which some interesting facts were deduced in determining the amount of heat building-stones will stand, and the results will be of interest to dealers. The investigations, all told, cover twenty-six kinds of granite, twenty-three of sandstone, seven of limestone, seven of marble, three of conglomerate, one of slate, one of soapstone, and one of stone artificially prepared.

Under the application of heat, the granite began to yield at a temperature between 700° and 800° Fahrenheit, the second example became cracked at 900° Fahrenheit, another became generally cracked when subjected to a heat from 800° to 950° Fahrenheit, and the fourth was rendered worthless on reaching 1000° Fahrenheit, or thereabouts. From all these tests we have made an unbiased average, which we present in the table below, and those, also, for the other kind of stone, the stages of destruction being indicated by the figures mentioned in the foregoing statements: —

Granite............	700 to 800°	800 to 900°	800 to 950°	at or below 1,000°
Sandstone.........	800 to 900°	850 to 1,000°	900 to 1,000°	1,000 to 1,200°
Marine limestone..	800 to 950°	900 to 1,000°	900 to 1,000°	mostly......1,200°
Marble............	900 to 1,000°	950 to 1,000°	1,000 to 1,200°	1,200°
Conglomerates.....	600 to 700°	700 to 800°	800 to 900°	900 to 1,000°

The specific gravity of the granites ranged from 2.600 to 2.727, excepting one example from Stansted, Canada, which showed a specific gravity of 2.833, and, as we immersed in distilled water and determined by displacement, the samples doubtless gained in weight by absorption. This increase of weight ranged from 1.283 to 1.818 of the original weight.

In the case of sandstone, the specific gravity ranged from 2.168 to 2.661, but the majority was under 2.400, and the absorption was 1.17 to 1.80, except two which gave 1.240, a freestone from Nova Scotia, and the Montrose stone from Ulster County, New York, which 1.118 represented. For the marble the specific gravity was from 2.666 to 2.8485, and the absorption 1.800 to 1.380 for the more solid; while the marine limestone gave a specific gravity of from 2.478 to 2.706, and the absorption was 1.280 to 1.480. These tests will show the builder which stone and variety of stone is best adapted to resist the influences mentioned as existing in their respective locality.

Again, there are other characteristics than these that stone must possess in order to be suitable for the varied uses to which building-stone is put. Among these characteristics may be mentioned strength. Indeed, this may be considered as a principal characteristic for specific purposes; but as their strengths vary in kinds, it is plainly a matter of the greatest importance that this be understood fully before laboratory tests are of any use to the architect or builder.

Concerning what is called actual strain, the trap-rocks of New Jersey furnished the best specimens we received. These samples would stand a pressure of about 2,400 pounds to the cubic inch; but one specimen of dolerite, from Staten Island, New York, we think would be equally good, but we had the misfortune to break the tester before completing, and not having a duplicate, could not complete as intended. This stone, however, is used only to a limited extent, inasmuch as it is very expensive, save in cyclopean architecture, where the blocks are fitted together roughly.

Regarding the granites, they have been used now sufficiently long to be considered regular standbys. The best and strongest specimens tested — and we had samples from almost everywhere — came from Rhode Island; Richmond, Virginia; and Port Deposit, Maryland. These will severally stand a pressure of 17.750, 21.250, and 19.750 pounds to the cubic inch. Of all the stone in general use, we consider the granites the most desirable; besides, they are the simplest and the richest. These stones, however, like all others, have their undesirable properties, but so far as durability is concerned, glass would be about the same. Of the red granites the best specimens come from Peterhead, not far from Aberdeen, Scotland, and a few good blocks come from the Bay of Fundy.

It is a common impression that nearly all our marble is imported, but this is a mistake. The strongest marble we have yet found came from the town of Lee, Mass., and bears a strain or pressure of 13,440 pounds to the cubic inch. Samples of marble from Tuckahoe, N. J., stood a pressure of 12,950 pounds to the cubic inch, a pressure much better than the sample from the Bay of Fundy; this only bears a pressure of 11,812 pounds to the cubic inch. Common marble from Staten Island stands a pressure of 11,250 pounds to the square inch, while statuary marble from Carrara responds to a pressure of only 9,723 pounds to the square inch.

With reference to the colored stones so much admired, the limestones are the most valuable, for the great variety they present. This stone is found in many localities. Those at Kingston, New York, and Bedford, Indiana, are about the same as regards strength, while Glen's Falls, New York, produces the finest variety of colored limestone in the world, it being so black it will reflect hardly a shadow, and takes a very high polish. Lockport, New York, produces a very fine gray variety of limestone, and the delicate cream and clove-colored varieties come from Athens and the Caen quarries. The "Indiana tints," though less delicate, are a stronger and more durable variety of limestone. For ornamental artistic work the finest stone comes from Florida and the Bermuda Islands.

Another quite striking peculiarity is possessed by limestones from some localities; many of them change greatly after being dressed. For instance, when some of the fine grays are trimmed with a hammer they resemble a light granite, and make a beautiful and durable trimming for brick houses. The curious cream stone from some localities is quite soft at first when quarried, but soon hardens on exposure, growing more durable with age. In this respect a stone now being quarried near Topeka, Kans., is among the best we have seen; it is first sawed into any desired shape, and soon gets nearly like iron in hardness. As to the most noted and valuable quarries of limestone, there are many now being worked to a very wide extent. Dayton, Ohio, keeps the builders of Cincinnati busy with stone. Bedford, Bloomington, and other portions of Indiana ship stone north, south, east and west, hundreds of miles, and of Indiana's stone the half has not yet been told. Along the L. E. & St. L. R. R. are acres and acres of undeveloped quarries, which, when properly worked, will rank among the best in the country. The favorite stone among the builders seems to be the Athens, from northern Illinois, and a test of samples from these quarries proves the correctness of the theory advanced before, for here we have a stone that physically will stand moisture and frost; chemically it will respond but feebly to the action of bituminous coal-smoke, besides presenting a fair resistance to unequal pressures. For resisting fire, a sample from St. Geneviève, Missouri, was found, a very fine-grained, straw-colored stone, and, though light, it stood a pressure of 50,000 pounds to the square foot.

Probably one of the strongest varieties of stone found in America came to us from Salt Lake, Utah. It is known and recognized there as hell-fire rock. This stone, when scratched in the dark, gives out a brilliant flash of light, or rather, when exposed to friction it illuminates, not like the spark from flint, but in broad streaks of illumination.

Many other samples received possessed many striking characteristics, but so far as their value for building purposes is concerned, the above is about all we could prove by a week's hard laboratory work.

J. F. ELSOM.

THE ILLUSTRATIONS.

CHURCH OF ST. CROIX, BORDEAUX, FRANCE.

THE façade of this church, which dates from the twelfth century, is said to be the only interesting feature about the building. As shown by the illustration, the greater part of the front has been recently restored.

GARDENER'S COTTAGE FOR CHARLES DANFORTH, ESQ., PATERSON, N. J. MR. CHARLES EDWARDS, ARCHITECT, PATERSON, N. J.

SKETCH FOR A SEASIDE COTTAGE. MR. S. S. WOODCOCK, ARCHITECT, BOSTON, MASS.

FIRST CONGREGATIONAL CHURCH, NORWOOD, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

HOUSE FOR LEONARD WARE, ESQ., ROXBURY, MASS. MR. S. PHIPPS, ARCHITECT, BOSTON, MASS.

A BRIDGE NEAR ROME, ITALY.

THE FIRST STEAMER TO CROSS THE OCEAN.

STATUE OF JACQUELINE ROBINS. ST. OMER, FRANCE. LORIMER SCULPT.

ONE of the most curious things in the history of transatlantic steam navigation is the claim that has been set up on the other side of the water to the construction and fitting out of the first of pioneer transatlantic steamers, or, more strictly speaking, to the proprietorship of the first vessels which crossed the ocean propelled exclusively by steam-power. These pioneers, it is claimed, were the *Sirius* and the *Great Western*, the former built for another class of voyages and afterward lost on the station between Cork and London; the latter built expressly for Atlantic navigation. They made the voyage in 1838, which, as will be seen, was twenty years too late for pioneers. If "exclusively propelled by steam power," as is urged for them, means that no sails were set during the passage, the claim may be founded on fact; but that it is deceptive and misleading here is surely no doubt. The *Savannah*, an American steamship, was surely the first ever built to cross the ocean, and, if she carried auxiliary sails and set them when the wind was fair, she did no more than every steamer has done from that time up to the present, and could by no means be forced on that account to forego her claim to being the first steamship that crossed the seas. She was built in 1818, by Col. John Stevens of New York, and the news of her master's intention to tempt the seas soon reached the English world, being heralded by the *London Times*, in its issue of May 11, 1819, in the following paragraph: "Great experiment. — A new steam vessel of three hundred tons has been built at New York, for the express purpose of carrying passengers across the Atlantic. She is to come to Liverpool direct." This was the *Savannah*, which, in May, 1819, left the port of New York, under the command of Captain Moses Rogers, bound for St. Petersburg *via* Liverpool. She reached the latter port on June 20, having used steam eighteen days out of the twenty-six, and thus proved the feasibility of transatlantic steam navigation.[1] The log-book of the *Savannah*, in which Captain Rogers jotted down the incidents of the trip, is yet preserved by his descendants.

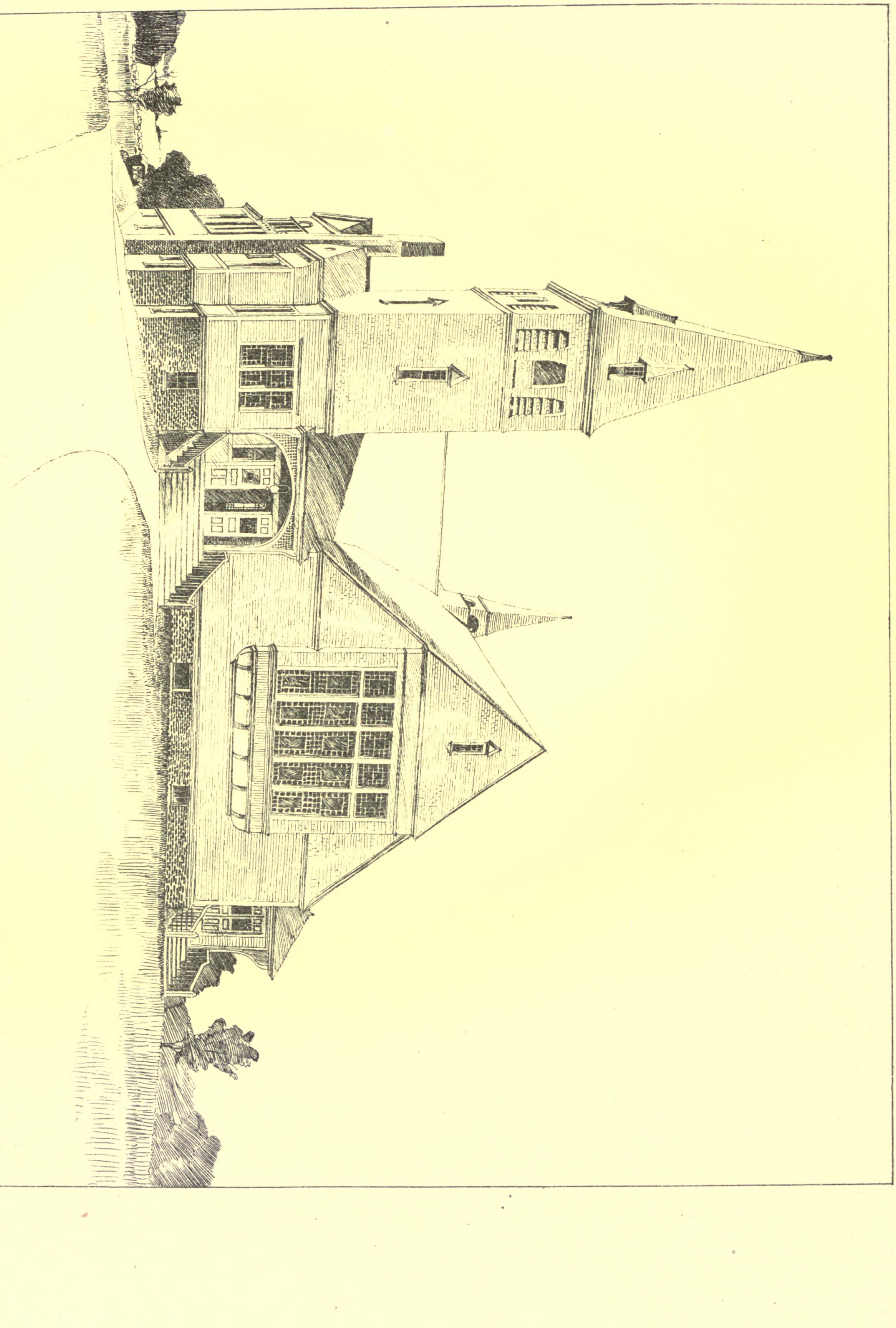
It is a curious collection of coarse, unbound paper pages, written in a bold and intelligible hand. On the first page is the following: "A journal of a voyage from New York toward Liverpool on board steamship *Savannah*, Moses Rogers, master." Here is the first entry in the log-book: "Sunday, March 28, 1819.—These twenty-four hours begin with fresh breezes at Northwest. At 10 A. M. got under way for sea with the crew on board. At 1 P. M. the pilot left the ship off Sandy Hook light." The second entry reads: "Remarks on board, Monday, March 29, 1819. These twenty-four hours begin with fresh breezes and clear. At 4 P. M. the Highlands of Neversink bore north by west six leagues distant, from which I take my departure. At 10 P. M. took in top-gallan' sails. At 8 A. M. tacked ship to the westward. Saw a brig and schooner steering to the westward. At 11 A. M. took in the mizzen and fore top-gallan' sails. At 11 A. M. got the steam up and it come on for to blow fresh. We took the wheels in on deck in thirty minutes. At meridian to-day fresh breezes and cloudy. Latitude by observation, 39 degrees, 19 minutes." It seems that the *Savannah* was so constructed that, when there was a heavy sea running, the paddle-wheels could be taken in on deck. This was done by rigging a sling from the main yard, which being swayed about, could be forced first over one wheel and then over the other. Now began a short season of very rough weather, during a part of which the *Savannah* was hove to. On the following Saturday, however, the weather being moderate, the wheels were again shipped and the vessel proceeded under steam.

[1] These dates cannot be reconciled with those in the log-book. — EDS.

After an uneventful voyage the coast of Ireland was sighted, and early one morning the *Savannah* approached the land. That afternoon she was boarded by the king's cutter, *Kite*, Lieutenant John Bowie. The log-book says little about this, but Moses Rogers's brother Stephen wrote an account of this amusing incident, which was published in the *Gazette*, of New London, Conn. He says: "She (the steamer) was seen from the telegraph station at Cape Clear, on the southern coast of Ireland, and reported as a ship on fire. The admiral, who lay in the cove of Cork, despatched one of the king's cutters to her relief. But great was their wonder at their inability with all sail, in a fast vessel, to come up with a ship under bare poles. After several shots were fired from the cutter, the engine was stopped, and the surprise of her crew at the mistake they had made, as well as their curiosity to see the singular Yankee craft, can be easily imagined. They asked permission to go on board, and were much gratified by the inspection of this naval novelty." Two days later, according to the log, they shipped the wheels and furled the sails, and ran into the river Mersey, and at 6 P. M. came to anchor off Liverpool. Captain Rogers seems to have been as modest as he was daring, for, though having succeeded in an attempt to navigate the ocean with paddle-wheels, which many of the ablest mariners and scientists had declared perilous if not impossible, he only jots down in his log-book a few dry details of his safe arrival, with never a comment.

A distinguished scientist had declared long before that it was not possible to cross the ocean by steam. Indeed, so sure was he that it could not be done that, when he heard that Captain Rogers proposed to make the attempt, he declared that he would swallow the first vessel that should safely reach the British Isles from this country. It would not, therefore, have seemed immodest had Captain Rogers, upon the arrival of the *Savannah*, have called upon the savant to fulfil his promise and swallow the ship. Fortunately, the aforementioned Stephen Rogers wrote an account of the scenes along the quays and river when the steamship drew near the shore. He says: "On approaching Liverpool, hundreds of people came off in boats to see the steamship. She was compelled to lie outside the bar until the tide should serve for her to go in. During this time she had her colors all flying, when a boat from a British sloop-of-war came alongside and hailed. The sailing-master was on the deck at the time and answered. The officer of the boat asked him, 'Where is your master?' to which he gave the laconic reply, 'I have no master, sir!' 'Where's your captain, then?' 'He's below. Do you wish to see him?' 'I do, sir.' The captain, who was then below, on being called, asked what he wanted, to which the officer answered, 'Why do you wear that pennant, sir?' 'Because my country allows me to, sir.' 'My commandant thinks it was done to insult him, and if you don't take it down he will send a force that will do it.' Captain Rogers then exclaimed to the engineer, 'Get the hot-water engine ready.' Although there was no such machine on board the vessel, the order had the desired effect, and John Bull was glad to paddle off as fast as possible. On approaching the city, the shipping, piers, and roofs of houses were thronged with persons cheering the adventurous craft. Several naval officers, noblemen and merchants from London came down to visit her, and were very curious to ascertain her speed, destination and other particulars."

It is curious, in looking over the English newspapers of this time, to see how suspiciously the English authorities regarded the American steamer. America was looked upon as very ambitious, and an enterprise like this on the seas filled the British breast with great alarm. It seems that Napoleon being now in captivity in St. Helena, his brother had offered a large reward to whoever should rescue him, or rather there was, it would appear, a rumor to that effect, and the British press was sure that this Yankee steamer was in European waters for no other purpose. The *Savannah* remained nearly a month in British waters, and while there Captain Rogers had jotted down in his log the following note of an unfortunate occurrence. It is here given literatim: "July 19, 1819. These twenty-four hours begin with fresh breezes and rain. Captain Rogers told Mr. Blackman to go on shore after James Bruce and John Smith to get them on board. They would not come; the watchman put them in the boat. John Smith tried to knock Mr. Blackman overboard; Struck him several times; he Swore he would take Mr. Blackman's life, but Mr. Blackman got him on board, and he denied his duty, and then he was put in irons. Middle and latter part fresh gales at S. W. and rain." On the 22d of July the *Savannah* set out for St. Petersburg under steam. She stopped at Copenhagen and also at Stockholm, where, as in England, she was the object of general attention, being visited by all the members of the royal family and the nobles. Captain Rogers's diary says: "Mr. Huse (Christopher Hughes), the American Minister, and Lady and all the Furran ministers and their Ladyes at Stockholm came on board." At St. Petersburg, where the steamer arrived in the early part of September, she was visited by the Lord High Admiral and members of the royal family. She sailed for America on October 10, and reached Savannah, Ga., November 30. While at Stockholm, Captain Rogers took aboard as



:FIRST CONGREGATIONAL CHURCH: NORWOOD MASS:

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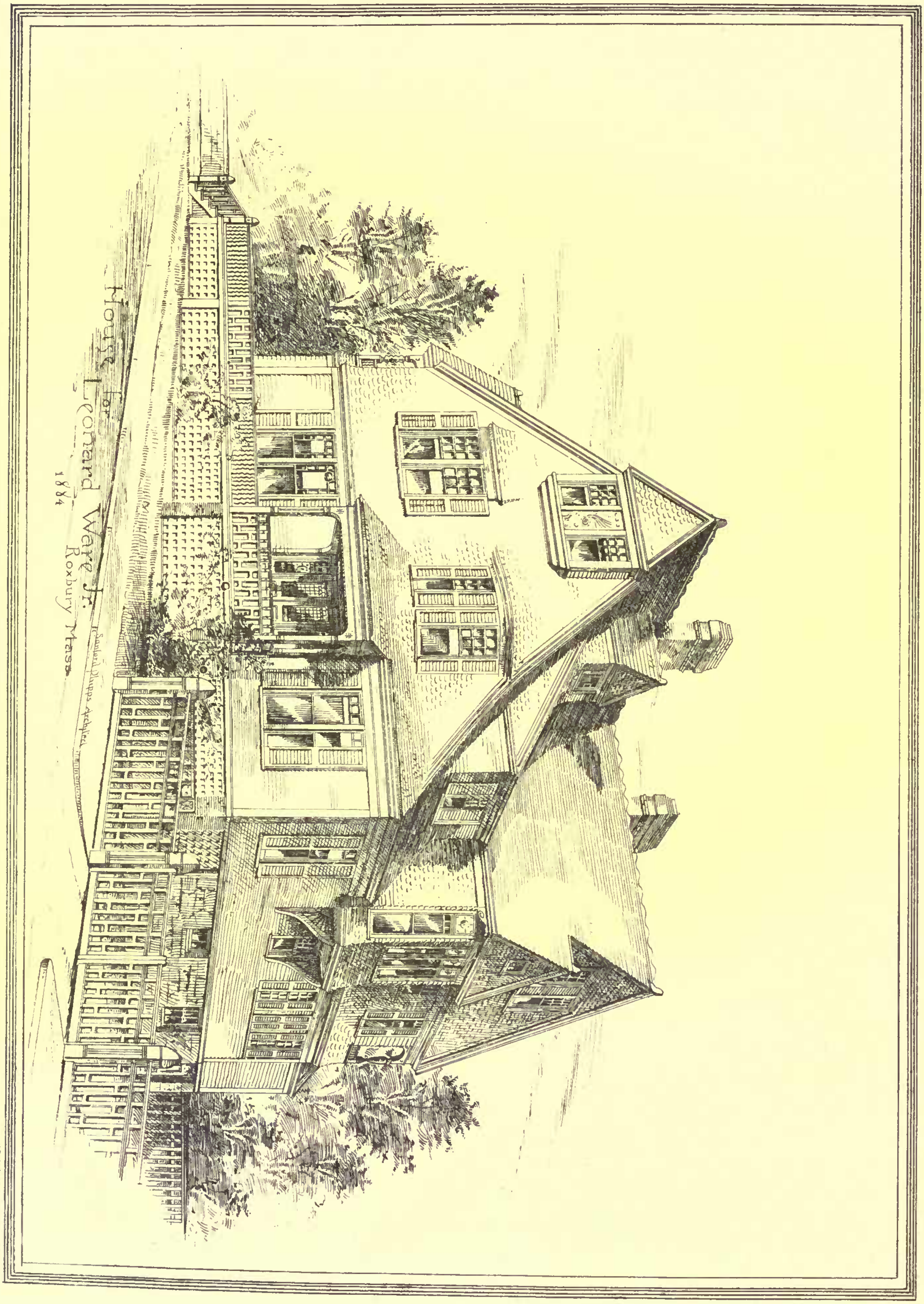

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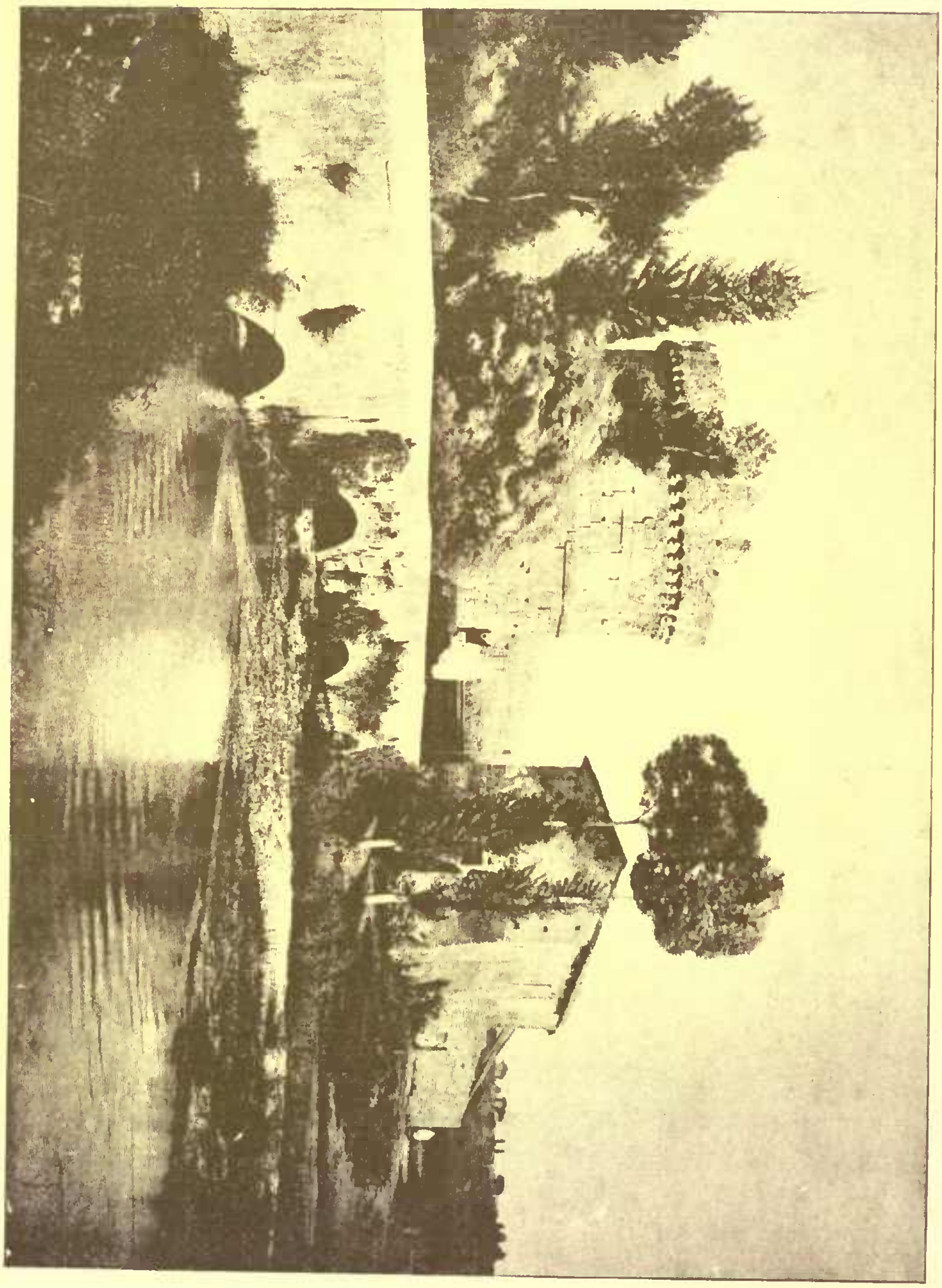

Bridge near Rome.

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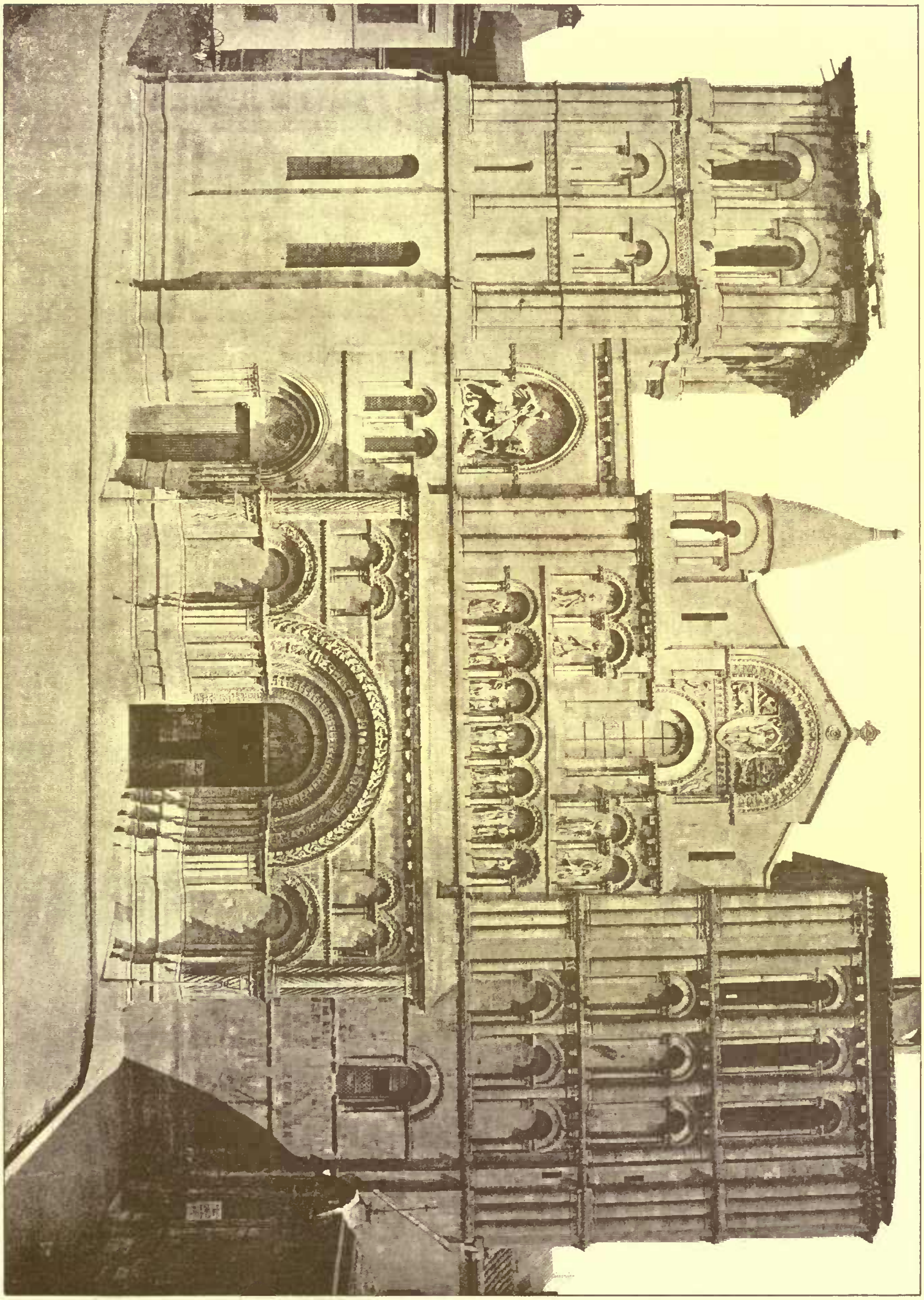

Church of St. Croix, Bordeaux, France.

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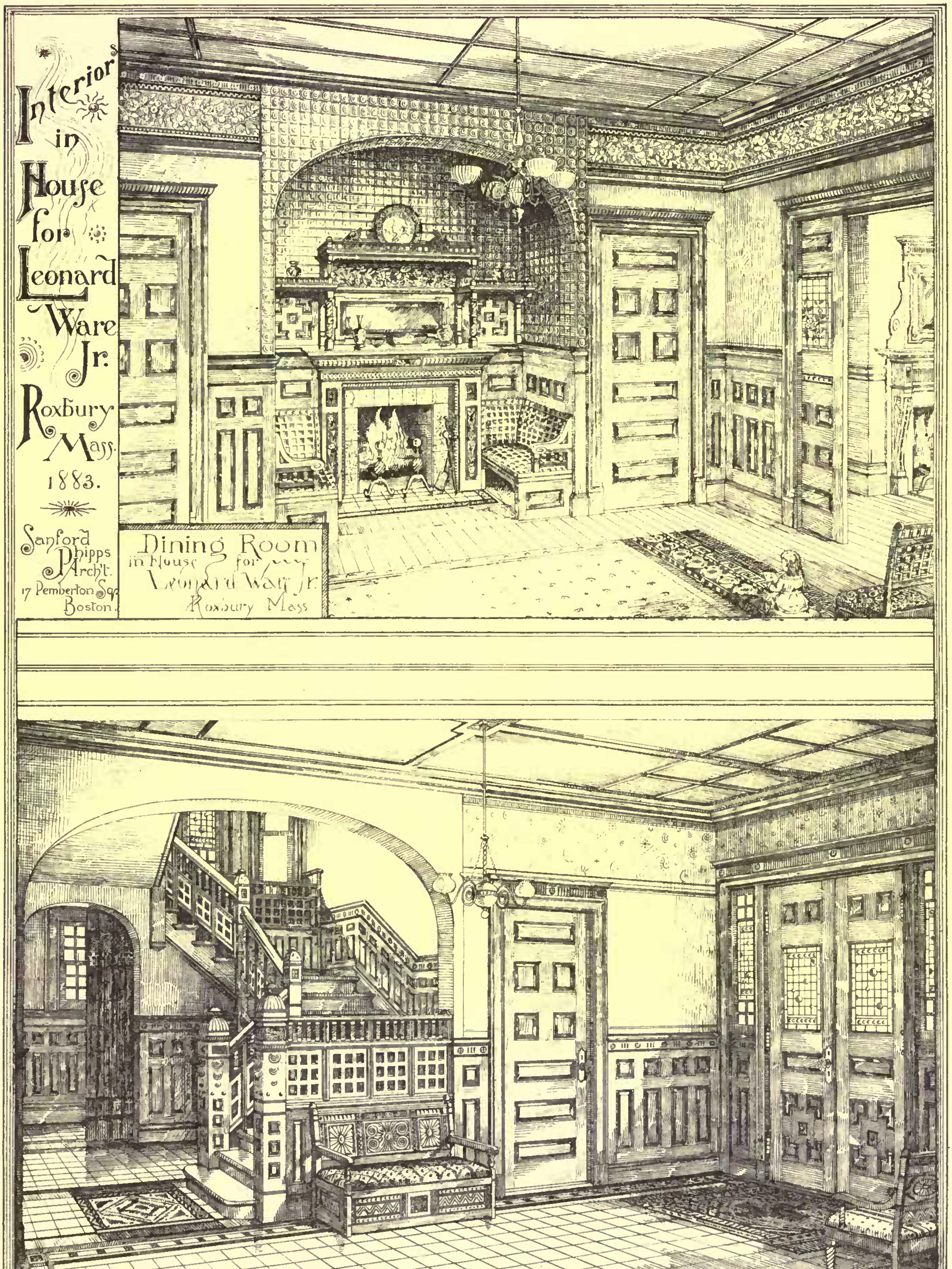

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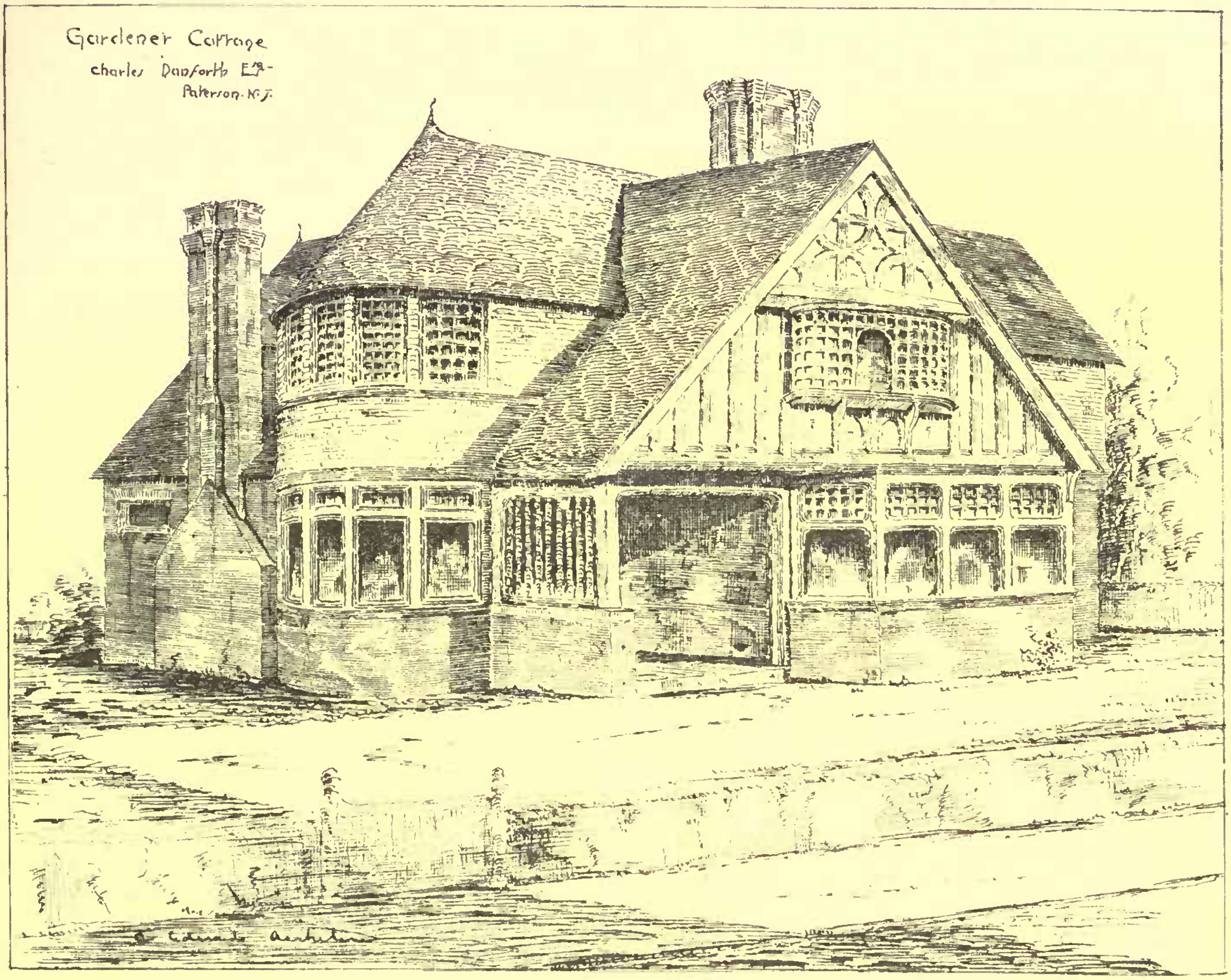
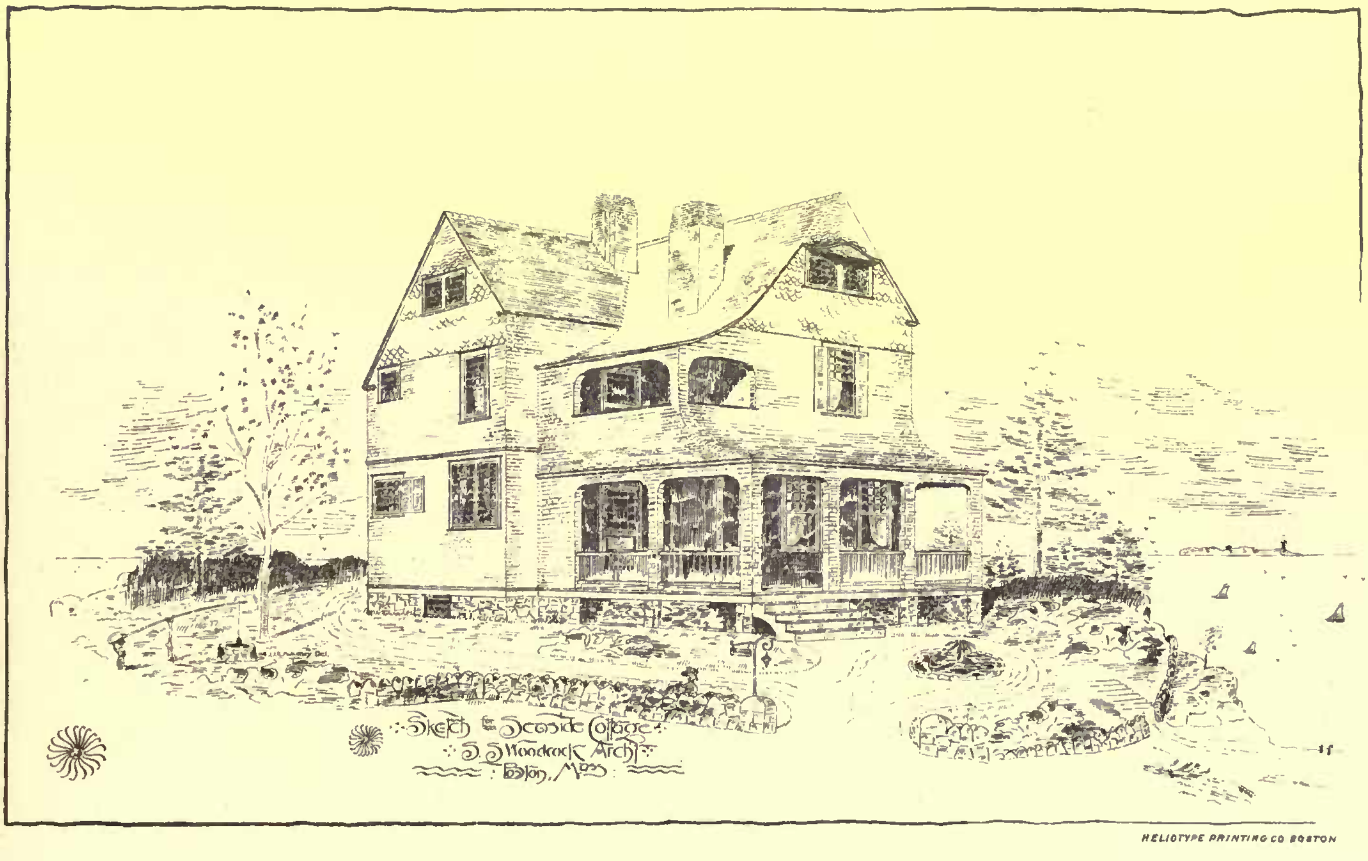




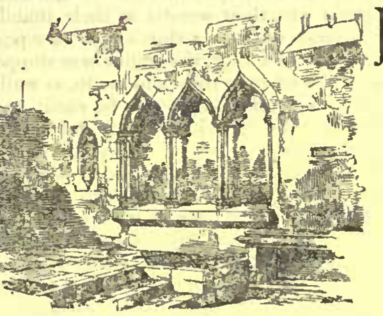
HELIOTYPE PRINTING CO BOSTON

an invited guest Lord Lynedock, an English nobleman, who made the journey to St. Petersburg aboard the steamer. When he left the ship, he presented Captain Rogers with a massive gold-lined tea-kettle. This tea-kettle is yet preserved by the descendants of Captain Rogers. It bears the following inscription:

"Presented to Captain Moses Rogers, of the steamship *Savannah* (being the first steam vessel that had crossed the Atlantic), by Sir Thomas Graham, Lord Lynedock, a passenger from Stockholm to St. Petersburg — September 15, 1819."

Thus it will be seen that the *Savannah*, which, by the way, was lost off the south side of Long Island, anticipated the alleged steam pioneers *Sirius* and *Great Western* by nearly twenty years. — *N. in the Brooklyn Eagle.*

THE WALL.[1]



Sedilia&Piscina:Etchyngham:Ch:Eng:

HAVING now looked a little *at* our wall, let us try to look *into* it as far as we can, and perhaps an architect can look farther into a stone wall than some other people, notwithstanding the old proverb. What then are walls made of? You may lay it down as a general rule that a wall must be made of something that lies ready to hand. In many cases the fact that the material of which some small ornate object is to be made comes from far is a point in its favor. We prefer Italian marble to Derbyshire, or to the serpentine of Cornwall, not because they are always more beautiful (for they are not), but because they are Italian. But for wall building so much and such heavy stuff is wanted that it never does to bring it far. Accordingly, in localities where nothing else is to be had walls are built of earth. In Devonshire, for example, cottages, barns, and the walls of gardens and orchards are commonly of earth, and they are warm, solid, and, if well taken care of, durable; but moisture must not be allowed to get into the heart of them, or they will soon crumble. Next to earth is a material not, so far as I am aware, known in England, but once in use in the East — sun-dried bricks. Vitruvius says that the walls of Babylon were built with sun-dried bricks laid in bitumen; and it is supposed that they were largely used in Assyria and Babylonia, and that some of the shapeless mounds which now mark the site of ancient structures consist of a mass of what was once sun-dried bricks. Next, of course, we should come to bricks — the material only too familiar to the London eye, and the refuge of builders throughout the world, and of every age who, like the London builder, were not so fortunate as to have stone within reach. In Egypt and many parts of Italy there are remains of brickwork of great antiquity, and in Lombardy, North Germany, France, Belgium, and our own country brick has been extensively used, and is in use at the present day. I should occupy the entire evening if I told you, as I hope to tell the students of the constructive courses, only very hastily how bricks are made and burnt, what are good and what bad, and how they are to be laid in a wall. I can, I think, only remark that bricks are not always of the sizes and shapes we are familiar with. The Romans made them flat, more like our tiles, and in many European countries they have been used considerably smaller. The size is a good deal influenced by the weight. An English brick can be held and managed by an artisan with one hand. If it were much larger or much heavier it would take two hands, or even two men, as were probably employed on the Roman bricks. The most refined kind of brick is called terra-cotta. It is of the nature of brick, but bears the same kind of relation to it that marble does to stone, or silver to pewter. Terra-cotta is, in theory at any rate, the most appropriate ornamental substance to employ with brickwork, and though there are some practical difficulties in the way of using it, when these are overcome it is an admirable material. The best and most desirable material for wall building is, however, stone. Every sort of stone that is in the least degree deserving the name of stone has been made use of for the purpose of wall building, from flints, which are some of them as inconvenient in shape for the mason's use as potatoes would be, up to the hardest granite, the finest and truest freestone from our many excellent limestone and sandstone quarries, or the beautiful and precious marbles of Greece and Italy. There are stone walls in Greece and in the Etruscan plain, which have come down to us from remote antiquity, made of large polygonal stones unwrought, or but slightly wrought — and coarsely fitted together without mortar. There are others in Egypt of the finest polished granite with joints so close and true that the edge of a sheet of paper cannot be got between the blocks; but as remarkable in its way as these specimens of consummate handicraft is the construction of the Roman walls, which were often made of small stones, such as we make macadamized roads of, set in a tenacious mortar which has hardened till it is as strong as the stone itself, and steadied at intervals by the introduction of a bond-course of flat bricks or large stones. With this mode of construction, which could be carried out anywhere, the Romans built vast works, the ruins of which remain all over Europe. There is quite as much to learn about stone as about brick; in fact, a great deal more, as, for example, how to select stone, for, owing to the ease with which many sorts of stone are acted upon by the weather, there are many precautions to be taken in the selection or use of material. I will just name the three cardinal ones, which are these: — First, select for use stone from a quarry, and from a bed in that quarry which experience has shown to be durable. Secondly, let that stone lie in the building in the same way as it lay in the quarry, or, as masons would say, bedwise. As an illustration of this you may make an imitation of a wall of books laid flat, and they will do very well; pile the same books on their edges, and they will illustrate in a few minutes what will be, in the course of time, the behavior of blocks of stone that are face-bedded — that is to say, laid the wrong way. Thirdly, and lastly, take such precautions as will insure that no moisture gets into the inside of your wall, or into the heart of the stones that compose it. The materials I have named all of them require to be held together by some sort of cement if the wall is to be durable and weather-tight. Lime is at the bottom of all the cements in general use, and its faculty of hardening after being calcined and slaked, and as it hardens of adhering to the surface of the stones or bricks with which it is in contact, is invaluable. Mortar is made of quicklime and sand. Cements and hydraulic limes are compounds (natural or artificial) of lime and other substances, chiefly alumina, which enables it to set harder, and under water, and more rapidly than in its unmixed state. Plaster of Paris, so serviceable to the French builder, is sulphate of lime, and so on through all the series of cementing agents. In putting walls together great skill is often shown in the bonding or interlacing of the bricks or stones, by means of which they are enabled to hold one another tight; and when big stones are employed, or much difficult masonry occurs, it is, generally speaking, essential for the materials to be cramped and tied together by cramps, dowels, joggles, bond-course, and ties. Before leaving the subject of walls built of bricks or stones and mortar, I ought to say something further as to the fact that from the time of the Romans to our own day very few walls have been homogeneous — that is to say, built of the same materials throughout. This sort of rough masonry of small stones which I referred to just now as much used by the Romans, was not very well adapted to stand the weather and to look handsome; accordingly it was a frequent custom to coat it with a surface of finer stone in larger blocks, as well as to bond it by courses of stones or bricks; and this sort of construction has been, with more or less skill, in use ever since. I need hardly point out that where the heart of a wall is of many rough stones laid with much mortar (a substance more or less compressible), while the face is formed of few well-dressed and squared stones laid with little mortar, there must be great risk of the two parts of the wall behaving differently the one from the other when weight comes upon it. This happened in much of the work of the builders during the 11th and 12th centuries in England — the period of the Norman style. Professor Willis has gone so far as to say that if a Norman tower has not fallen, that circumstance throws great doubts upon its being Norman. Certainly an immense number of them have fallen, and as an example of failure, happily anticipated before there was a fall, I may remind you of Peterborough, where the core of the Norman piers carrying the great central tower has crumbled, and the piers have arched, and have been taken down within the past year. Different from the practice of building composite walls is another which I will only just mention, that of building hollow walls as a protection against damp. We have by no means exhausted the list of materials for walls if only your patience will hold out. A modern material which I will just name, but not dwell on, is concrete, excellent if well looked after, dangerous otherwise; cheap if used in large quantities and where there are few features or irregularities, but far from cheap in small or intricate buildings; very strong, very durable, and sometimes valuable where nature yields few materials for walls of another sort. Timber has been used time out of mind for the walls of houses, and even churches and dignified buildings, in the spots where it is plentiful. There is evidence that timber buildings were in use in Assyria, Egypt, and Lydia, from the curious fact that ancient remains of stone or marble are actually cut into shapes that imitate timber; indeed, the whole system of architectural treatment in use in Greece is a kind of petrifaction of timber construction. The countries of Europe where timber buildings are now mostly to be met with are Sweden, Norway, Russia, and Switzerland. They are in many ways excellent. A timber wall is by no means a bad protection against weather; but it is liable to catch fire, and so quite unfit for use in cities. Many railway stations in England, however, are built of timber, and any one of these will serve to illustrate a cheap way of building timber walls. In Sweden whole logs, halved at the angles, are used, and a wall far more solid, durable and weather-tight can be obtained. The same method is followed in Russia — and you may see a good specimen at the Health Exhibition in the Russian house at the back of the dairies. Timber framing filled in with plastering or with brickwork in the spaces, called usually half-timbered work, is an excellent material for walls if done with the solidity and liberal use of strong timbers that was common in England in the sixteenth and seventeenth centuries. In Lancashire and Cheshire, in Worcestershire and Gloucester, in Kent and Surrey, and in other parts of England you may find many fair half-timbered walls, and even here and there one still lingers in London or the outskirts. We

[1] Portions of a lecture, by Prof. T. Roger Smith, F. R. I. B. A., delivered before the students of University College, and published in the *Building News*.

have in these later days taken to build our walls of glass, as at Sydenham, and of corrugated iron, as in many temporary rooms and churches, and each has its uses. The newest material for wall construction in England (though not, I believe, new in China and Japan) is paper. At the Health Exhibition a very serviceable little cottage walled and roofed with paper may be found. It is known as the Willesden Cottage, and I think I may say from some little experience of it, that the walls are by no means the worst within which I have been sheltered in my lifetime. We will now leave the construction of walls and turn to their treatment as an important factor in architecture. A wall, as we look at it, ought to have three parts: its base, which though below ground ought to be represented by some description of plinth or base-mounting, its body, and its top, which may be a coping to throw off water, or may be the overhanging eaves of the roof which it carries. These, then, are infinitely varied, but they are generally all to be seen in any wall that is architecturally satisfactory to the eye. The different ways of dealing with a wall as an architectural feature may perhaps be grouped as follows: —

I. Emphasizing construction.
II. Masking construction.
III. Varying the outline or plan of the wall.
IV. Enriching the surface of the wall.
V. Color.

These, of course, interlace and exchange, and I adopt a classification not because the things classified are really quite separate, but because it helps us to consider the different sides of the same subject one after another, and to be sure we do not omit something vitally important. Of the methods of emphasizing construction, which is our first division, a very ancient and obvious one is to use large stones. This was a favorite plan with the Egyptians and the Greeks, especially in archaic times. Great stones were used in the Pelasgic walls, large remains of which still exist in Greece and in the Etruscan plain in Italy. These stones were usually polygonal, very carefully fitted together, built up without mortar; such form strong walls, and they impress the spectator very much by the appearance of savage strength which they present. Stones of very large size occur in Greece and in Egypt, and in Syria stones remarkable for their dimensions and for the way in which their outline is marked round with a broad, round mark. Capt. Conder, who has measured many of them, has been kind enough to give me some particulars. He says:

The stones in the Temple wall at Jerusalem are generally 3 feet 4 inches high, with a draft 3 inches wide, and ½ inch deep. The longest stone is 38 feet 9 inches, and there are many 20 feet long. The "master course" is 5 feet high.

The stones in the Hebron Haram are exactly like those at Jerusalem in all respects, including the tooling with a toothed adze driven by a hammer, and bosses and lewis-holes for moving the blocks.

There are four stones of great size at Baalbek — three in the wall and one in the quarry. The latter is the largest. It is 68 feet long. Those in the wall are about 63 feet long and 14 feet high and thick. There is a large amount of masonry at Baalbek about the size of the Jerusalem masonry, and drafted and finished like it. These stones bear Greek letters, apparently masons' marks, and are of the second century A. D. I think myself the larger stones are probably of the same date.

There is another building with great stones in Syria not to be forgotten (see "Heth and Moab," pp. 161–170). It is the palace of Hyrcanus, built about 176 B. C. The stones are 7 to 10 feet high, and 20 to 25 feet long, larger than the Jerusalem stones; but they are only 2 feet 3 inches thick, which is peculiar, as there was no backing.

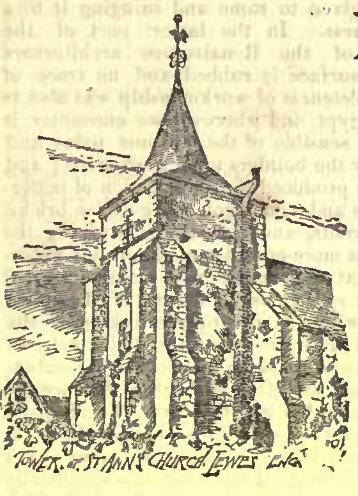
It seems, then, that the Jews used this masonry in the time when they became acquainted with Greek architecture; and I believe drafted masonry is found at Athens in the Acropolis, also of great size, but I know no details. The temples at Thebes have stones quite as large as those in Syria, I understand.

I do not know a single fact to lead us to suppose that the Phœnicians used this kind of drafted masonry, or that Solomon would have used it. I do not think the Jerusalem masonry is older than Herod's time.

Another mode of emphasizing construction, which the Jews seem to have taken a pride in, is the employment of large corner stones. When a wall is built of small or loose materials it is not easy to make the corner strong; in fact, in parts of England the towers, which would otherwise be square, are round, because there is little else but flint to build with, and with flints you cannot make a square corner. It is usual, on account of this tendency to weakness, to fortify the corner by building it of large stones, or better than others; and the Jews seem to have attached some semi-superstitious importance to the top stone at the corner of the building — perhaps a more really appropriate place for a famous stone than our "foundation" stone — which rarely, if ever, is part of the foundation. These stones at the corners came up again in Roman work, and still more frequently in the styles derived from Roman. The famous long and short stones at the corners of Saxon buildings, the well-marked quoins of Gothic ones of all ages, and the carefully wrought rusticated, and raised quoins of Renaissance buildings, all go upon the principle of marking construction. In simple and homely structures, built of materials with a fine surface of good color any method of marking the structure of a wall is successful. In Cumberland and Westmoreland, where many varieties of stone rich in color are met with, the walls of humble churches, or even cottages, are sometimes quite a sight to see and admire from their beautiful and varied tints, especially if a method of walling be adopted which allows the natural cleavage of the stone to be seen without any tooling. Another and an opposite mode of emphasizing treatment, if not construction, consists in exaggerating the squaring and dressing given to stone and bringing it to a surface of the utmost smoothness. In the latter part of the Gothic period, and in much of the Renaissance architecture which followed it, the whole surface is rubbed, and no trace of the tool is left. The same completeness of workmanship was also to be met with in Greece and in Egypt, and wherever we encounter it the spectator seems to be made sensible of the immense pains and care that have been lavished by the builders upon their walls; and to a less extent the same effect is produced by the selection of materials with a fine texture of surface and a good color, like choice bricks. A wall consists of stones and joints, and one way of marking the construction is to make the joints more conspicuous than they naturally would be. We have seen that in ancient Jewish masonry a *draft* or breadth of finely-tooled work surrounds the margin of the stone. In some Greek work we meet with a severe square sinking at the joint, and in Roman work with a more strongly-marked channel. In the revived Roman, which we know as Renaissance, this accentuation of the joints of stone is practised often with great frequency; and the refined mason's work, to which we have given the absurdly inappropriate name of rustication, is one of the sources of the great beauty of many Italian palaces and houses. There are many other ways of emphasizing construction to which I have not time specifically to allude, but may say generally that any treatment of a wall which makes its materials or its construction evident almost invariably adds a natural and, so to speak, a spontaneous grace to buildings. This is nowhere more preceptible than in the half-timbered houses of our country and the entirely timber walls of houses in Switzerland or Sweden. We will now pass to our second group of methods of architectual wall treatment — methods which mask or conceal the construction. The inner face of a wall is almost invariably shrouded in some kind of covering; but even the outer face is as often as not of a nature to conceal the structure. I have already spoken of the custom of *facing* walls, and have pointed out that it may, and often does, render them more fit to resist weather. But for one case in which it is done with this legitimate object you will find scores when it is done for the sake of appearance, and this at every period of the world. There is not one wall in fifty that is built through its entire mass of the same material as on its outside — nay, I have known walls built of homely but durable materials faced with something better looking but not so trustworthy, like a wall of good sound London stock faced with soft porous red or white Suffolk bricks. I am not going to denounce this as a sham,— it used to be very much more the custom to talk about absolute truth in architecture than it now is, and I do not think there is any real sin against good taste in using two materials in one wall, the one fit for the heat and the other fit for the face, if it can be so done as to make a solid structure. Where stone is very scarce, as in London, is very costly, as is the case with the marble used for the outer face of some Italian churches, it has been the custom, and, I suppose, always will be, to use it for the face only. Of course, where this is done it is not infrequently the case that the thin facing is so used as to give the idea of enormous massive blocks, a deceit which I do not advocate or recommend. Another mode of covering the construction up is to ease a wall with some description of plaster. This is often structurally of great advantage in keeping out moisture, and if so done as not to imitate stone is no doubt quite legitimate. Many English country churches were built to be plastered, and have been covered with plaster from their origin till the present day, and now find themselves exposed naked to the weather, stripped of their proper garment, all the seams and joints of their original rough masonry brought to view, their quoins sticking up three-quarters of an inch from the general surface, and their appearance not what the original builders intended. Among methods of construction I may just name a curious one, common until lately in Sussex, of building walls of timber framing and then hanging tiles on to them, so shaped and fitted together as to look like brickwork. Many of the apparently brick walls in Hastings, for example, are really only wood-work tiled.

What is a Billion? — In the French system of notation, which is also used in the United States, it is a thousand millions; but the English system gives the name billion to a million millions. Sir Henry Bessemer, the famous inventor, who is in the habit of occupying his leisure with curious calculations for the amusement of his grandchildren, tried to convey some idea of the immensity expressed in this little word. He took it successively as a measure of time, of length and of height. Selecting the second as the unit to be used in his first calculation, he began with the startling assertion that a billion seconds have not yet elapsed since the commencement of the Christian era, nor, indeed a sixteenth part of that number. A billion seconds make 31,687 years, 17 days, 22 hours, 45 minutes, 5 seconds. In regard to length, he chose for his unit the English sovereign, a coin of the size of a half-eagle. A chain of a billion sovereigns would be long enough to pass 736 times around the globe; or, supposing all these coins lay side by side, each in contact with its neighbor, it would form about the earth a golden zone 26 feet 6 inches wide. This same chain, were it stretched out straight, would make a line a fraction over 18,328,445 miles in extent. For measuring height, Sir Henry chose for a unit a single sheet of such paper as that upon which the London *Times* is printed, a measure of about one three hundred and thirty-third of an inch in thickness. A billion of these thin sheets, pressed out flat and piled vertically upon each other, would attain the altitude of 47,348 miles. — *Engineering News.*

CAST-IRON IN BUILDINGS.



If any building material can be said to have fallen under a cloud it is cast-iron. Unless in the form of columns and stanchions it is seldom used, or only when no material can be substituted. Cast-iron is supposed to be treacherous, uncertain, incapable of sustaining tensile strains, liable to flaws, which are concealed from all eyes, and equally puzzling to operators in the blast furnace and the foundry. How many of its defects arise from imagination may not at first sight be apparent. Constructive science is not without its prejudices, and a good many of them surround cast-iron. Why that material should be slighted is easily explained. At the time when exceptionally large railway bridges were projected, a Royal Commission was appointed to inquire into the use of cast-iron and wrought-iron for the purpose. The risks arising from the vibration of cast-iron caused by the constant passing of trains, and from the occasional derailment of a locomotive or a line of carriages, were considered, and it was supposed that cast-iron in those contingencies was less suitable than wrought-iron. The Britannia Bridge, on the other hand, made it plain that an immense structure could be constructed of plates and angle-irons with as much ease as a house was built of bricks, and of a strength that was equal to every reasonable test. The engineers of that bridge, Stephenson, Fairbairn, Hodgkinson, and Clark, became, as it were, the lawgivers on iron construction, and as they were supposed to be in favor of wrought-iron exclusively, it was made the favored material. A little inquiry would have shown that Stephenson, who was the chief among them, had no partialities. If he used wrought-iron to cross the Menai Straits, in a no less remarkable work, the High-Level Bridge at Newcastle-on-Tyne, he gave the preference to cast-iron. Fairbairn, however, found it more convenient to undertake contracts for wrought-iron girders, and, as he was a rather productive writer, his literary influence was widespread, and was employed in advocacy of the material. Wrought-iron was also supposed to offer more facility for designing new types of bridges, and in consequence a great many engineers were attracted by it. During the last thirty years very few cast-iron bridges of any importance have been erected in England, while the varieties of those in wrought-iron are almost countless.

Fairbairn was better known as a practical engineer in connection with mills than with railways, and as soon as, by a piece of sharp practice, he had patented a rivetted girder, he was able to introduce a great many of them into buildings. About the same time another influence came into operation against cast-iron. In 1846, the carpenters of Paris organized a general strike, and architects and builders were in consequence compelled to substitute iron for wood in floors and roofs. Various sections of rolled girders were tried, and eventually the I-girder was evolved. The employment of one with a bearing of 18 feet in a house in the Boulevard des Filles du Calvaire, in Paris, about 1849, was among the most memorable events in the history of modern building construction, and cast-iron beams were henceforth superseded. They had been in use from 1801, when Boulton & Watt arranged the iron-work for Phillips & Lee's mill in Manchester.

There is no denying the convenience and advantages of wrought-iron, whether in the form of rolled joists or rivetted girders. But let us be just to beams in the other material. When cast-iron lost its position little was alleged about deficient strength or liability to collapse through invisible flaws. The experiments on it produced remarkable results. Thus, for example, it was ascertained by the Royal Commission on the Application of Iron to Railway Structures that when cast-iron bars were exposed to successive transverse blows, each blow producing one-third of the ultimate deflection (or deflection immediately before breaking), they bore four thousand such blows without having their strength impaired. It was likewise found that when bars of cast-iron were exposed to successive deflections by means of a revolving cam, they bore one hundred thousand such deflections without any impairment of strength. These figures show that cast-iron does not so readily succumb even under variable loads which are frequently applied and removed.

The bridges which were constructed in days when wrought-iron was not recognized as a building material are also evidence of the endurance of cast-iron. The Coalbrookdale Bridge over the Severn, designed by Abraham Derby, was constructed in 1777. Telford's Bridge, near it, at Buildwas, was finished about twenty years afterwards, and his Waterloo Bridge at Bettws-y-Coed in 1815. The big Sunderland Bridge, 236 feet span, dates from 1796, and bids fair to last long, although it is only the work of an amateur engineer. It was designed by the rebellious staymaker, Tom Paine, and was originally put together at the Yorkshire Stingo in Lisson Grove. Southwark Bridge has sustained the wear and tear of metropolitan traffic from 1819. All those bridges are in positions which are exceptionally trying, and their existence is a refutation of the suspicions which some people have entertained respecting the strength of cast-iron. If the material can withstand the variety of loads which pass over Southwark Bridge, and all variations of atmospheric condition, there need be no fear about its security within a building.

With such precedents, the Corporation of Middlesbrough may have full confidence in the fitness of cast-iron to support the floor of their great hall, no matter how crowded it may be. Nevertheless a good deal of credit is to be given to Mr. Hoskins for the experiment, which has been so well carried out by Messrs. Dennett & Ingle. It would have been possible to have used wrought-iron beams for the purpose, but apart from questions of expense and headway, the appearance of the room must have been very different. Experience has shown that it is almost impossible to give an architectural character to rivetted or rolled girders. The utmost that can be done is to decorate them with painted ornament, or to perforate the web-plate with patterns. But cast-iron is more tractable and lends itself to design. There is of course a risk that it can be made into forms which are more applicable to wood or stone, but in good hands there need be no want of fitness in the ornamentation. The material has been so little used, it is not surprising that occasionally there should be a doubt about the artistic treatment that is most appropriate to it. The late Owen Jones did a good deal towards the creation of a style that was adapted to cast-iron. He seemed to keep in view the crystalline nature of the material as a fundamental idea, and to have restricted himself to geometrical patterns which would be in keeping with extreme rigidity and power to resist compression. On the other hand, there are structures of cast-iron, which are so profusely ornamented with imitations of carving as to suggest only the ease with which the metal can be melted and run into moulds. The spandrels of railway bridges might be cited as examples which show that more was thought of the flowing curves of the "filling in" than of lines which might express construction.

It is not to be inferred from what we have said that we propose a substitution of cast for wrought-iron in buildings. All we venture to imply is that both kinds of girders have their uses, and that by restricting himself to horizontal beams in wrought-iron, the architect very often adds to his difficulties in his endeavors to produce effect; while cases often arise like the Middlesbrough Town Hall, where cast-iron demands a preference before all other materials. — *The Architect.*

THE WESTERN ASSOCIATION OF ARCHITECTS.

CONSTITUTION.

SECTION I. The name of this organization shall be the WESTERN ASSOCIATION OF ARCHITECTS.

SEC. II. The objects of the Association are: To unite in fellowship the architects of the United States, to combine their efforts so as to promote the artistic, scientific and practical efficiency of the profession, and to cultivate and encourage the study of kindred arts.

SEC. III. This Association shall consist of Fellows and Honorary Members.

SEC. IV. Any architect practising his profession in the United States may become a Fellow of this Association. All members in good standing in any State Association organized under the laws of that State, also all members of the American Institute of Architects who shall become subject to the constitution of the Western Association are by virtue of such membership Fellows of this Association.

SEC. V. The officers of this Association shall be a president, a secretary, a treasurer, and as many vice-presidents as there shall be State associations, the president of each State association being a vice-president of this Association.

SEC. VI. It shall be the duty of the President to preside at all meetings of the Association, but in his absence the Vice-President of the association of the State in which the meeting of this Association shall be held shall preside.

It shall be the duty of the Secretary to take the minutes of the meetings, and conduct the correspondence of the Association, subject to the Board of Directors.

It shall be the duty of the Treasurer to collect all funds, and disburse the same on the order of the Secretary, when countersigned by the Chairman of the Board of Directors.

SEC. VII. This constitution may be mended by a two-thirds vote of the Fellows present at any regular meeting.

BY-LAWS.

ARTICLE I. The annual meetings of this Association shall be held upon the third Wednesday in November, and at such place as shall be designated by a majority vote of members present at the previous meeting.

ART. II. The meetings of this Association shall be conducted in accordance with "Robert's Rules of Order."

ART. III. The Board of Directors shall consist of five Fellows, who shall have the care of the property, and management of the general welfare of this Association, and shall report at such regular meeting.

ART. IV. With the exception of Vice Presidents, all Officers including Directors shall be elected annually by a majority ballot-voto at an annual meeting of this Association.

ART. V. All papers, books, and other records shall at all times be open to the inspection of the Fellows of this Association.

ART. VI. Candidates for membership as Fellows of this Association shall pay an initiation fee of five dollars, excepting members of State Associations or of the American Institute of Architects, who shall be admitted free.

ART. VII. All Fellows of this Association shall pay an annual due of two dollars.

Art. VIII. All applicants for membership as Fellows of this Association shall be referred to the Board of Directors, who shall investigate their standing, and if found worthy, recommend them for election at the next meeting.

Art. IX. Twenty Fellows shall constitute a quorum for the transaction of business.

Art. X. The By-Laws of this Association can be amended at any meeting by a vote of two-thirds of the Fellows present.

OUR STABLE COMPETITION.

Baltimore, Md.

To the Editors of the American Architect: —

Dear Sirs, — As you do not mention what you wish the drawings to be finished in; will you kindly inform me if color will be allowed, or whether they must be finished entirely in India ink?

Yours truly, Architect.

[Drawings are to be rendered in pen-and-ink. — Eds. American Architect.]

LEARNING WITHOUT TEACHERS.

Kansas City, Mo., November 18, 1884.

To the Editors of the American Architect: —

Gentlemen, — Please inform me through your valuable journal, if a student can learn the orders of architecture, so that he can apply them to buildings, without the aid of an instructor; if so, please name an English book that treats best on the subject; I have a book, but it gives no details, and I cannot see how I can practise the orders, especially the capitals, without details. Also please state the best book that treats on sketching for a student?

By answering the questions, you will oblige

Frank Maurice.

["*Nicholson's Cyclopædia of Architecture*," "*Gwilt's Cyclopædia of Architecture*," "*The Architectural Director*," "*Batty Langley's Builder's Treasury*," "*Chambers' Civil Architecture*," "*Nicholson's Students' Instructor*," "*Nicholson's Treatise on the Five Orders*," and several other books, give details of the orders. Nicholson's books are perhaps the best of the cheaper ones. To learn sketching without a teacher, get "*Ruskin's Elements of Drawings*," practise faithfully all the exercises in it, and then sketch from nature as much as possible, copying a plate in one of the architectural journals occasionally, to get ideas of rendering forms and textures. — Eds. American Architect.

AN ARCHITECT'S CHARGE QUESTIONED.

November 3, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I desire to submit for your opinion the following case.

A club in this city decided last year to build a house for its occupation. In the ranks of the club was an architect. This architect submitted plans for the approval of the club. The club finally appointed a committee to take entire charge of the erection of the building (including the acceptance of suitable plans).

At the outset this committee was informed by the above-named architect, that no charge would be made for his services.

At the first meeting of this committee, the plans came up for approval, and some radical changes were suggested, to which the architect replied, that the change of plan suggested would put him to considerable trouble and expense, and the fact that the architect was to make no charge for his services, had its influence in inducing the committee to waive their views regarding the change suggested, and the plans as presented were adopted.

The building has been erected on the original plans presented, and it now transpires that the adoption of the change suggested at the first meeting of the committee would have been greatly to the advantage of the club.

Six months after the completion of the building, the architect presents a bill for "incidentals" (no charge being made for services), for over two and three-quarters per cent on the entire cost of the building. This bill is a complete surprise to each member of the Building Committee, as well as to every member of the club.

Will you kindly inform me what you consider the rights and duties of the club in the premises?

There is no one in the club versed in the matter of building, but it does seem to me that the architect having informed the committee that he should make no charge for his services, and the committee understanding that this meant no charge of any kind, and his assertion that a change of plan would put him to considerable expense and trouble, would seem to indicate that at that time he did not intend to make any charge of any kind; and further his presenting no bill until six months after the occupation of the building, would tend to confirm the view I take, that when he proposed to make no charge for his services, he did intend to convey the impression of no charge of any kind. Respectfully yours,

Enquirer.

[We think there must have been some misunderstanding as to the architect's intention. It is hardly possible that a professional man should have intended to present his club with the whole time, responsibility and money required for designing and supervising the erection of a club-house. Even if an inexperienced and over-generous member should have done so, however, it would be, we should say, quite inconsistent with the spirit which should rule in clubs of gentlemen to take him at his word, and exact from him the literal fulfilment of his rash offer, if it involved, as it certainly would, labor and expenditure on his part which he could not have foreseen. Our advice to the club would be to pay the architect his two and three-quarters per cent, and to be thankful that it contained a member so liberal as to make a contribution to the new building of the remaining two and one-quarter per cent. — Eds. American Architect.]

NOTES AND CLIPPINGS.

The First Maker of Plate-Glass.—Plate-glass was discovered in an accidental way, in 1688, by a man named Thevart. It is attributed to the breaking of a vessel containing melted glass, a portion of which found its way under a large flag-stone, which, when subsequently removed, was found to cover a plate of glass. This suggested the idea of casting glass in plates.—*Philadelphia Bulletin.*

Heavy Chains.—Two heavy chains of the following dimensions, for use on the large floating bridge connecting Portsmouth and Gossport, have recently been made in England: each chain was 640 yards in length, consisting of nearly 5,000 links, the diameter of iron being 1 11-16 inches, and the weight of each chain 21 tons, tested to a tensile strain of 40 tons, or twenty per cent over Admiralty test, the actual breaking strain being proved to be 70 1-2 tons. Each chain was loaded upon a carriage weighing eleven tons, the load for road transit being 32 tons.—*Iron Age.*

Assyrian Excavations. — Sir Henry Layard has recently repeated his statement that Botta discovered the first Assyrian monument (at Khorsabad), but says that Botta did not excavate in the mound of Konyunjik, which is now considered to mark the site of Nineveh, from the discovery there of the ruins of the palace of Sennacherib. "I went to Mosul in the early spring of 1840, and visited the ruins which were then supposed to mark the site of Nineveh. Even then the idea of excavating occurred to me. After spending nearly two years in the Bakhtiyari Mountains, with the object of discovering Assyrian remains and cuneiform inscriptions, I returned to Mosul in 1842. Botta had then just arrived there as French consul. I urged him to excavate, and visited with him the mounds on the banks of the Tigris. I specially urged him to try that of Nimroud." These statements have been called out by remarks of Professor Max Müller, in his latest volume, which have the effect of depreciating the services of Layard, H. C. Rawlinson and other Englishmen. The latter calls attention, in the *Athenæum*, to the explorations, measurements and charts made by British Resident Rich, of Bagdad, prior to 1820, and refers Professor Müller to Rich's "*Residence in Kurdistan and on the Site of Ancient Nineveh*," London, 1836. Sir Henry Rawlinson also defends himself from the disparaging remarks of the famous Sanskrit scholar, and points to his long residence in Bagdad, "in exile," for the purpose of solving the mysteries of cuneiform, his earlier services in that cause, his gallant conduct in obtaining the almost inaccessible Behistun inscriptions, so important to the decipherment of the arrow-headed character, and incidentally charges Professor Müller with many omissions of credit to himself and other workers in this field. — *Exchange.*

Roofing of the Royal Exchange.— The roofing of the Royal Exchange, London, envolved engineering features which make it of more than passing interest. The inclosure covered is about fifty-eight feet in width and one hundred and sixteen feet in length. The roof is in accordance with the style of the building, and was designed with the idea that any roof to be added over the open area should be not a mere glass cover, but of a character consistent with the architecture of the court, such that it might have been designed by the architect of the building, the late Mr. Tite, as a great saloon, had he been so instructed originally. The design of the roof is symmetrical, applicable only to the particular building. The ceiling is composed of glass coffers, glazed in prismatic form, with the tops hinged so that the inside can be cleaned from the outside. In the centre of the roof is a dome, forty feet in diameter, around which are louvres for ventilation. Access for cleaning, removing snow, etc., from every part of the outside of the roof has been provided, with complete safety to the workman, by means of steps on each main rib, by a platform or gallery around the outside of the dome, and another around the lantern-light. For the principals a box-section has been adopted, as being peculiarly suitable for resisting the strains to which the roof is subjected. They are arched in form, with a total rise of seventeen feet. There are eight principals or ribs, six of which span the court-yard, fifty-eight feet in width, and the two central ones carry the dome or cupola. Trussed principals in such a situation have been considered inadmissible, and they are therefore made without tie-beams, to prevent them thrusting out the walls. Neither are there buttresses behind the walls to resist the thrust of an arch. Under these peculiar conditions the principals, although arched in shape, are designed to act as girders, with a vertical or downward pressure upon the walls. The latter, being only two feet thick, would resist but little horizontal or outward thrust. The strains in the girders do not exceed five and three-fourths tons per square inch in tension, and four and three-fourths tons in compression. For calculation, the maximum horizontal pressure of the wind has been assumed to be half a hundredweight per square foot of vertical surface opposed to it in roof and dome, coming from any quarter. The greatest strains are in the two girders carrying the dome, and one of these has been tested with loads equal to all the weights and pressures that can possibly come upon it, in order to ascertain if there would be any danger of its thrusting out the walls. The feet rested on iron plates and spread apart with the loads already mentioned one-half inch, and this was due in a great measure to the two halves of the girder having been fastened together with service-bolts. The result of this experiment is considered satisfactory. All the wrought-iron arched-roof principals were lifted into position by means of an upright timber or derrick, ninety-five feet high and sixteen inches square, properly guyed, from which the girders were suspended by their middle with a rope a little over two inches in diameter. Additional strength was given to the derrick by a system of trussing with twisted strand wire and short wooden struts, to prevent flexure. The tackle consisted of upper and lower blocks, each containing three sheaves, which made six parts to the rope. The first girder erected weighed, with its attachments, nine tons. Besides the tackle mentioned, a double-purchase crab was used, and a separate snatch-block at the foot of the derrick.— *The Metal-Worker.*

GELATINE EDITION.

During the year 1885 a series of Gelatine Prints, (Heliotypes) photographed from the natural object, will be published in the AMERICAN ARCHITECT AND BUILDING NEWS.

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BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

308,337. Spring-Hinge. — James H. Alexander, Philadelphia, Pa.
308,340-341. Hoisting-Machine. — James Boyd, St. Paul, Minn.
308,358. Water-Closet. — Frank B. Hanson, New York, N. Y.
308,391. Brick-Kiln. — John Weaver, East Liverpool, O.
308,402. Cork Strip for protecting Steam and Gas Pipes, etc. — Jules Bourdon, Paris, France.
308,426. Levelling-Instrument. — William H. Munford, Anna, O.
308,428. Hot-Air Furnace. — John B. Oldershaw, Baltimore, Md.
308,443. — Window-Bead Fastener. — Ezra W. Talbot, Napoleon, O.
308,444. Fire-Escape. — Augustus H. Terwilliger, Newburg, N. Y.
308,454. Stone-Drill. — Thomas M. Yerkes, San Francisco, Cal.
308,465. Fireplace. — Edwin Chickering, Cedar Rapids, Iowa.
308,486. Derrick. — Thos. Gaffney, Detroit, Mich.
308,517. Fastener for Meeting-Rails of Sashes. — John A. Paine, Tarrytown, N. Y.
308,535. Easel. — Thomas C. Vail, Topeka, Kans.
308,537. Spring-Hinge. — Patrick H. Walsh, Waterbury, Conn.
308,540. Compound Faucet. — Charles H. Waters, Chicago, Ill.
308,559. Combined Lock and Latch. — Horace L. Heaton, Indianapolis, Ind.
308,561. Wrench. — John Houlehan, Toledo, O.
308,574. Shingle-Gauge. — Samuel T. Poe, Covington, Ky.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report eleven permits have been granted, the more important of which are the following: —

Adam Horn, three-st'y brick building, e s Eden St., n of Bank St.

Chas. Dimling, 3 two-st'y brick buildings, e s of alley, w of Burke, and s of Monument St.

Charles Fisher, two-st'y brick building, in rear n w cor. Patterson Park Ave. and Jefferson St.

The labor quotations for December remain as quoted.

Boston.

The Public Library. — At the meeting of the Common Council, November 28, the order passed last week for the appointment of a committee to award the prizes for the Public Library plans, though it had been specially assigned for reconsideration, did not come up.

Building Permits. — *Gray St., No.* 18, Ward 17, for Jas. G. Smith, brick apartment-house, 34' x 50' 9", flat; J. H. Coon & Co., builders.

Ruggles St., Nos. 101 *and* 103, Ward 17, for T. Connolly, brick tenement, 34' x 37', flat; T. Connolly, builder.

Shawmut Ave., No. 25, Ward 12, for G. R. White, brick store, 16' x 25', flat; J. H. De Leue, builder.

West Fourth St., No. 71, Ward 13, for J. Cavanagh, brick dwell. and office, 20' x 41', flat; J. Cavanagh, builder.

Clifton St., near Cottage St., Ward 20, for A. P. Clifford, wooden dwell., 14' x 18' 6" and 27' x 50', pitch; A. P. Clifford, builder.

East Ninth St., No. 906, Ward 14, for Lyman Looke, wooden storage, 22' x 50', flat; A. P. Clifford, builder.

Longwood Ave., near Batchelder St., Ward 20, for Mrs. Annie Riley, 2 wooden dwells., 14' x 14' and 20' x 29', pitch; Peter Riley, builder.

Chaucer St., near Moore St., Ward 1, for J. G. Morton, wooden dwell., 18' 6" x 26', pitch; J. G. Morton, builder.

Fairview St., near Skinner St., Ward 23, for Jno. D. Noyes, 21' 6" x 35', pitch; Swanson & Murray, builders.

Brooklyn.

Building Permits. — *Norman Ave.*, n e cor. Diamond St., 4 three-st'y frame tenements, felt, cement and gravel roofs; cost, each, $3,800; owner, architect and carpenter, David Atkin, 551 Lorimer St.; masons, Oately & Smith.

Graham Ave., No. 18, e s, 75' s Debevoise St., four-st'y brick store and tenement, tin roof; cost, $7,000; owner, John Schultheiss, 16 Graham Ave.; architect, Th. Engelhardt; builder, John Auer.

Ellery St., Nos. 314 *and* 316, s s, 275' e Broadway, 2 three-st'y frame dwells. and sash-maker's shops, tin roofs; cost, each, $3,000; owner, Michael Mayer, on premises; architect, Th. Engelhardt.

Elm St., No. 41, n s, 100' w Bushwick Ave., three-st'y frame dwell., tin roof; cost, $3,500; owner, Mrs. M. Uhrig, Hudson, N. Y.; architect, Th. Engelhardt.

Marion St., n s, 150' e Reid Ave., 3 three-st'y brick dwells., tin or felt and gravel roofs; cost, each, $3,000; owner, Mrs. E. Sullivan, Patchen Ave., near Decatur St.; architect, M. Walsh; builder, Philip Sullivan.

Twelfth St., s s, 80' w Sixth Ave., three-st'y brick dwell., tin roof; cost, $4,000; owner, Edwin C. Squance, 238 Eleventh St.

Warren St., n s, 232' 2" e Fourth Ave., 3 four-st'y brick tenements, felt and gravel roofs; cost, $7,000; owner Geo. R. Brown, 34 South Portland Ave.; architect, C. E. Cozzens; builder, L. E. Brown.

Bushwick Ave., s e cor. Palmetto St., three-st'y brick tenement, tin roof, cost, $5,500; owners, Blaisdell Bros., 890 Bushwick Ave.; architect, Th. Engelhardt.

Twenty-second St., n s, 175' e Third Ave., 4 two-st'y and basement frame dwells., tin roofs; cost for the four, $8,200; owner, Mary A. Drury, 195 Adams St.; architect, Samuel Bennett; builder, John Starbler.

Gates Ave., n s, 200' w Tompkins Ave., 5 four-st'y brick stores and flats, tin roofs; cost, each, $10,000; owner, W. H. Aldridge, on premises; architect, Robt. Dixon; builder, James Burns.

Eagle St., No. 156, s s, 125' e Manhattan Ave., three-st'y frame store and tenement, felt and gravel roof; cost $4,000; owner, John P. Wierk, 154 Eagle St.; architect and carpenter, John D. Eggers; mason, John Hafford.

Lexington Ave., n s, 100' e Patchen Ave., three-st'y brick express stables, tin roof; cost, $4,800; owner, Smith Cox, 57 Patchen Ave.; architect, J. D. Reynolds.

Manhattan Ave., n e cor. Clay St., three-st'y brick store and tenement, tin roof; cost, $6,500; owner, Peter McKeever, 75 Clay St.; architect, J. Mulhaul; builders, J. Rooney and J. Zallon.

Chauncey St., n s, 375' e Patchen Ave., 3 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner, architect and builder, Joseph Smyth, 255 Chauncey St.

Third Ave., e s, 42' s Twenty-sixth St., 2 three-st'y brick stores and dwells., tin roofs; cost, each, $3,500; owner, Thomas Pitbladdo, 213 Seventeenth St.; architect, B. S. Brown; builders, Wm. and Thos. Corrigan.

Sumner Ave., No. 144, n w cor. Pulaski St., three-st'y brick and brown-stone store and dwell., tin roof; cost, $7,500; owners and carpenters, Wm. and Walter Wyetts; architect, W. F. Clayton; mason, R. Wyetts.

Sumner Ave., w s, 20' n Pulaski St., 3 two-st'y brick and brown-stone dwells., tin roofs; also, *Pulaski St.*, n s, 82' w Sumner Ave., two-st'y brick and brown-stone dwells., tin roofs; cost, each, $5,500; owners and carpenters, William and Walter Wyetts; architect, W. F. Clayton; mason, R. Wyetts.

Hicks St., w s, 125' s Clark St., 2 four-st'y brick dwells., Sparham fire-proof cement, etc., and terra-cotta; cost, about $20,000 each; owner, John W. Mason, 79 Remsen St.; architect, W. W. Morris; masons, J. Stevenson & Son; carpenters, Morris & Selover.

Chicago.

Building Permits. — J. Whasononsky, two-st'y dwell., 258 North Sangamon St.; cost, $2,500; builder, M. Lukowski.

S. O. Moore & E. A. Wariner, 2 two-st'y dwells., 3231 and 3245 Groveland Park Ave.; cost, $15,000; architect, S. H. Schock.

W. Walsh, two-st'y dwell., 3131 Wabash Ave.; cost, $7,000; architects, Fromann & Gebson; builder, H. Appel.

F. Gorke, three-st'y store and dwell., 660 Blue Island Ave.; cost, $7,000; builder, C. Baumann.

G. B. Cornell, 2 two-st'y dwells., 334-336 Park Ave.; cost, $8,000; architect, C. L. Stiles; builder, O'Connell.

Chicago, Milwaukee & St. Paul Railroad, ice-house, California Ave.; cost, $3,500.

J. Dillenburg, three-st'y store and dwell., 477 Halsted St.; cost, $6,000; builders, Field & Shay.

Duffy & Guffin, 2 two-st'y dwells., 3705-3707 Prairie Ave.; cost, $6,000; architect, Van Pelt.

Mrs. C. Boshelman, two-st'y dwell., 623 Loomis St.; cost, $2,500; builder, F. Leman.

L. Kohl, two-st'y dwell., 420 West Randolph St.; cost, $8,000; architect, H. Seiks; builders, C. Agnew & Son.

J. Lastowska, cottage, 604 West Seventeenth St.; cost, $3,000; builder, J. Ronta.

E. J. Lehmann, 2 two-st'y dwells., 885-887 North Clark St.; cost, $3,000; builders, Bodner Bro.

C. W. Pardridge, 5 two-st'y dwells., 3712-3720 Ellis Ave.; cost, $15,000.

C. Enders, three-st'y store and dwell., 31 Chicago Ave.; cost, $7,000; architect, Rehwoldt.

T. Harvy, two-st'y dwell., 264 Tremont St.; cost, $4,500; architect, T. Karls.

J. Waugelin, two-st'y flats, 50 Burling St.; cost, $3,200; builder, A. Baumann.

T. M. Pope, two-st'y dwell., 759 Ashland Ave.; cost, $3,500; builder, E. H. Bessa.

Heidmau, two-st'y dwell., 148 Burling St.; cost, $4,000.

Cincinnati.

Building Permits. — H. W. Scarborough & Sons, addition to two st'y brick building, cor. Fifth Ave. and Main St.; cost, $5,000.

Mrs. C. Pope, two-st'y frame building, Court St., between Hatch and Pavilion Sts.; cost, $2,700.

Henry Thumm, three-st'y brick building, cor. Vine and Molitor Sts.; cost, $4,000.

W. S. Ralphey, two-st'y frame building, Chapel St., near Willow St., Walnut Hills; cost, $2,000.

Wm. Hickey, two-st'y frame building, cor. Laue and Locust Sts.; cost, $3,000.

Henry Eldering, two-st'y brick building, 598 Sycamore St.; cost, $3,000.

Repairs and additions; cost, $4,210.

Total number of permits, 716.

Total amount to date, $2,744,703.

New York.

Armories. — The Armory Commission, at their meeting on December 1, decided to accept the plans of Mr. Henry F. Kilburn for the Twenty-second Regiment armory, and of Mr. J. R. Thomas for that of the Eighth Regiment.

House. — For Mr. Joseph F. Kittel a three-st'y brick and terra-cotta house is to be built on the e s of Riverside Drive, 50' n of One Hundred and Twenty-second St., from plans of Mr. A. B. Jennings.

Building Permits. — *Tinton Ave.*, s e cor. One Hundred and Sixty-third St., 9 frame dwells., and corner building for store; cost, 8 each, $1,800, and 1, $2,800; owner and builder, John W. Decker, 841 Forest Ave.; architect, W. W. Gardiner.

One Hundred and Twenty-ninth St., s s, 100' e Eighth Ave., five-st'y brown-stone front tenement, tin roof; owner, John H. Provost, 426 East One Hundred and Nineteenth St.; architect, Andrew Spence.

Seventy-fifth St., s s, 200' w of Boulevard, 5 three-st'y brown-stone front dwells., tin roofs; cost, each, $12,000; owner, Daniel D. Brandt, 38 Bank St.; architect and builder, Wm. J. Merritt, 113 West One Hundred and Twenty-eighth St.

Seventy-fifth St., n s, 200' w of Boulevard, 4 five-st'y brick flats, tin roofs; cost, each, $20,000; owner, architect and builder, same as last.

East Broadway, No. 38, five-st'y brick tenement and store, tin roof; cost, $14,000; owner, Esther Simon, 38 East Broadway; architect, Wm. Graul.

West Fifty-sixth St., Nos. 539 *and* 541, four-st'y brick factory, gravel roof; cost, $30,000; owner, H. H. Hollis, 471 West Fifty-seventh St.; builder, Stephen H. Mapes.

One Hundred and Fifty-sixth St., n s, 100' e Tenth Ave., two-and-a-half-st'y frame dwell., shingle roof; cost, $3,000; owners, H. P. Steers and wife, Tenth Ave. and One Hundred and Fifty-sixth St.; architect, Henry Foucheaux.

Fifty-fifth St., s s. 225' e Eleventh Ave., 5 four-st'y brick tenements, tin roofs; cost, each, $18,000; owner, Chas. H. Bliss, Grand Union Hotel; architects, Thom & Wilson.

White St., Nos. 115, 117, 119 *and* 121, s e cor. of Centre St., seven-st'y brick factory and stores, tin roof; cost, $75,000; owner, Hanan & Son; architects, Babb, Cook & Willard.

Sixtieth St., n s, 150' w Tenth Ave., five-st'y brick flat, tin roof; owner, Chas. Kopp, 223 West One Hundred and Thirty-third St.; architect, Chas. Baxter.

One Hundred and Seventh St., n s, 150' w Avenue A, two-st'y brick office and stable, asphalt roof; cost, $5,000; owner, Geo. A. Reeber, 222 West Thirtieth St.; architect, Chas. Baxter.

Sixty-second St., s s, 100' e Eleventh Axe., 24 five-st'y brick flats (2 with stores), tin roofs; cost, each, $18,000; owner, Gotthold Hang, 1766 Third Ave.; architect, Geo. W. Spitzer.

Ninth Ave., w s, Sixty-first and Sixty-second Sts., one part one and part three-st'y brick armory (12th Regiment), tin roof; cost, $300,000; owner, City of New York, Gen. Alen Shaler, sect'y Armory Board, 9 West Forty-fifth St.; architect, Jas. E. Ware.

One Hundred and Thirty-fourth St., s w cor. Alexander Ave., two-st'y brick lumber storage and carpenter shop, tin roof; cost, $20,000; owner, New York Wood Turning Co.. One Hundred and Thirty-fourth St., bet. Lincoln and Alexander Aves.; architect, C. C. Peck.

East One Hundred and Twentieth St., No. 227, four-st'y brick stable and warehouse, tin roof; cost, $——; owner, Richard Weber, 211 East One Hundred St.; architects, Jas. S. Wightman.

Alterations. — *West Fourteenth St., No.* 313, internal alterations, partitions, light shaft, chimney, etc., fit up for flats; cost, $5,000; owner, Henry B. Havemeyer, New Windsor, N. Y.; architect, John Sexton; builder, E. H. Miller.

East Sixteenth St., No. 112, bay window and extension on rear second and third stories; cost, $5,000; owner, Auguste Lewis, 74 Union Pl.; architects, Vaux & Radford; builders, D. C. Weeks & Son and Henry Ellis.

West Fifty-eighth St., No. 223, four-st'y brick extension, tin roof; cost, $20,000; owner, Chas. E. Appleby, 216 West Fifty-ninth St.; architect, C. Abbott French; builder, M. McDermot.

Bowery, Nos. 17 *and* 19, raise one-st'y and repair damage by fire, new iron front; cost, $4,000; owner, Marcus Kohner, 147 East Fifty-sixth St.; architect, Bart Walther.

Fifth Ave., No. 80, is to be altered into a six-st'y building, the first floor for store purposes, and above studios and offices. Mr. Geo. Hiller, the owner, will expend about $50,000 on the improvement.

Philadelphia.

Building Permits. — *Reese St.*, bet. Cumberland and Huntingdon Sts., one-st'y building, 20' x 60'; George Kressler, contractor.

Eleventh St., cor. Indiana Ave., 2 two-st'y dwells., 16' x 34'; J. R. Pyle, owner.

Thirteenth St., bet. Jackson St. and Snyder Ave., one-st'y blacksmith shop, 30' x 50'; Wm. C. McPherson, contractor.

Haverford Ave., between Thirty-sixth and Thirty-seventh Sts., 2 two-st'y dwells., 15' 6" x 46'; Chas. F. Hall, owner.

Wilson St., s of York St., two-st'y dwell., 16' x 28'; Caffrey & Alexander, contractors.

Nickel St., below Venango St., 2 three-st'y dwells., 14' x 30'; John Rodel, owner.

Sixtieth St., bet. Greenway St. and Kingsessing Ave., two-st'y dwell., 34' x 43'; Robert H. Parker, contractor.

Lancaster Ave., bet. Thirty-fourth and Thirty-fifth Sts., two-st'y stable, 34' x 40'; Jno. G. Ruff, contractor.

Sixteenth St., e of Master St., 4 three-st'y dwells., 15' 9" x 40'; B. Ketchum & Son, contractors.

Orkney St., bet. Indiana and Columbia Aves., 11 two-st'y dwells., 14' x 30'; Thos. L. Kells, owner.

Thirty-third St., cor. Thompson St., ice-house, 37' x 47'; John Brainer, contractor.

Marshall St., No. 2304, two-st'y dwell., 16' x 44'; Jas. P. Yerkes, owner.

Frankford Road, No. 1754, two-st'y stable, 18' x 30'; Jas. McCaully & Son, contractors.

Howard St., between Columbia and Montgomery Aves., office and dwell., 25' x 44'; Engelbert Schmidt, contractor.

Cabot St., No. 1610, two-st'y addition to stable, 14' x 28'; Geo. Moore, contractor.

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CONTENTS.

AMID the firing of cannon, the topmost stone was last week placed upon the Washington Monument, five hundred and fifty-five feet above the ground. There is some satisfaction in reflecting that the United States now possesses the tallest building in the world, but this cheap glory will not last long, and when it is gone there will be little else about the monument to be proud of. It is curious to see how completely the original design of the monument has been forgotten. As a part of Mills's novel and thoroughly classical conception, the obelisk, rising from the stupendous colonnade which supported it, was well-proportioned and elegant, but without that support it is an ugly chimney, and nothing more; and the ridiculous attempts which have been made ever since Mills's design was abandoned to argue people into the idea that the monument, as it now stands, is beautiful, or symbolic, or Egyptian, or anything else but a lanky pile of stone, simply illustrate the dulness and hypocrisy which reign supreme among us in regard to artistic matters. If it were not for the enormous cost of carrying out the original plan, with its peristyle of marble columns a hundred feet high, we should be strongly in favor of returning to it, but the monument has cost already eleven hundred and thirty thousand dollars, and we are sure that Washington, rather than have either as much more spent on a colonnade proportioned to the great shaft, or a smaller sum upon an inadequate little tail-piece to it, would prefer to see his monument finished up as quickly as possible, with a few sods about the base, and any surplus money devoted to erecting monuments of gratitude to him in the hearts of those poor fellow-citizens of his who are dying of starvation and pestilence.

CARELESS architects, who, to save trouble and expense, take the risk of placing in the hands of workmen original drawings whose loss would be at least an inconvenience, will do well to take warning by the loss that has recently been inflicted on many of their fellows by the burning, last week, of a portion of the Boston Terra-Cotta Company's works. The report of this fire probably caused as widespread anxiety amongst architects all over the country as could be brought about by any similar disaster, for it was at once stated that the fire had destroyed a large number of detail and other drawings, furnished by architects for terra-cotta work on buildings in every quarter, and the first report was so worded as to give the impression that the entire works were destroyed, and that therefore it would be impossible for the company to fulfil its contracts. This meant trouble, delay and loss to architects, contractors and owners, with only a compensating gain to lawyers. It is a gratification to find that the loss, though severe to the company, does not at all incapacitate it, as it was only the upper portion of a new building that was destroyed, the old buildings and machinery, which have until recently been sufficient for the business, being unharmed. The loss, however, is to a degree irreparable, as the portion destroyed contained the modelling-rooms and studios filled with the partly-finished models, the drawings, casts and designs of all kinds from which work was being prepared for the kiln. This loss, though great, is not irremediable, except in cases where original drawings have been consumed, but the company suffers a loss which cannot be made good in the destruction of its museum of duplicates, models, moulds, drawings, photographs and negatives Two sculptors having studios in the building also lose largely in similar ways.

A NOVELTY in estimating, to which it is worth while to invite the attention of builders, is reported from England. It seems that a certain gas-company in the County of Kent advertised in a local newspaper for tenders for building a new retort-house and other structures, adding a notice that the plans and specifications could be seen at the office of the company's engineer in London. A certain contractor, who writes on the subject to the *Builder*, called at the engineer's office to inspect the drawings, and was informed that a charge of one guinea, nearly six dollars, would be made for the privilege of looking at them, and that he would be supplied with a copy of the specification for an additional charge of half a guinea, and with tracings of the plans for a still further sum. The contractor, rather surprised, inquired of the engineer whether these payments were not intended as deposits, such as are often required of competing mechanics, with the object of excluding irresponsible persons, and are refunded to them when their bids are received. The engineer, however, replied that in this case no payments would be returned. As he said, "nobody wanted the builders to estimate, and the company would not pay for a hundred outsiders troubling about the plans." One would think that the builders might respond, with considerable effect, that if the gas-company did not want their estimates it might go without them; but the probability would be that after the respectable ones had been driven away by this ridiculous attempt at robbery, the others would combine to add to their bids a sufficient sum to cover their outlay for "the privilege of looking at the plans," with interest added, so that no one except the company would lose anything in the end. If we are not mistaken, it is only a few years since a builder in this country demanded payment of the architect for time spent in estimating upon a certain building, and got it; so that it seems as if either the English or the American builders had something still to learn on the subject.

THE many American friends and pupils of M. Daumet, of Paris, will be interested to know that he has been chosen to carry to completion the work upon the great church, or basilica, as it is called, of Montmartre, succeeding the late M. Abadie. We gave, a few months ago, a little description of the present condition of this structure, which has as yet barely reached the level of the first floor, the construction of the foundations, which were in a honeycombed and treacherous soil, with the vast crypt, having consumed an amount of time and money which would seem extraordinary under any other conditions than as a part of the imposing general scheme of the church. The building was to have been the crowning work of the regretted Abadie, and it is fortunate that a successor so skilful and experienced as the distinguished architect of the Château of Chantilly should have been appointed to finish it for him.

THE *Builder* gives a long account of the system of supply by which the General Hydraulic Power Company now furnishes water under pressure to a large number of customers in London. It seems from the account that a similar system of hydraulic power supply has been in use in the great Yorkshire town of Hull for about nine years, so that the engineers of the London company have had the advantage of studying an experiment already successfully made, and it seems very likely that a similar plan will be carried out before long in most large commercial cities. We have before spoken of the ingenious filters used to purify the water forced through the pipes, but details of the manner in which the power furnished by the Company is used have not before come under our notice. It seems that the Company is authorized by its charter to take one million gallons of water a day from the Thames, which would furnish, with the pumps now in service, about eight hundred horse-power for constant use during the day, but as the draft on the pipes is intermittent, this supply would really, it is estimated, afford from two to three thousand horse-power. The consumption at present is only about one-tenth of the maximum power which the Company is indirectly authorized to furnish, but the demand is rapidly increasing. After passing through the filters, the water is led into a series of storage-tanks, which supply the pumping-engines. These, although working with eighty pounds steam pressure, force the water, by means of accumulators, into the mains at a pressure of eight hundred pounds to the square inch. The engines have automatic movements connecting the accumulators with the steam valves in such a way that when the pressure in the mains has reached the limit of eight hundred pounds, the pumps stop, but as soon as the pressure is lowered by a draught upon any supply-pipe, they start again and act until the maximum pressure is restored. Although seven or eight hundred pounds to the square inch would be a dangerous tension in steam-pipes, little is to be feared from the bursting of a water-pipe, and there is great economy in using the water at a high pressure, so that the cost of the supply system, which must be composed of very strong pipes, united with flange-joints, is in the end repaid. Several miles of mains have already been laid, and additional pipes are being rapidly put down, to accommodate new customers. The water, at the Company's pressure, is sold by meter measurement, the charge being from one to two dollars a quarter for each thousand gallons' supply, with an extra charge of a dollar and a quarter as meter rent. This brings the cost of lifting by the Hydraulic Company's power, economically applied, to about one cent for fifty foot-tons; that is, let us say, for hoisting a ton weight fifty feet into the air; which is from one-quarter to one-half as much as would be charged by the ordinary water companies for an amount of water, under the usual street pressure, capable of doing the same work.

AS might be expected, the most usual application of the power is for lifting, and freight and passenger elevators of all kinds are operated by it; but it is used in many other ways. The proprietors of a lead manufacturing establishment, for instance, have taken out all their steam machinery, and use the hydraulic power exclusively, not only for hoisting and transportation, but for making lead pipe by forcing the metal over a mandrel. For this a pressure of about five thousand pounds to the square inch is needed, and is readily obtained by means of a double hydraulic press, comprising two cylinders of different diameters, and a piston in each, connected by a single rod. By admitting the water at the Company's pressure to the large cylinder, a pressure is produced in the small cylinder inversely proportionate to the sizes of the two pistons, and the same pressure is then easily transmitted from the small cylinders to the place where it is wanted. In several places along the river bank hydraulic cranes, of a kind familiar abroad, though little used here, are used for unloading vessels, and hoisting from them into storehouses. Many of these cranes are made with double power, like our double-power hydraulic elevators, and as they are turned, raised, and lowered with the utmost facility, they form admirable appliances for their purpose. It has been doubted, on theoretical grounds, whether hydraulic force could be transmitted through pipes for any considerable distance, without much loss, but one establishment, using the Company's power, is situated nearly two miles from the pumping-station, and although an auxiliary pumping-station was established expressly to supply any defect in force which might be observed in this distant district, the engines placed there have never been used, and no appreciable difference in power or steadiness is observed between the service at this point, and at others in the vicinity of the main pumps. In fact, it has been ascertained that hydraulic power can be conveyed through small pipes at the rate of one foot per second, with a loss of only two per cent per mile, which is less than the usual deterioration of steam power under similar circumstances.

LA *Semaine des Constructeurs* describes a pyrometer, constituted on a new principle, by which the temperature of a kiln or furnace can be observed with great facility and precision. The ancient pyrometers, as a rule, are very inaccurate. The earliest, that of Wedgwood, measures high temperatures by the contraction of a piece of clay, which, of course, must be placed in the fire for a time, and then taken out and allowed to cool, all of which takes time, and involves some risk to the contents of the furnace by inopportune opening of the doors, while the contraction of clay is incapable of very accurate measurement, and at best gives but a rough idea of the heat to which the mass has been subjected. Other pyrometers have been made of metal rods, which by their expansion and contraction may be made to move an index on the outside of the furnace, but the increase of length by expansion is very slight, and is said to change its rate, so that this method is unsuited for accurate observation. The new pyrometer, which was invented by an ingenious French blacksmith, employs water as the means of measuring the heat; or, more properly, as a vehicle for bringing, so to speak, portions of the heat from the furnace, to be measured outside. As water is volatilized at a temperature of two hundred and twelve Fahrenheit degrees, it would seem to be a rather unavailable material for measuring pyrometric temperatures, which range from fifteen hundred to three thousand degrees above zero, but the difficulty is readily overcome by keeping the water in such rapid motion through the fire that it does not have time to become sufficiently heated to form vapor.

AS now made for sale, the de Saintignon pyrometer comprises a tank of water, a filter, a pipe, bent in the middle into a long loop, which projects through the wall of the furnace into the fire, two mercurial thermometers, and a glass tube open at the top, and closed at the bottom by a stop-cock. For convenience in connecting, portions of the tubing are of India-rubber, and the two thermometers and the open tube are mounted side by side on a board. When in use, the stop-cock at the bottom of the open tube is turned, so as to allow water to run through it. The supply from the tank, passing first through the filter, which removes sediment or suspended substances, runs to the first thermometer, and, circulating about its bulb, brings the mercury column to the point corresponding with its own temperature. Thence it passes into the bent tube in the fire, entering on the lower side of the loop, and returning by the upper side, which leads it back directly to the second thermometer, placed beside the first; and after circulating about the bulb of this thermometer, it runs into the open tube, and escapes thence by the stop-cock at the bottom. As the supply tank is placed at some distance above the rest of the apparatus, the water in the open tube would rise to the top and overflow, unless its level were kept down by the escape through the stop-cock. If the stop-cock were thrown wide open, the water would all run out of the tube; while, if the escape were less rapid than the incoming current, the water would gradually rise in the tube and overflow. When the escape is exactly equal to the supply, the water level in the tube remains constant, indicating a perfectly uniform flow through the apparatus. The pyrometers are usually regulated for a flow of a quart a minute as a maximum, but it is easy to set them for a more rapid flow, if the heat to be measured is unusually great. In flowing at this speed through the loop of pipe in the fire, the water becomes warmed, and the thermometer immersed in the current flowing out of the furnace shows in consequence a higher temperature than that about which the inward current circulates. The instrument gives, therefore, three data, the velocity of the current, the temperature of the water before entering the fire, and its temperature on leaving it; and from these the actual temperature of the furnace can be readily calculated, with the help of a few simple preliminary tests, to show the relation between the difference in temperature of the inflowing and outflowing water, and the degree of heat in the furnace. These preliminary tests are made upon the instruments before adjusting them, and it is of course easy to regulate them for any range of temperature, but as ordinarily sent out the proportion between the difference of temperature of the warm and cold thermometer and the furnace temperature is fixed at one to twenty-five; so that if the cool thermometer shows the water from the tank to be at forty degrees, and the one beside it shows the current out of the furnace to be at one hundred and twenty degrees, the actual temperature of the furnace is two thousand degrees above zero. The calculation is simplified by the use of a movable graduated card, set at the side of the warm thermometer, with an index at the lower end, extending over to the cool thermometer. On sliding up the card until the index meets the top of the mercury column in the cold thermometer, and then observing the point on the card reached by the column in the warm thermometer, the furnace temperature can be immediately read off.

SANITARY PLUMBING.[1]—XXXI.

WASH-BASINS.

General Considerations.

Ordinary Basin-Strainer. Most Common Form. Actual Size.

Ordinary Sink-Strainer. Actual Size.

THE character of our lavatories is a matter of very much greater importance than is usually supposed. We have been in the habit of selecting our wash-basins and bath-tubs purely from a standpoint of convenience, appearance and economy. Sanitary considerations have been quite overlooked, in the belief that they have little or nothing to do with the form of these particular fixtures, so long as their traps and waste-pipes were properly made. This is a very serious error, and particularly so in relation to wash-basins, in the choice of which sanitary considerations should outweigh all others. We say this advisedly, and for the following reasons: as usually constructed, the outlet is altogether too small in proportion to the size of the trap and waste-pipe. The result is imperfect flushing of these pipes, gradual accumulation of filth in them, and the various serious evils to which such accumulations give rise. The initial cuts show the actual dimensions of the ordinary basin and sink strainer, as traced from the brass-work when new. It will be found, by accurately measuring these figures, that the amount of water-way is just equivalent to that of a three-fourths-inch pipe. A very short usage soon reduces this meagre opening, through the collection of sediment and lint, to a still smaller stream. Accordingly we find that by far the greater part of the ordinary basins now in use discharge a stream not over half an inch in diameter. The waste-pipes are usually an inch and a quarter or an inch and a half in diameter, a capacity which is given for the purpose of ensuring the safe removal of the water delivered by two supply-faucets running full force, under medium or high city pressure, and escaping through the outlet and overflow passages combined, together with a possible simultaneous discharge of other adjoining fixtures entering the same waste. Now a half-inch stream of waste-water trickling through pipes capable of delivering ten times as much, fouls, but does not scour them. The writer has taken out such waste-pipes and found them more than half filled with slime and filth, and in places where the pipe ran nearly horizontal, or made sharp bends, he has found them nearly filled with the putrefying mass. No amount of ventilation can cleanse such pipes. But the sediment was soft and gelatinous, and would easily have been swept away by the powerful discharge of a basin filling the pipes full bore.

In order to test this, the writer caused a piece of waste-pipe in which a coating of sediment had been collecting for a long time to be attached to the outlet of a wash-basin constructed with a large outlet, and allowed the water to escape through it at the rate of about a half a gallon a second. After two or three discharges it was found that almost all of the coating of greasy sediment had been removed by the powerful friction of the water.

It must be borne in mind that the scouring effect of a stream of water (irrespective of its size) which fills the waste-pipe "*full bore*" is entirely different from that which only partially fills the pipe. The former flows with a velocity and force determined by the weight of its entire column, or under a head equal to its perpendicular length; while the latter falls *without head*, because the air breaks the continuity of the water column, and then the velocity and force occasioned by the head is entirely destroyed.

As the first aim and principle of sanitary engineering is to remove foul matters as rapidly and completely as possible, so in the present connection, our first care should be to see that our basins are formed with outlets large enough to fill the pipes full bore in order to accomplish this result.

Had the framers of our present plumbing laws included a provision requiring all lavatories to be constructed on this principle, instead of insisting upon the worse than useless trap and branch-waste ventilation, the public would have been greatly benefited. No reason is given why the laws should now continue to exist with these serious imperfections. It remains to be seen how soon the good sense of the public will demand their correction.

Besides the important sanitary advantage of a rapid discharge, we have others of economy and convenience. To empty an ordinary basin requires a very considerable amount of time and more patience than the majority of people possess. The result is that people fall into the habit of washing from the faucet rather than from the basin, and a great waste of water is involved. A quick waste and convenient method of operating and controlling it results in a saving of water and very great convenience in usage. A knowledge that a sudden discharge of a basinful of water through the pipes acts as an important sanitary measure, after the manner of a flushing-tank, in cleansing them from end to end, leads to a legitimate use of the basin and an economy of water, a consideration which the water-companies and the public in times of drought will not be slow to appreciate.

[1] Continued from page 221, No. 463.

Following the course we have adopted in the preceding chapters, let us imagine an ideal basin, and then review the state of the plumbing art, to see how far such an ideal has been realized.

A critical examination of the leading types of fixtures now in use is necessary to enable us to understand clearly what features are to be recommended, and what are to be avoided. Such a classification is also indispensable to enable the reader to judge at once for himself the merits of any fixture he may be called upon to examine. It systematizes his ideas, and in this lies its chief difference from a mere "cataloguing" of plumber's supplies, which oftener results in confusion. From these considerations it is evident that our drawings must illustrate, not imaginary types, but those in actual use, in order to be of any practical benefit as a guide in selection, and hence we shall in most cases select some special fixture as a standard representing its class.

Classification of Requirements.

The ideal wash-basin should possess the following characteristics:

(1) It should be so formed as to permit of a discharge sufficiently rapid to fill the pipes "*full bore.*"

(2) It should provide for suitable overflow without concealed or inaccessible passages.

(3) The whole of the fixture and each of its parts, including the discharging mechanism, should be visible and easily accessible at all times from the outside without removing any part.

(4) Its outlet passage should be controlled by a mechanism requiring but a single, simple movement to operate it, and the minimum of strength or effort.

(5) It should be easy to set, and have no parts liable to clog or get out of order.

(6) It should be simple, durable, economical, and unobjectionable in appearance.

Classification of the Different Kinds of Wash-Basins.

We have divided basins into two general classes: (I) those having concealed overflow passages, and (II) those having visible and accessible overflow passages. Each of these we subdivide as follows:

Basins having concealed overflows into:—

(*a*) Plug-and-Chain Outlet.
(*b*) Waste-Cock Outlet.
(*c*) Valve Outlet.
(*d*) Plunger Outlet.
(*e*) Floating-Plug Outlet.
(*f*) Stand-Pipe Outlet.
(*g*) Receiver Outlet.

Basins having visible overflows into:—

(*a*) Funnel Outlet.
(*b*) Stand-Pipe Outlet.

Each of the above classes may have for its supply either ordinary standing faucets or nozzles supplying water at some point or points below the basin-rim.

(I) *Wash-Basins having concealed Overflow Passages.*

This class of fixture violates one of the first conditions of sanitary plumbing. A portion of the apparatus intended to carry off waste water at irregular and uncertain intervals, by which it becomes fouled without the chance of cleansing through flushing action, is placed in such a position that it cannot be seen nor reached without disconnecting the whole fixture.

Our first subdivision of this class is the ordinary

(*a*) *Plug-and-Chain Outlet Basin.*

We see here (Fig. 240) the concealed overflow pipe constructed of lead and so placed as to be altogether inaccessible. Being above in open communication with the air of the room, it taints it with the decomposing soap and filth with which its sides soon become coated. The ordinary wash-basin has no proper flange for connection with the lead overflow-pipe; the joint has therefore to be made with ordinary putty, which can never be made permanently and surely tight. The lead pipe must be connected with the main waste-pipe above the trap, and the joint here must be wiped with solder. Thus, to set an ordinary wash-basin, the plumber has two extra joints to make, which add both to the expense of the work and to the chances of imperfection and leakage. It is an exceedingly common thing to find the overflow-pipe wrongly connected; it is sometimes entered below the trap, sometimes attached directly to the trap-vent, and sometimes connected with the wastes of other fixtures in such a way as to open, through the vent-pipes, an indirect avenue into the house for sewer-gas. It forms, in short, an unnecessary and dangerous complication to the plumbing, and these basins should never be used.

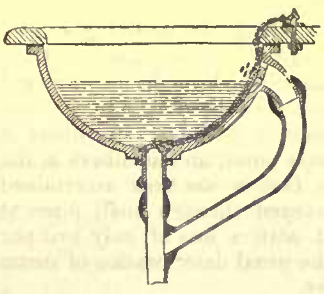


Fig. 240.—Ordinary Wash-Basin with Plug-and-Chain Outlet.

Many house-owners stop up the holes in the earthenware leading into the overflow-pipe at considerable inconvenience to themselves, in the hopes of avoiding the chance of the entrance of offensive or injurious gases into the house through this channel. With defective traps, or with traps whose seal is liable to be quickly destroyed by evaporation, siphonage or other cause, this precaution against danger would not be useless if the overflow-pipe connections could be made certainly tight, especially when the fixture is left for some time unused. As they are made, however, it is probable that no such precaution would form any reliable security.

The use of the plug and chain, which characterizes this type of basin, is another serious defect. The chain, lying in every successive formation of dirty water, collects gradually in the recesses of its links an unknown quantity and variety of filth, which cannot be entirely removed, on account of its irregular form, without the use of special acids or constant scrubbing with a brush, a process never applied to it. The length of wire used in an ordinary basin-chain averages six feet, and has a surface of about fourteen square inches,[1] a surface which in consideration of the peculiar adaptability of the form of the links for retaining dirt, presents a very formidable area of pollution. To those persons who use their reasoning powers in these matters, the idea of washing the face in water defiled by a chain transferred immediately from the dirty water of some unknown predecessor is with good reason exceedingly repulsive. The chain, moreover, frequently breaks, and then the hand must be plunged into dirty water to remove the plug.

The position of the chain and plug at the bottom of the bowl is moreover peculiarly inconvenient, inasmuch as they are in the way of the hands, which should meet a smooth, unbroken surface of earthen-ware, rather than the hard and irregular outlines of the brasswork. If this latter consideration appear to some trivial, it does so only because custom has rendered us callous to such defects: the defect none the less exists, and acquires importance through the frequency of its repetition and the constant use of the fixture in which it occurs. The fact that it is altogether unnecessary is a sufficient reason for its abolition. Thus we find that the wash-basin in most common use possesses *not one of the six desiderata* enumerated in our table of requirements. These basins are sometimes made elliptical instead of circular in form. This adds considerably to their expense without corresponding benefit.

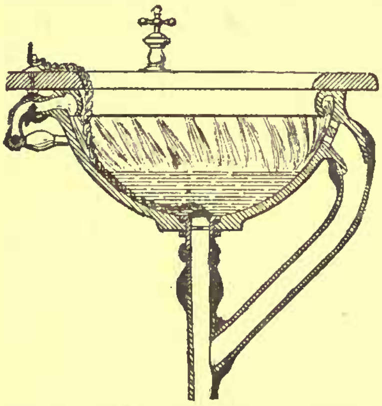


Fig. 241. — Plug-and-Chain Basin with Flushing-Rim Supply.

Figure 241 represents a plug-and-chain basin, with a flushing-rim supply. The disadvantages of this arrangement are quite as great as the advantages. Water cannot be drawn into a separate vessel from this form of supply as is often quite important and possible with the ordinary standing faucet, and the cost of the fixture is greatly increased. The object of the flushing-rim is to cause a partial cleansing of the sides of the basin, by the running water before filling. But the scouring is quite imperfect. Sediment will ultimately collect in spite of the flushing, and must be removed by scrubbing.

Constructing the overflow-pipe in one piece with the basin as shown in Figure 242, gives a great advantage. The danger of defective overflow connections is thus avoided, and the setting of the basin is very much easier. A closure of the overflow holes of this basin affords an actual safeguard against the evils arising from evaporation of the water-seal, caused by trap-ventilation, where a fixture is left unused for any length of time, provided the outlet be also tightly closed and both closures be carefully watched. But in this case the danger of damage from overflow arises, and the overflow passage becomes practically useless. The difficulty of closing up tightly all the openings is so great that no householder would undertake it, if it had to be done and undone every time the fixture were left in temporary disuse.

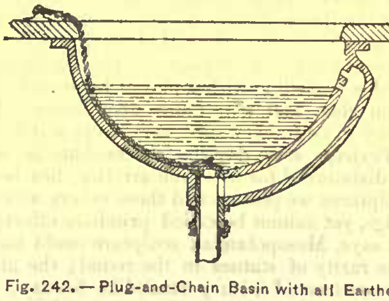


Fig. 242. — Plug-and-Chain Basin with all Earthenware Overflow.

(b) Waste-Cock Outlet.

In this type of wash-basin, the outlet passage-way is controlled by an ordinary ground brass water-cock. The arrangement is expensive, and extremely liable to become clogged and get out of order. The general type may be further sub-divided into three kinds; (1), those having a *perpendicular* waste-cock moved by a rod passing through the marble slab, and having its handle behind the basin; (2), those having a *horizontal* waste-cock worked from the front of the stand below the bowl; and (3) those in which the waste-cock is operated by a lever movement.

As an illustration of the first kind, we have the so-called "Boston Waste," Figure 243, which is very popular. There is probably no form of basin-fitting more faulty in principle than this. It contains two independent, inaccessible and invisible foul-water passages, one forming the overflow passage, and the other the outlet passage-way between the strainer and the waste-cock. This latter passage forms an elongated *cesspool* for the defilement of the clean water entering the basin. After using the fixture, the waste water escaping through this channel deposits part of its dirt, particularly floating matters and soapsuds, all along its sides, and leaves it there to be taken up and applied in a diluted solution to the hands and face of the next comer. Six wiped solder joints, one putty joint, and five threaded joints, making *twelve* in all, are required to adjust the waste-pipes of this apparatus and its trap below the basin slab! No wonder the plumber is constantly in requisition to keep in repair such a complicated machine so long as the owner allows it to remain in his house. Not the least of its defects is that the passage-way for the waste water through the ground cock is usually so small (scarcely a quarter of an inch wide) that the least deposit of sediment will entirely prevent the outflow of the water. The "Boston Waste" cannot be too strongly condemned. The great extent of its use in spite of its high cost shows how little knowledge the public has in these matters, and how important it is that their attention should be called to them. In Figure 244, we have the "Boston Waste" complicated with still another disorder. The overflow pipe, instead of opening into the upper part of the basin descends, and re-enters the waste-pipe on the inner side of the waste-cock. This doubles the length of the inaccessible cesspool between the outlet and the waste-cock. Its object was apparently to trap the overflow pipe; but as the waste-cock cannot be relied upon as a sure seal at all times against sewer-gas, because we cannot depend upon its being always turned off after use, this device becomes valueless.

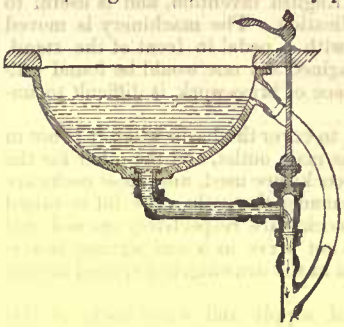


Fig. 243. — Waste-Cock Outlet Basin, the "Boston Waste."

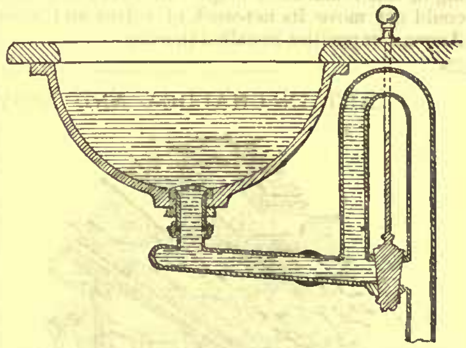


Fig. 244. — The Waste-Cock Outlet Basin with Siphon Overflow.

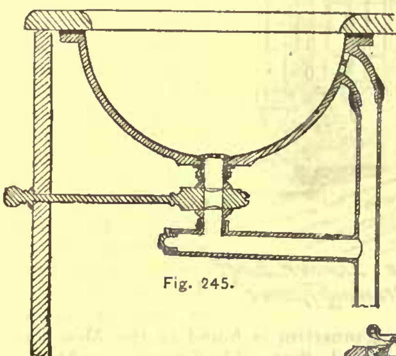


Fig. 245.

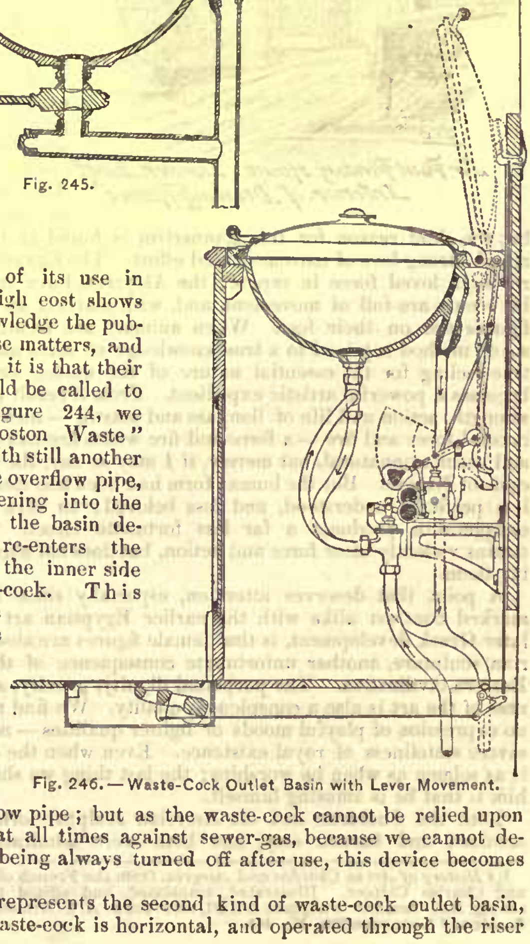


Fig. 246. — Waste-Cock Outlet Basin with Lever Movement.

Figure 245 represents the second kind of waste-cock outlet basin, in which the waste-cock is horizontal, and operated through the riser

[1] The writer's basin-chain has sixty links, each made of wire one and one-fourth inches long. The wire is over three-sixteenths inches in circumference. The total superficial area of the chain amounts, therefore, to more than fourteen square inches.

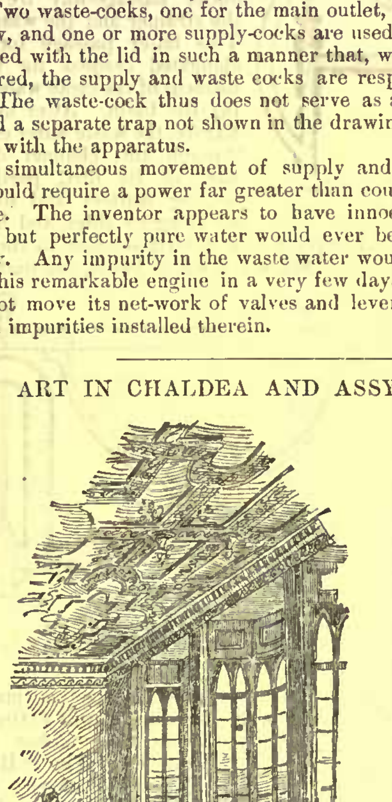
or wood-work of the wash-stand. This arrangement necessitates encasing the basin in wood-work, a requirement which adds another to its many disadvantages. In other respects it is similar to the "Boston Waste" already described.

Figure 246 illustrates by a special apparatus (probably never executed in its entire perfection) the third kind of waste-cock outlet basin. The fixture shown is an English invention, and is useful to illustrate the evils of over-complication. The machinery is moved by cranks and levers connected with a pedal in front of the stand. How the inventor could have imagined any one would be found willing to pay for so complicated a piece of brass-work is difficult to understand.

In this device a lid is employed to cover the basin when it is not in use. Two waste-cocks, one for the main outlet, and the other for the overflow, and one or more supply-cocks are used, and these cocks are connected with the lid in such a manner that, when the lid is raised or lowered, the supply and waste cocks are respectively opened and shut. The waste-cock thus does not serve as a seal against sewer-gas, and a separate trap not shown in the drawing, is required in connection with the apparatus.

The simultaneous movement of supply and waste cocks of this kind would require a power far greater than could ever be applied in practice. The inventor appears to have innocently imagined that nothing but perfectly pure water would ever be passed through his lavatory. Any impurity in the waste water would destroy the working of this remarkable engine in a very few days, so that a Hercules could not move its net-work of valves and levers, nor clean out the Augean impurities installed therein.

ART IN CHALDEA AND ASSYRIA. — V.[1]



Sir Paul Pindar's House. London Engd. Interior of Drawing-Room:

THE Chaldean used hard stone in the few examples of his sculpture that have come down to us, and the Assyrian also upon occasion; but the chief materials with the latter were soft limestone and alabaster. Of these were formed their bas-rereliefs, and the little resistance they offer to the chisel partly explains the over-emphasis of the local style. Instead of the disposition we find in Egypt to simplify and summarize form, we find a tendency to exaggerate and amplify it. The joints, when seen, are very strongly marked, and the muscles stand out in knotted lumps; but the chief reason for this mannerism is found in the Mesopotamian's strong love of movement and effort. The Egyptian, as M. Perrot says, loved force in repose; the Assyrian, force in action. All his scenes are full of movement, and, with scarcely an exception, his figures are on their feet. When animals are treated, the emphasis of method is joined to a true knowledge of form and structure, a true feeling for the essential nature of the model, and therefore it becomes a powerful artistic expedient. From it result the unequalled strength, action and life of lion, ass and mastiff — their almost supernatural force and fire — a force and fire which are more than lifelike, and yet not unnatural, but merely, if I may so say, the artistic apotheosis of Nature. But the human form had been less clearly described, less perfectly understood, and less beloved; so here the technical exaggeration produces a far less fortunate effect. The sculptor strains violently after force and action, but does not succeed in reaching them.

A point that deserves attention, especially since it is in such marked contrast alike with the earlier Egyptian art and with the later Greek development, is that female figures are absent from Assyrian sculpture, another unfortunate consequence of the customs of Eastern civilization. The perpetual dignity, gravity, almost sombreness of the art is also a conspicuous quality. We find no caricatures, no expression of playful moods or lighter qualities — nothing but the severe stateliness of royal existence. Even when the king hunts, he is as solemn as when he worships; the last thing we should say about him is that he is amusing himself.

Both the Chaldean and the Assyrian sculptor formed figures of moulded and burned clay, and both were admirable workers in bronze. The splendid *repoussé* bands that decorated the gates at Balawat, and that show the campaigns and victories of Shalmaneser II (of the first Assyrian empire) have already been mentioned; but metal was also cast in the round, as is proved by splendid bronze lions that were made in the time of Sennacherib, son of Sargon. Bas-reliefs and inscriptions cut upon the rock have immortalized the names of Assyrian kings in more than one part of Mesopotamia.

It has been impossible here to retrace M. Perrot's account of all the variations that Assyrian sculpture underwent between the time of the first monarch of the first empire and the last monarch of the second. They were never so great as to alter its dominant characteristics. A desire for more variety and more freedom characterizes the latest relics, and M. Perrot is inclined to think that the art was still progressing when Nineveh fell, and with it all the artist's future. But even when it began it was not a young and fresh inspiration; it was derived from Chaldea, and it perpetuated — accented, indeed — the predilections there displayed. This fact may serve to explain the anomalies it exhibits: conventionality combined with strong love of force and action, skill mixed with awkwardness, emphasis joined to tiresome repetition. And the necessity for rapid production, moreover, must have worked for evil. When an entire palace had to be decorated for each successive monarch, it was hardly possible that all the work should be confided to the most skilful hands, or that any sculptor should take pains to develop all that might be in him. Patronage is a good thing for art, and yet it may crush art's noblest qualities, if its demands are too extensive and too insistent.

Every one knows what immense numbers of relics have been found that once belonged to Assyrian libraries and record offices. They are not rolls of papyrus, as in Egypt, but tablets of clay, on which the inscriptions are cut in those peculiar, sharp, wedge-like signs we call "arrow-heads" or "cuneiform" characters. And upon the bas-reliefs we find them, too, not confined at all to the background, but running right across the whole slab, figures and all. This system of writing, says M. Perrot, was, like the Egyptian and the Chinese, originally nothing more than a series of ideographic signs, "the abridged and conventionalized representation of familiar objects." But in the very dawn of history, in the very first relics of Chaldean writing we possess, the script is no longer *hieroglyphic*, like the Egyptian; it was much more rapidly and thoroughly conventionalized. There are only a few very ancient tablets where we find anything that can be perceived to bear the remotest resemblance to a natural object. It is interesting here to trace the reaction of his material upon man as he creates and uses it. Papyrus would of course be very scarce and dear in Mesopotamia, and what should be used in its place if not the clay which was the Mesopotamian's friend in so many other needs? What so cheap, so easily written upon when soft, so durable when burned? But it was, of course, much easier to write upon one's soft clay with one's pointed instrument, if one used short, straight strokes only. Hence the Mesopotamian script was, before the days of early Chaldean greatness even, transformed by the omission of all curved and all continuous lines into the arrow-heads we know, with short and sharply-cut indentations, deeper and broader at one end than at the other — struck rather than engraved on the material. For a while, as we can see from the oldest specimens, certain signs retained, in the way their wedges were arranged, some remote semblance of the objects they indicated, discernible only, however, when we already know what they mean. But before the full development of art, even this much trace of primitive fashions had disappeared, and the script had become purely conventional. The most important bearing of the fact upon our present subject is that, for this reason, the Mesopotamian sculptor and painter were not, as were their Egyptian brethren, in any sense "scholars of the scribes." Only in the sculptor's *handling* does M. Perrot find any trace of the influence of current modes of writing. "The Chaldean artist must have carried out his modelling with a play of hand and tool learned in cutting texts upon clay, and still more upon stone. The same chisel-stroke is found in both, very sure, very deep, and a little harsh."

Perhaps some day the intermediate art which is now lacking may be disinterred for us — the art that lies between the early Chaldean sculptures we possess and those others which, though Assyrian beginnings, yet cannot be called primitive efforts; but even so, as M. Perrot says, Mesopotamian sculpture could hardly rival that of Egypt. The rarity of statues in the round; the absence of portraits and of figures treated with portrait-like fidelity; the non-existence of the nude, and the weakness in treating humanity that this implies; the absence of the feminine element, that *ewig Weibliche* which nothing else can replace in art; the narrow range of subject-matter; the conventionality of theme; the persistence in one key of sombre stateliness; all these characteristics work together to place it below an art which produced such varied works as the art of Egypt. Nor, apart from questions of variety, is there any one respect in which Assyrian sculpture can be called as attractive and satisfying as that of Egypt, excepting only in its treatment of animals. In this point it has scarce a peer in any period of art; but even here it is chiefly *strength* that we admire. Beauty, as the Greeks explained the word, as even the Egyptians sometimes understood it, is absent almost wholly from the work of the Assyrian sculptor.

Like all southern peoples, the Mesopotamians had a strong love of color. M. Perrot enforces the important, but often misunderstood fact that very strong light *destroys* the apparent modelling of objects; that, by the reflections it casts into the shadows, it interferes with our power to distinguish one plane from another. In every country

[1] *A History of Art in Chaldea and Assyria*, from the French of Georges Perrot and Charles Chipiez. Illustrated, translated, and edited by Walter Armstrong, B.A. London: Chapman & Hall, New York: A. C. Armstrong & Son, 1884. Continued from page 236, No. 464.

where a vertical sun shines in an unclouded sky, the decorator has had to invoke the help of color against the violence of the light—has had to accept its aid in strengthening his contours, and in making his figures and ornaments stand out against their ground. Our author believes — and it seems to me upon good grounds, both of general theory and of actual evidence, though some explorers differ from his opinion — that the Assyrian bas-reliefs were touched with color to enhance their effect and to bring them into harmony with the painted walls above them. For we must not, I may note, picture to ourselves the Assyrian alabaster as the light-colored, variegated, brilliant, almost translucent stone we are most accustomed to associate with the name; it is a cold, gray stone, without any decorative charm. Black, white, red and blue seem to have been the only colors used on the reliefs. And the Assyrians also employed what is called "natural polychromy." They built up a figure out of several different materials, each having a distinct color value of its own. Wood, enamel, colored earths, bronze, gold, silver, and brilliant stones seem all to have been used in this art, which may be regarded as the direct progenitor of that which produced the chryselephantine statues of Greece.

Painting, as modern nations understand the word, was a sealed art to the Mesopotamians, as it was to the Egyptians. Decorative painting, in which colors were used broad and flat, and with little regard to the direct imitation of Nature, was the only style they practised.

Pottery of many kinds was of course a common material, and glass was also invented at a very early period. It has been found both opaque and transparent, and a lens of rock-crystal was discovered at Nimroud, by Layard, which may have been used as a magnifying or as a burning glass. It is the oldest object of the kind of which we have any knowledge, and M. Perrot believes that if more lenses are unearthed, we may fairly conclude that these ancient folk knew how to reinforce their sight.

The metal dishes and utensils figured and described in M. Perrot's pages are very interesting and sometimes very charming. Some are purely Assyrian in their decoration; others show an admixture of Egyptian motives, now copied boldly, though without intelligence in the use of the hieroglyphics, and now subdued into fainter likeness of themselves and in better accord with the native elements they mingle with. Examples of similar dishes are found in the Cypriote collection at the Metropolitan Museum, and have been discovered in Greece, in Magna Græcia, and in Etruria. It is a question as to whether or no they are all of Phœnician origin. M. Perrot is inclined to think that they were first made in Nineveh and Babylon, and afterwards imitated and turned into articles of commerce by the Phœnicians.

Among a people who disliked nudity as did the Assyrians, and who were lovers of luxury and splendor in every form, it is but natural that a peculiarly large share of artistic attention should have been paid to garments. Textiles of all sorts were produced in great variety and beauty by the looms of Babylon and Nineveh, and were famous throughout all ages of antiquity. The Bible alone would tell us as much, were no other evidence forthcoming; but the Assyrian sculptor has left us testimonials which could hardly be more complete. His neglect of the nude and the softness of his stone alike tempted him into an elaborate rendering of clothing, which is not even remotely approached by any other artist of antiquity. Figures, animals, the sacred tree, the rosette and palmette, and every other current form of band and pattern are found minutely recorded as having been employed in garments, which M. Perrot believes were embroidered by the needle. All the elements of ornamentation that were used in other places were used here, too, and the system of arrangement is the same: a central motive is surrounded by bands of decoration, as it is, for example, on the bronze dishes; but the adaptation is skilfully made, and the shape and character of the garment are well preserved under all its abundant embroidery. The weaver was of necessity less free and naturalistic in style than the worker with the needle, but he was also very clever and very artistic, as we may see from the great sills of stone and metal, which very evidently repeat such patterns as had become familiar in woven rugs and carpets.

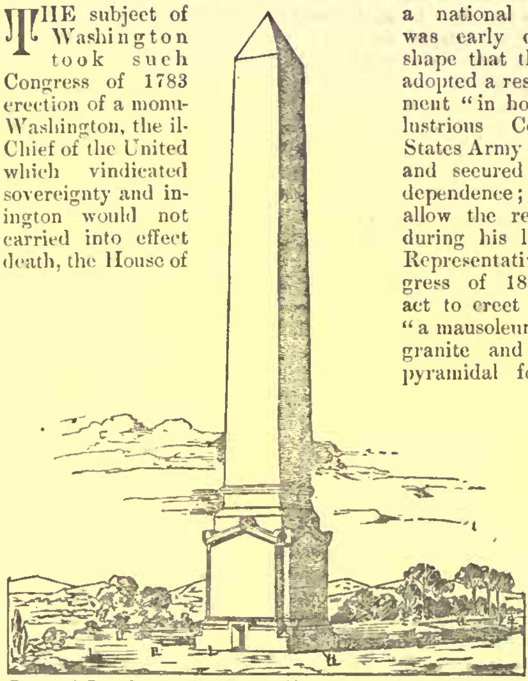
In spite of the justice M. Perrot does to the superiority of the Egyptian over the Mesopotamian decorator, there is one particular contrast that I venture to note on my own account. The Egyptian seems to me to have had a truer and finer decorative instinct, because he did not depend so entirely on formal symmetry in producing strictly decorative results. The Assyrian was very formal, even in his bas-reliefs: but he was absolutely formal in his more purely ornamental designs. He obtains the desirable balance and harmony of parts only by the simplest expedient, that of exact repetition and opposition. There is nothing in his work at all analogous to such Egyptian designs as, for instance, the "Hunting in the Marshes" and the "Water Combat," which were reproduced in these pages when M. Perrot's earlier volumes were reviewed. Here we have a freedom of treatment and a variety of motive very different from the Assyrian formalism, combined into a whole quite remarkable for its balance and harmony of line. There is nothing so truly decorative in the design of the Assyrian bas-reliefs; there is nothing so free and varied in the design of the less "representative" Assyrian patterns. There is nothing in all Mesopotamian ornamentation that is to me one-half so charming, or so expressive of the best kind of decorative power as these Egyptian examples, where a very natural kind of representation is joined to a very perfect kind of decorative effect.

The translation of the next succeeding instalment of Messrs. Perrot & Chipiez's work is already in press. It will deal with the art of Asia Minor, of Phœnicia and of Cyprus, and while it will undoubtedly be of extreme interest to readers in every land, its value will be peculiarly great to us; for we may expect to find in its pages the best criticism that has yet been printed in an accessible shape of the Cypriote relics which fill the Metropolitan Museum in New York.

M. G. VAN RENSSELAER.

THE WASHINGTON MONUMENT.

NEW YORK, November 8, 1884.



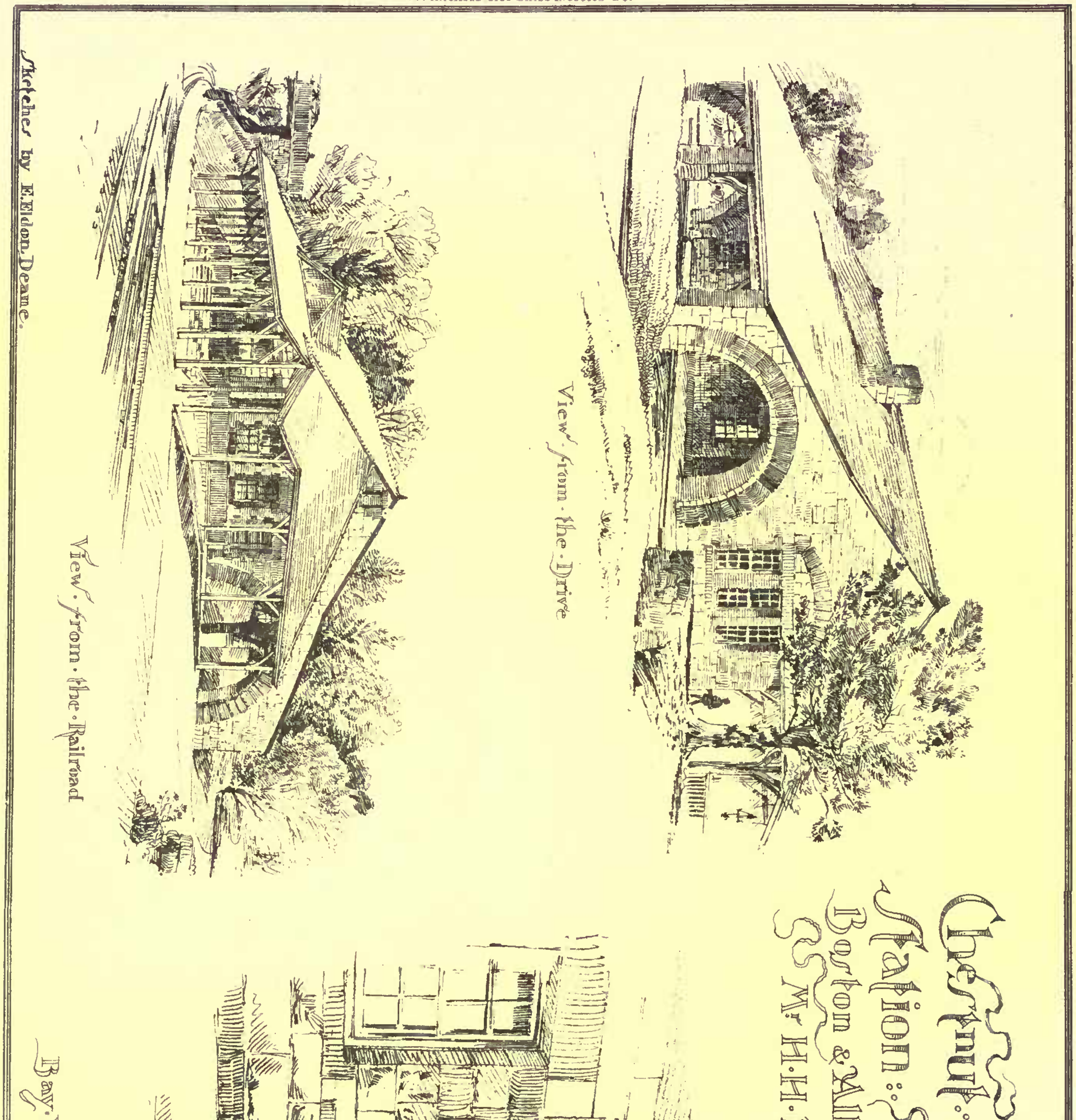
Proposed Base for the Washington Monument. H. O. Avery, Architect, New York, N. Y. The present Monument is a simple Obelisk, 555 feet high, and classically proportioned. Finished in 1884.

THE subject of a national memorial to Washington was early discussed, and took such shape that the Continental Congress of 1783 adopted a resolution for the erection of a monument "in honor of George Washington, the illustrious Commander-in-Chief of the United States Army during the war which vindicated and secured their liberty, sovereignty and independence;" but Washington would not allow the resolution to be carried into effect during his life. After his death, the House of Representatives in the Congress of 1800 passed an act to erect to his memory "a mausoleum of American granite and marble in a pyramidal form." But it failed of passage in the Senate, and it was not until 1833 that the monument project assumed definite form, when the Washington National Monument Society made an appeal to the country, and secured $230,000. Work was not begun, though, until 1848, when the site, said to have been originally chosen by Washington, of the present monument was designated by Act of Congress. It includes twenty acres of the government reservation along the Potomac River, and will eventually be a portion of a beautiful park.

The Society proceeded with the work of construction, after having laid the corner-stone July 4, 1848, until 1854, when it was compelled to suspend operations on account of its inability to obtain more money. The monument was left at a little way above its foundation until 1878, at which time the Government undertook its completion, under the direction of the United States Corps of Engineers, with the Monument Society as an advisory board. After a large appropriation by Congress, this Joint Commission ordered work to be resumed January 28, 1879. The necessary earth excavations for uncovering the old marble foundation were begun, and two cuts were made beneath the work, on diagonally opposite corners, and speedily filled with concrete; but the removal of 144 square feet of bearing surface from beneath a foundation and shaft 180 feet high and weighing 71,500,000 pounds, was found to give such rapid motion to the Monument that only one cut at a time was made at the remaining angles and opposite sides. The entire mass of new concrete beneath the old foundations is 126 feet 6 inches square, 13 feet 6 inches in depth, making a total depth of 36 feet 10 inches, and extends 18 feet within the outer edge of the old foundation, and 23 feet 3 inches without the same line. The mass contains 7037 cubic yards of Portland cement concrete, of a mixture by volume of one part cement, two parts sand, three parts pebble, and four parts broken stone. This concrete possessed a crushing strength, when seven and one-half months old, of 155 tons per square foot.

The entire work of underpinning was accomplished without causing the slightest crack or the least opening in any joint of that portion of the Monument already described. The area of the original rubble foundation was 6,400 square feet, to which was added 16,002 square feet of concrete, a surface two and one-half times as great, and as the Monument, as now completed, weighs 80,470 tons; this will give a normal pressure on the bed of the foundation of more than $3\frac{1}{2}$ tons to the square foot, which will be increased to a maximum pressure under the action of the wind. The shaft, which is 555 feet high, has a base of 55 feet; it is therefore ten diameters high, with an entasis of one foot in every thirty-four in height. It is faced with white, large-crystal marble, and backed with blue granite; but as the walls increase in height, the proportion of granite diminishes, and at the level of 452 feet, the backing disappears, and the walls from that level to the top are entirely of marble. The settlement of the structure varies at each corner, but the average is 1.7 inches.

The interior of the monument consists of an iron frame, in two



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Windsor Castle.

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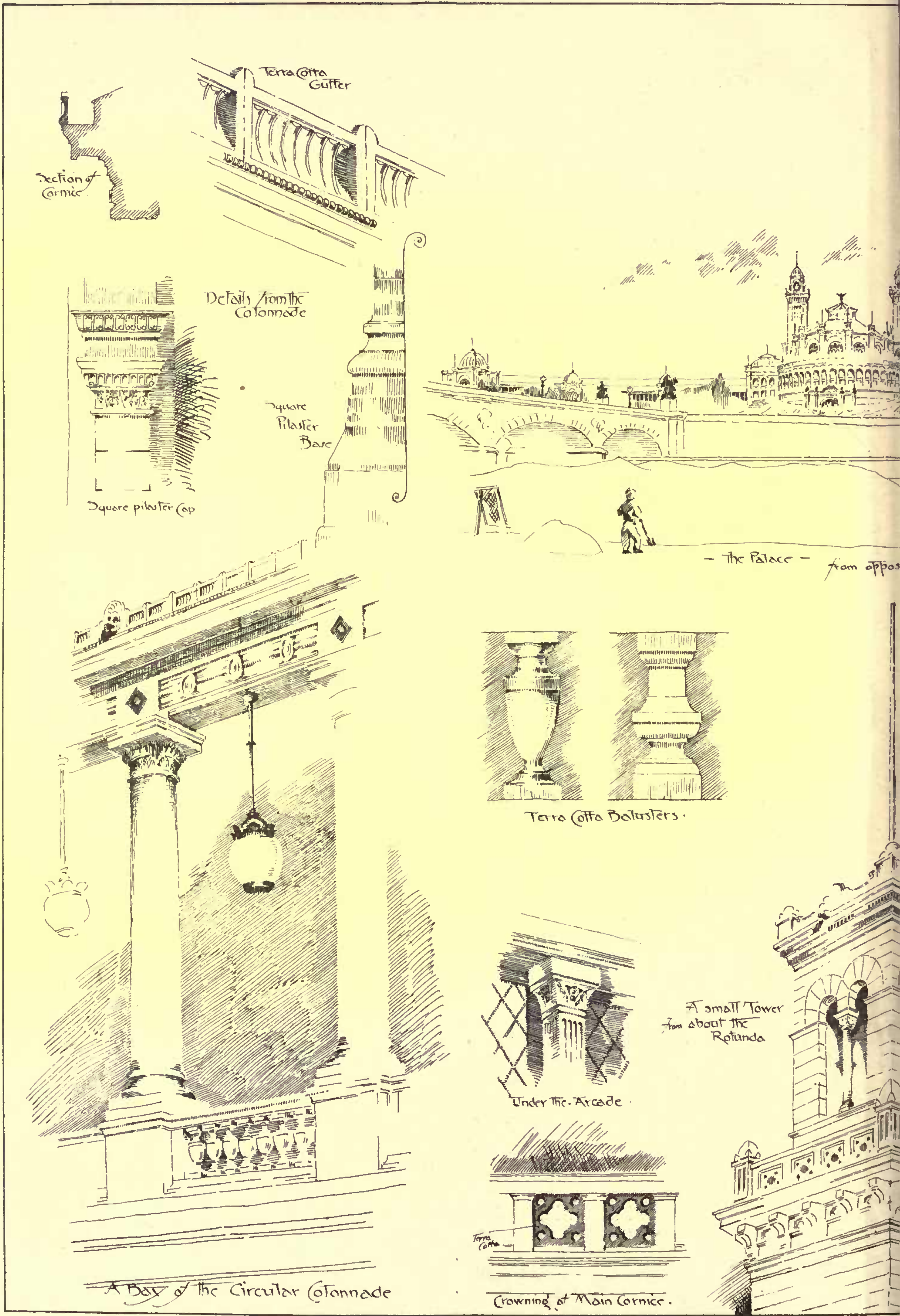
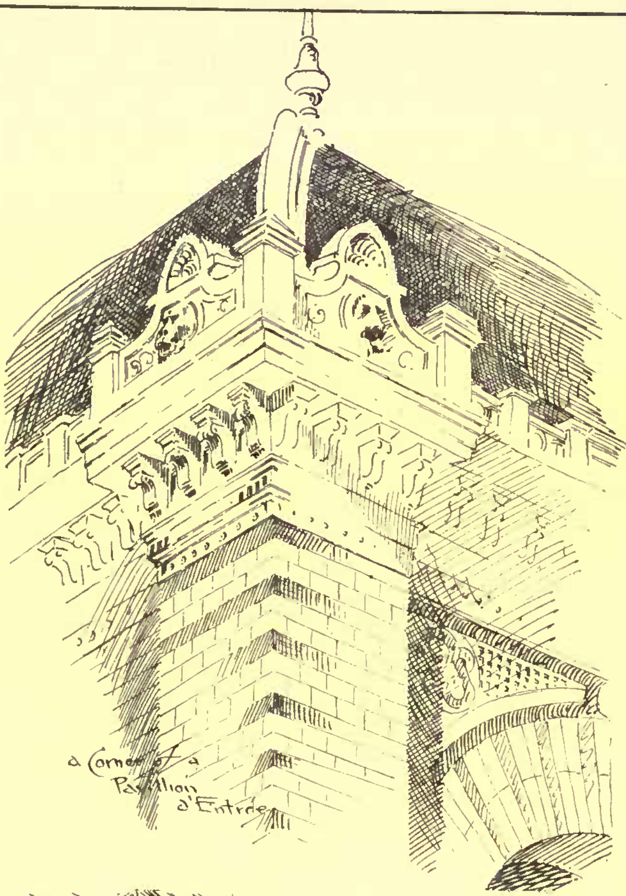
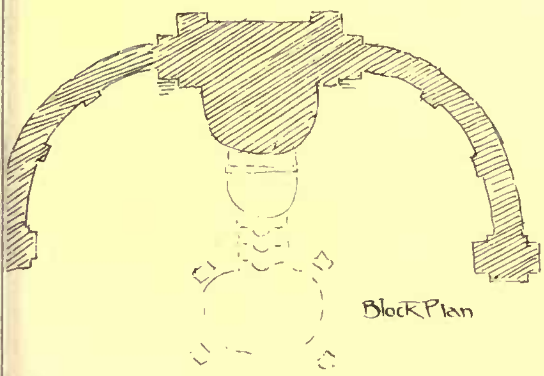

Terra Cotta Gutter
Section of Cornice.
Details from the Colonnade
Square Pilaster Base
Square pilaster Cap
— The Palace —
Terra Cotta Balusters.
A small Tower from about the Rotunda
Under the Arcade.
Terra Cotta
Crowning of Main Cornice.
A Bay of the Circular Colonnade

Quai.



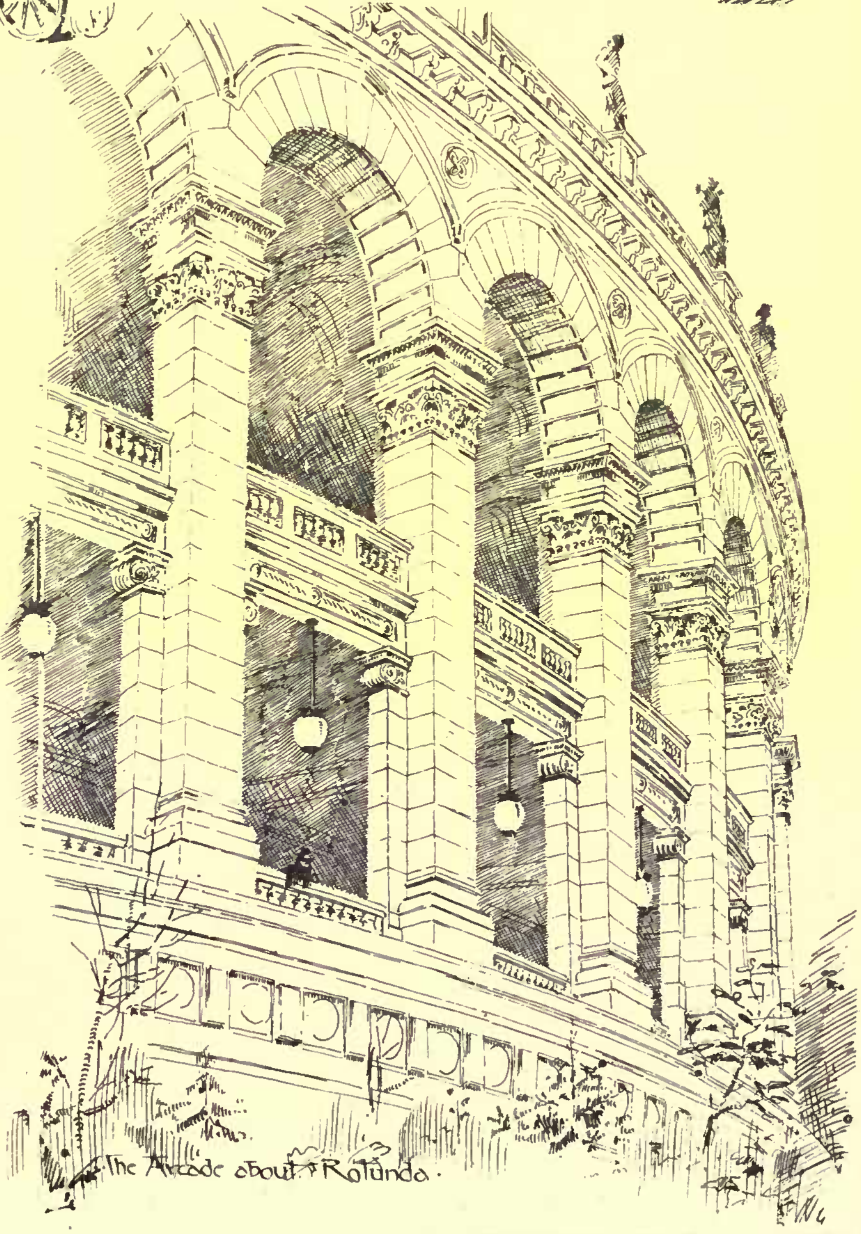
a Corner of a Pavillion d'Entrée



Block Plan

Sketches from the Palais du Trocadero — Paris.

by C.H. Blackall.



The Arcade about ye Rotunda.

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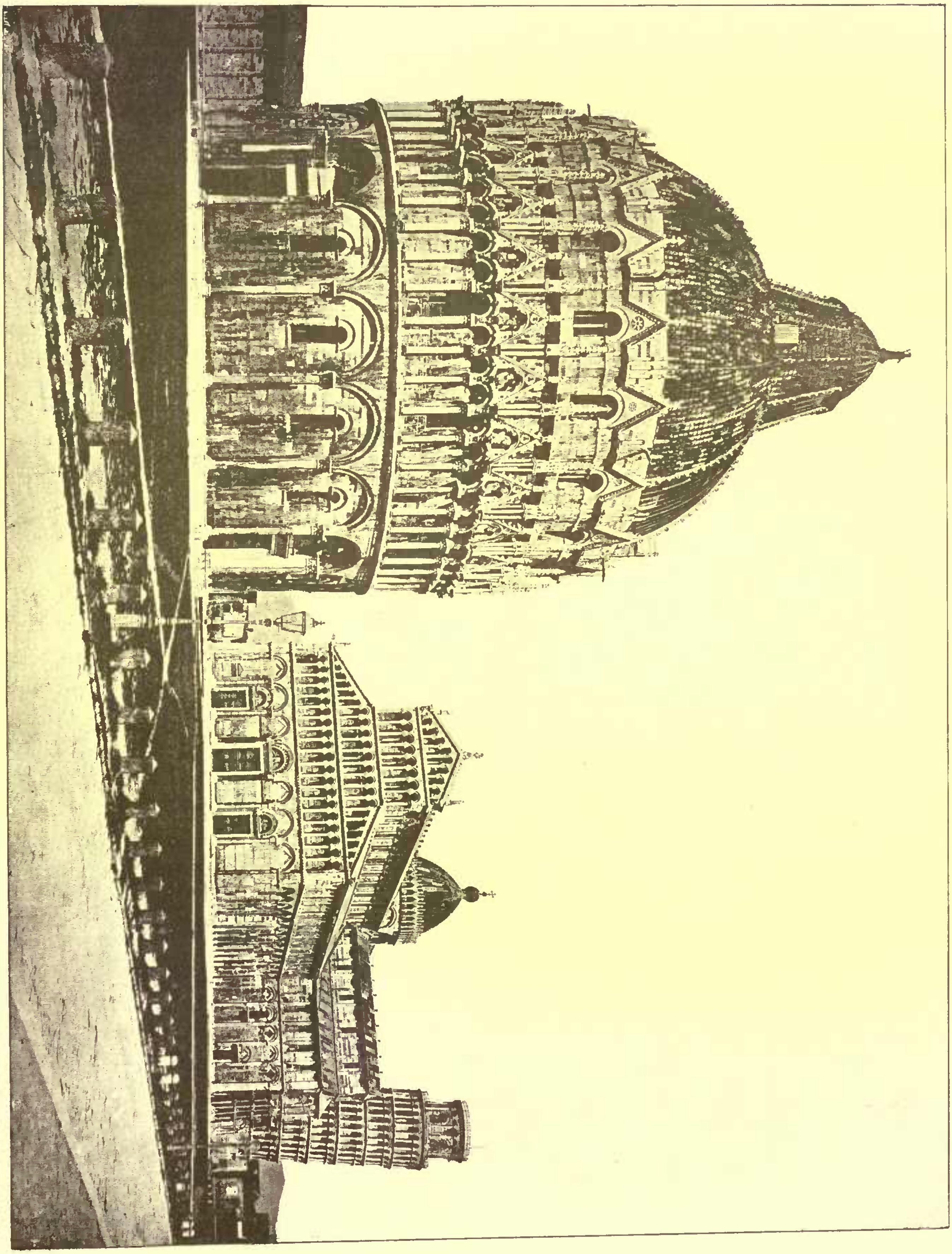

Cathedral, Baptistery, and Leaning Tower, Pisa, Italy.

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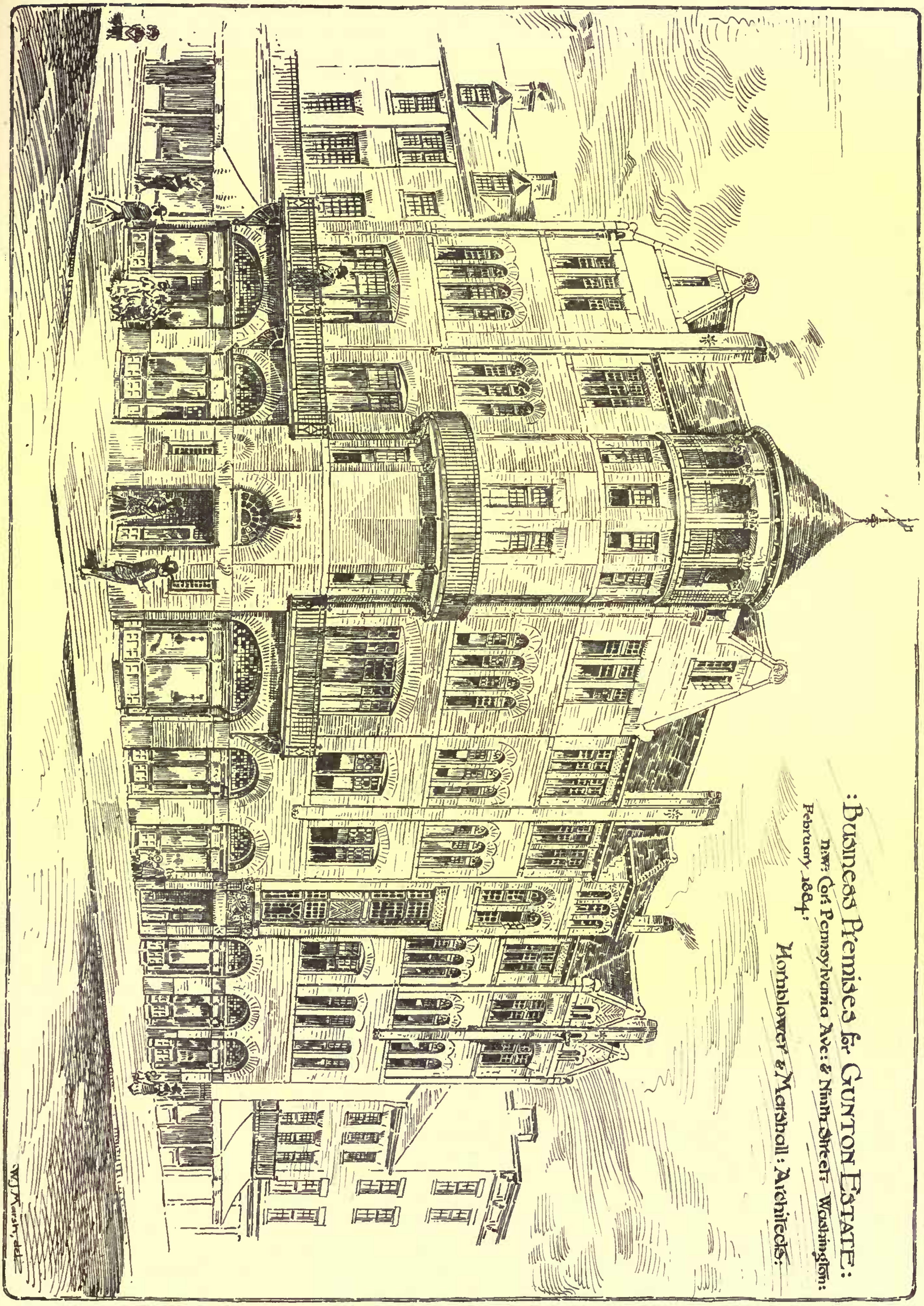

:Business Premises for GUNTON ESTATE:
N.W. Cor. Pennsylvania Ave: & Ninth Street: Washington:
February 1884:
Hornblower & Marshall: Architects:

W. J. Marsh, del.

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parts, one of which carries the stairs and landings, the other the elevator machinery; as the work progressed, this was utilized for lifting the stones.

The stair frame-work consists of four wrought-iron Phœnix columns, 7½ inches in diameter, which are located at the four corners of a square 15 feet 8 inches on a side, and concentric with the hollow well of the monument shaft. At levels of 20 feet, the one above the other, nine-inch beams were passed through the two east and two west columns, and the ends of these beams firmly secured in the north and south wlals of the shaft. These beams formed the inner edges of strong wrought-iron frames, which constitute the landings, the outer edges being made by 9-inch channel-bars, the ends of which are firmly secured in the north and south walls. The landings are thus located along the east and west faces of the well, and are so spaced vertically that any landing on the east wall is 10 feet above the next landing below it on the west wall. These landings are then connected by iron staircases along the north and south faces of the well, the inner carriages of the stairs being bolted into the columns. The elevator-shaft is formed by four Phenix columns, 6 inches in diameter, placed at the four corners of a square, 9 feet 9½ inches on a side, and concentric with the square formed by the four columns of the staircase frame. These columns are securely fastened and braced to the columns of the staircase. Upon the northwest and southeast columns, the girders and ratchets for the safety-pawls of the elevator are fastened, while upon the top of these columns an iron framework carries the large pulleys for the hoisting-ropes and other minor parts of the mechanism.

During the progress of the work, the eight columns above mentioned were built to the height of 30 feet above the top of the masonry shaft, and firmly tied and braced with vertical and horizontal ties and horizontal braces, making a rigid structure. To each of the four outer columns of this framework a crane arm was attached, which swung over one-quarter of the top of the wall. Each of these arms had a mast 18 feet in height, and a boom 19 feet 6 inches in length, and was supplied with a travelling car and differential hoisting pulleys. By means of this arrangement, 20 feet in height of masonry was added to the walls of the Monument. It would then become necessary to add 20 feet to the height of the iron frame, and to move the elevator and stone-setting machinery to its top, when another 20 feet of wall could be built. This alternation of building first 20 feet of the iron frame and 20 feet of the walls was continued to the top of the structure.

In 1883, the appropriation of 1878 having been exhausted, Congress devoted another large sum of money, sufficient to finish the monument, including the interior staircase and platform, the masonry of the well, the paving of the floor, and the passenger-elevator, which has a capacity for a load of six tons, with a large factor of safety, and can easily accomplish two trips an hour. No account was taken, though, in this last appropriation, for any embellishment of the doorways, the terrace and approaches to the structure, the insertion in the walls of the presentation stones, the final disposition of the boiler-house, or of appliances for lighting the interior of the shaft. The monument has already cost $1,250,000, and if these are properly carried out, another quarter of a million will be necessary.

It was always intended to have some finish at the base of this obelisk, and to this effect Congress approved an idea of Mr. Robert Mills, an American sculptor, which changed the monument into a sort of Pantheon, 100 feet high, with a colossal statue, over its portico, of Washington in a chariot, with six horses driven by Victory; but this was finally abandoned, and later the Joint Commission approved a design by another sculptor — Mr. Story — by which the entire obelisk was to be embellished by an ashlar covering, of porticos, cornices, pilasters and niches, changing the character from an obelisk to a campanile, but as this would have cost more than three-quarters of a million, Congress rejected the idea. Many designs were proposed and submitted, but it was finally decided to finish the monument as a simple obelisk, and as such it exists and remains, a fac-simile of the old Egyptian ones, barring the hieroglyphics, and as classically proportioned. Of the hundreds of obelisks and monoliths of more modern times, more than nine-tenths have embellishments at the base, and this, the largest obelisk and highest monument in the world, would also look better with something for a base finish, however simple. HENRY O. AVERY.

THE ILLUSTRATIONS.

CATHEDRAL, BAPTISTERY AND LEANING TOWER, PISA, ITALY.

THE cathedral at Pisa, with its baptistery, campanile, and the *campo santo* or cemetery, are a group of buildings of more curiosity than any four edifices in the world, and the more so from being so strongly marked with the distinguishing features of the Byzantine and Romanesque styles. The cathedral, whose architect was Buschetto of Dulichio, a Greek, was built in the beginning in the eleventh century. It consists of a nave, with two aisles on each side of it, transepts and choir. Its bases, capitals, cornices and other parts were fragments of antiquity collected from different places, and here with great skill brought together by Buschetto. The plan of the church is a Latin cross; its length from the interior face of the wall to the back of the recess is 311 feet, the width of the nave and four side aisles 106 feet 6 inches, the length of the transept 237 feet 4 inches, and its width, with its side aisles, 58 feet. The centre nave is 41 feet wide, and has twenty-four Corinthian columns, twelve on each side, all of marble, 24 feet 10 inches high, and full 2 feet 3 inches in diameter. From the capitals of these columns arches spring, and over them is another order of columns, smaller and more numerous, from the circumstance of one being inserted over the centre of an intercolumniation below, and from their accompanying two openings under arches nearly equal to the width of such intercolumniations. These form an upper gallery, or triforium, anciently appropriated to the use of females. The four aisles have also isolated columns of the Corinthian order, but smaller, and raised on high plinths, in order to make them range with the others. The transepts have each a nave and two side aisles, with isolated columns, the same size as those of the other. The soffit of the great nave and of the transepts is of wood, gilded, but the smaller ones are groined. The height of the great nave is 91 feet, that of the transepts about 84 feet, and that of the aisles 35 feet. In the centre nave are four piers, on which rest four large arches, supporting an elliptical cupola. The church is lighted by windows above the second order of the interior. The edifice is surrounded by steps. The extreme width of the western front, measured above the plinth moulding, is 116 feet, and the height from the pavement to the apex of the roof is 112 feet 3 inches. The façade has five stories, the first whereof consists of seven arches, supported by six Corinthian columns and two pilasters, the middle arch being larger than the others; the second has twenty-one arches, supported by twenty columns and two pilasters; the third is singular, from the façade contracting where the two aisles finish, and forming two lateral inclined planes, whence in the middle are columns with arches on them as below. The columns which are in the two inclined planes gradually diminish in height; the fifth story is the same, and forms a triangular pediment, the columns and arches as they approach the angle becoming more diminutive. The two exterior sides have two orders of pilasters, one over the other. The roof of the nave is supported, externally, by a wall decorated with columns, and arches resting on their capitals. The whole of the building is covered with lead. The drum of the cupola is externally ornamented with eighty-eight columns connected by arches, over which are pediments in marble, forming a species of crown.

Dioti Salvi, whose birthplace even is unknown, commenced, in 1152, the baptistery of Pisa, and after eight years completed it. It is close to the cathedral of the place, and though on the wall of the inner gallery there be an inscription, cut in the character of the Middle Ages, "A. D. 1278, ÆDIFICATA FUIT DE NOVO," and it may be consistent with truth that the edifice was ornamented by John of Pisa, there is nothing to invalidate the belief that the building stands on the foundations originally set out, and that for its principal features it is indebted to the architect whose name we have mentioned. It is 100 feet in diameter within the walls, which are 8 feet 6 inches thick. The covering is a double brick dome, the inner one conical, the outer hemisphericał. The former is a frustum of a pyramid of twelve sides. Its upper extremity forms a horizontal polygon, finished with a small parabolic cupola, showing twelve small marble ribs on the exterior. The outer vault terminates above, at the base of the small cupola, which stands like a lantern over the aperture. From the pavement the height of the cupola is 102 feet. The entrance is by a decorated doorway, from the sill of which the general pavement is sunk three steps round the building; the space between the steps and the wall having been provided for the accommodation of the persons assembled to view the ceremony of baptism. An aisle or corridor is continued round its interior circumference, being formed by eight granite columns and four piers, from which are turned semi-circular arches, which support an upper gallery; and above the arches are twelve piers, bearing the semicircular arches which support the pyramidal dome. On the exterior are two orders of Corinthian columns engaged in the wall, which support semicircular arches. In the upper order the columns are more numerous, inasmuch as each arch below bears two columns above it. Over every two arches of the upper order is a sharp pediment, separated by a pinnacle from the adjoining ones; and above the pediments a horizontal cornice encircles the building. Above the second story a division in the compartments occurs, which embraces three of the lower arches; the separation being effected by piers, triangular on the plan, crowned by pinnacles. Between these piers, semicircular-headed small windows are introduced, over each of which is a small circular window, and thereover sharp pediments. Above these, the convex surface of the dome springs up, and is divided by twelve ribs, truncated below the vertex, and ornamented with crockets. Between these ribs are a species of dormer window, one between every two ribs, ornamented with columns, and surmounted each by three small pointed pediments. The total height is about 179 feet. The cupola is covered with lead and tiles; the rest of the edifice is marble.

The extraordinary campanile, or bell-tower, near the cathedral, was built about 1174. It is celebrated from the circumstance of its of its overhanging upwards of thirteen feet, a peculiarity observable in many other Italian towers, but in none to so great an extent as in this. There can be no doubt whatever that the defect has arisen from bad foundation, and that the failure exhibited itself long before the building was completed; because, on one side, at a certain height, the columns are higher than on the other, thus showing an endeavor on the part of the builders to bring back the upper part of the tower to as vertical a direction as was practicable, and recover the situation of the centre of gravity. The tower is cylindrical, 50 feet in diameter and 180 feet high. It consists of eight stories of columns, in each of which they bear semicircular arches, forming open galleries round the story. The roof is flat, and the upper story contains some bells.— *Gwilt's Encyclopædia of Architecture.*

WINDSOR CASTLE, WINDSOR, ENGLAND.

It would be hard to say which were more familiar to American ears and eyes, Windsor Castle or the Tuileries — homes of royalty both, and each the shrine of devout pilgrims. But one has passed away, the victim of unreasoning socialism, while the other bids fair to last for ages, the pledge of which lies in its retired situation remote from the attacks of passing passions, enduring a calm and placid existence as undisturbed as the narrow Thames flowing beside it. Here we have dignity and impudence closely associated, as ever: the railway pointsman's box in the foreground, temporary and utilitarian to the last degree, while beyond it rises with all the pomp of a royal residence the favorite home of a powerful, sovereign, a very centre of romantic interest. This juxtaposition in a way typifies the encroachments that energy and brains are making on the realms of traditions. Windsor was purchased from the monks of Westminster Abbey, by William the Conqueror, who built the circular keep, or castle proper. Between this time and the reign of George IV, buildings were added to the group, enlarged, extended, altered. Under this monarch Sir Jeffrey Wyattville made extensive restorations, and under Queen Victoria still more elaborate changes were made which cost in all about four-and-a-half million dollars. Amongst other things the chapel built by Henry VII as a mausoleum for himself, before he finally chose Westminster Abbey for his resting place, adjoining St. George's Chapel has been rehabilitated as a memorial chapel to the Prince Consort, perhaps the most consistent and complete of the memorials which the Queen has scattered over the land. The restorations were made by Sir G. G. Scott. The view shows the State Apartments of the Queen, which can be seen by tourists during the absence of the royal family.

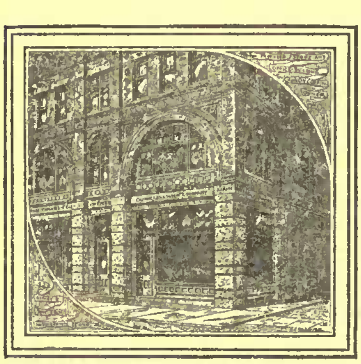
STATION OF THE BOSTON & ALBANY R.R., CHESTNUT HILL, MASS. MR. H. H. RICHARDSON, ARCHITECT, BROOKLINE, MASS.

BUSINESS PREMISES FOR THE GUNTON ESTATE, WASHINGTON, D. C. MESSRS. HORNBLOWER & MARSHALL, ARCHITECTS, WASHINGTON, D. C.

SKETCHES FROM THE PALACE OF THE TROCADERO, PARIS, FRANCE, BY MR. C. H. BLACKALL.

FIFTY-FIFTH EXHIBITION AT THE PENNSYLVANIA ACADEMY.

Philadelphia, November, 1884.



The Academy Exhibition opened with a discouragingly meagre exhibition. I do not know that the average of merit is below what it usually is, but the exhibition is very small. Water-colors, etchings, wood-engravings, pen-and-ink drawings, and architectural designs are all included, and yet the whole amount of entries foots up less than three hundred and fifty, and as very many of the pictures are quite small, the effect is certainly not imposing, and the comparison which is inevitable between this and the displays of the last two or three years in these same spacious galleries is not reassuring.

With the exception of Mr. Charles Sprague Pearce's two pictures, Mr. W. P. W. Dana's one, Mr. Alexander Harrison's marine, and a very pretty picture by Miss Ellen K. Baker, there is nothing to speak of from Paris, and one wonders what is the matter, that the source from which the Academy was wont to draw so much interesting material, and in connection with which everybody thought it was doing such good work, has all at once failed.

Then the home painters are almost all disgruntled, and have not exhibited, so that the collection has had to be eked out with loans of "old familiar faces," some of which I am sorry to say never had anything to do with American art.

One of Thomas Hill's pictures of the Yosemite Valley, one of the ponderous performances that belong to the Bierstadt epoch in American art — although, of course, it is better than anything that Bierstadt ever painted — is hung in the most conspicuous position in the exhibition, the place which is usually regarded as the place of honor, and has been awarded the Temple silver medal. These medals which went begging last year — young Trego, you know, refused to receive his, and brought suit against the Academy for the $3,000 which constituted the first prize in that memorable competition — have found "takers" this year, and confer, I have no doubt, a great deal of honor. The gold medal goes to George W. Maynard, for his portrait of Frank D. Millet in "war correspondent" garb, a very good picture which everybody must have seen (it was exhibited in Boston five years ago, if I am not mistaken), and the silver medal to Mr. Hill as just stated.

These medals are to be given annually hereafter, the gold medal for the best figure picture exhibited, and the silver one for the best landscape or marine. The awards this year, and there are several, strike the unprejudiced observer — the uninitiated, I mean, for I would not for the world insinuate that anything like prejudice exists anywhere — as very funny. There wasn't such a bewildering amount of excellence to choose from, I know, but it seems to me the committee might have come a little nearer the mark than this. Charles Sprague Pearce's very beautiful "The Prayer," is here from the last *Salon*, and so is Mr. Caliga's "A Flaw in the Title," an extremely good picture as it seems to me, containing five figures managed with a great deal of feeling, and painted with a great deal of skill. Not that I have anything to say against Mr. Maynard's portrait, I think it is first rate; but then the medal was offered for a "figure picture," and if the qualities which go to make up so important a composition as this of Mr. Caliga's for instance, were to be recognized at all, there could certainly be no very serious comparison between the two.

Then in landscape there are three or four very lovely things. Bolton Jones's "Early Spring," is very choice, and Mr. Charles Henry Eaton has two landscapes of great brilliance and beauty; the larger one, a "View at Lakeview," is certainly superb. In marine pictures nobody now-a-days does anything better than the strong, free painting of Alexander Harrison, and he is represented by the best piece of work (except in figures), that he has ever shown here. He calls it "Evening," and it represents with wonderful vividness that delicious moment in a summer afternoon when

"The moon is up, and yet it is not night."

The picture is full of light, which does not come from the full moon which has just arisen. The sea comes pouring in in magnificent fashion to the observer's very feet. It is all freshness and vigor, and — well it ought to have received the silver medal.

In the giving the prizes which necessarily go to residents or to students of their own school the Academy's committee is hardly more happy than in the case of the Temple medal. The Charles Toppan prizes of $200 and $100 respectively, are for those who have studied in the Academy for at least two years, one of which must have been the year preceding the exhibition of which the prize is awarded. The first prize goes this year to Mr. Charles A. Fromuth, for a picture containing two figures, entitled "The Soldier's Widow." Mr. Fromuth is a young man, and is evidently a faithful and hard-working student: it is to be hoped that the encouragement given in this prize is well deserved, and will do good, but the less that is said about the picture the better.

The second prize has been awarded to Miss Ellen W. Ahrens, for a portrait-study, three-quarters length, of a young girl. It is a good, solid, simple piece of work, and deserves much praise, and the award which it has received.

The Mary Smith prize of $100 for the best picture by a lady artist resident in Philadelphia, has been awarded to Miss Lucy D. Helme's full-length study of a sitting figure, a woman dressed in some soft, yellow Eastern stuff, entitled "Petrona." The picture is very nice in color, and except for its entire absence of *quality*, the flesh looking like mahogany, and the dress like feathers, it is very good *as* a study. As a picture it is not to be compared with a "Portrait of a Child," by Miss Alice Barber, which hangs opposite it, the overlooking of which by the committee is one of those unaccountable things at which we can only wonder. "Petrona" has been bought for the Temple collection.

Miss Barber's picture is large in treatment, exquisite in color, eminently truthful to the character of the subject, and is, take it altogether, one of the very best things from any hand, that is shown in the exhibition.

Other students of the Academy, and those who have received their training here in very recent years, have sent creditable work.

Some heads by Miss Cecilia Beaux are very beautiful, one of them is in water-color, a department in which there is not a great deal of important work, although Mr. F. Childe Hassam's three sketches of water views are very nice, the "Grey Morning at Venice," is I think, the best. Very pretty work also, is shown by Mr. Edmund H. Garrett, and by Mr. William Graham. Mr. Sidney R. Burliegh, of Providence, sends the largest and most imposing of the water-colors, "Close of a Heavy Day," the subject a bit of rocky coast, and a stormy sea. To return to the oil paintings, Mr. Frank L. Kirkpatrick exhibits this year the best work he has done since he made a decided hit with his "The Greek Rhyton in the Museum at Seville" three years ago. This year along with "A Temple of Baal," which is not so good, he exhibits a very beautiful picture called "In the Museum." It is quite free from the looseness of handling which has been noticeable in a good deal of his work, the figures, of which there are several, being beautifully drawn, and the whole painted with much refinement. You have to accept Mr. Kirkpatrick's point of view, of course; his determination to make the work decorative whatever else it is, and his persistent use of a scheme of color which all the wise critics told him long ago was false and wrong. It is a mannerism certainly, but the effect is so pleasing, that I think the plucky young painter deserves much more credit than criticism. This picture has been purchased for the Temple collection also.

Mr. Theodore Wores, of San Francisco, is represented by a "Chinese Actor," a scene in the Chinese theatre at San Francisco, which is fresh and unhackneyed enough in subject certainly, and which contains some first-rate painting; the unimpassioned gestures of the principal figure, and the stolidity of the musicians who are crouched on the ground behind him, contrasting so vividly with the violence of the color, and the strained grotesqueness of the forms in his dress; the whole so strangely different from everything which we are accustomed to associate with dramatic interest, but all very characteristic of the Chinese, are admirably rendered.

Mr. W. P. W. Dana's "Seaside Harvest, Brittany," a spirited group of horses harnessed to a cart which is loading with sea-weed, is very strong and effective, the dull and patient donkey who does duty as a leader contrasts as well with the nervous horses with whom he has to pull, as his dark body does with the foamy sea against which it is relieved.

Mr. Thomas Allen's "The Maplehurst Herd," is a large and very strong cattle picture that deserved better treatment than it has received at the hands of the hanging-committee, who have mercilessly "skied" it.

In one respect the exhibition is more of a success than a good many of its predecessors. A good many sales are recorded. Let us take some comfort from that, and hope that enough good encouragement may be given to contributors in this way to make up for the blunders of last year's competition, which has had the effect evidently of alienating for this year most of the best painters at home as well as abroad.

L. W. MILLER.

UNDERGROUND TELEGRAPH-WIRES.

AT the three hundred and twenty-second meeting of the Society of Arts, held November 13, W. W. Jacques, electrician of the American Bell Telephone Company, read a paper on "Underground Telegraph Wires."

The first telegraph line constructed in this country, from Baltimore to Washington, in 1843, was intended to be laid underground, and the first nine miles were so laid. Four copper wires were each wound with cotton soaked in shellac, and the whole drawn into a lead tube. This tube was laid in a trench by the side of the railroad. Hardly was the section completed, however, when water found its way into the joints, destroying the insulation, and the conductors failed. They were accordingly replaced by wires strung on poles, and the rest of the line was constructed in this way. In England a similar line was built for a distance of thirteen miles along the Great Western Railway, which failed in exactly the same way as the American line, and was soon replaced by a pole line. The same thing occurred at various places on the Continent, and thus, although the first idea of telegraph engineers was to have underground lines, they were obliged to resort to pole lines. In Europe there has always been a strong desire to have a part of the electric wires under ground, on account of their safety, secrecy and reliability. After the introduction of gutta-percha, in 1846, many systems were tried, and the result is that there now exists a successful and durable system of underground telegraph-wires connecting the principal cities of Germany and France. In many European cities the lines are carried under ground as far as the outskirts, and in Paris not only all the telegraph lines, but also those for electric lights, telephones and other purposes, are carried through the sewers.

These systems, however, have cost from ten to twenty times as much as similar overhead lines, and there are many more miles of the latter than of underground lines; while in Paris, which is the only city in the world having a complete underground system, the great size of the sewers affords unusual facilities for running wires. Moreover, it has been found that, for delicate and quick-working apparatus, such as automatic telegraphs, polarized relays, and especially the telephone, long underground lines are far less efficient than pole lines. Apart from the difficulty of securing good insulation, there are two reasons for this fact; viz., (1) the *retardation* which takes place when the conductor is brought near the earth, which limits the speed of working of the apparatus, or, in the case of the telephone, confuses and destroys the signals altogether; and (2) *induction*, which is noticed when two or more wires are run close together, as they must be when under ground, and which causes a message sent over one wire to be received on all the others. With telephone-wires this is noticeable on wires as short as one thousand feet. Steady currents, like those for electric lights, are, of course, unaffected by either of these phenomena.

The history of the attempts which have been made in the direction of underground wires proves that for long lines between cities, in this country, pole lines, which can be easily built and repaired, and where the wires are not subject to the effects of retardation or induction, are decidedly superior to underground lines. Between 1847 and 1870, all the systems which had been tried had proved complete failures. Since that time, however, in England, Germany and France, several lines have been built that have continued to work successfully. The English system used until recently between Liverpool and Manchester, was constructed by laying iron or stoneware pipes from one to two feet below the ground, and drawing in the cable of gutta-percha covered wires. The route was selected through a marshy section of country, so that the pipe was almost constantly filled with water, so as to preserve the gutta-percha. In the present German system, which dates from 1875, the cable is composed of seven copper wires, each coated with two layers of gutta-percha and two of Chatterton's compound, and the whole covered with an armor of galvanized-iron wires; this is laid in a trench by the roadside. The cost of the system was nearly twenty times that of a well-built pole line. The present French system was begun in 1880, and consists of cables of gutta-percha covered wires, which are drawn into iron pipes three or four inches in diameter, and buried along the side of the road. Although all these systems are now in successful operation, they are far less efficient than pole lines of the same length would be. The speed of working is limited, and the use of the telephone over considerable distances is impossible.

The speaker then gave an account of some experiments he had made on copper wire, insulated with gutta-percha, laid under ground, with a metallic circuit instead of the usual ground return, and in all cases covered. These experiments had been made on the Paris telephone-wires, the French Government wires between Paris and Orleans, the line between Paris and Soissons, and several German lines. The distance talked over in miles varied from twenty to eighty-five miles. These experiments had led Dr. Jacques to the discovery of the empirical law that if the product of the total resistance in ohms by the total capacity in microfarads was less than about 18,000, perfectly good conversation was possible, while if it exceeded that number, talking was more difficult, and in many cases impossible.

Within our large cities the problem is somewhat different, however, from that of connecting two cities with each other. The number of wires has of late been rapidly increased, and if run on poles, they disfigure the streets, interfere with the operations of firemen in case of fire, and cause annoyance to tenants and house-owners. These disadvantages have led many to ask whether the wires cannot be buried, at least in the cities.

In Paris, all wires are carried under ground in the sewers; in London, telegraph-wires are so carried from the central office to many of the branch offices; and in many German and Austrian cities the telegraph-wires are so carried to the outskirts; but in European cities, as in America, most of the telephone and electric-light wires, and a majority of the telegraph-wires also, are still carried on poles or over house-tops. In Paris, the telephone-wires are protected from induction and retardation by using, instead of a single wire, two wires twisted together, forming a metallic circuit, which obviates the difficulties referred to, though doubling the cost of the wire. It is thus *technically* possible to place all of the wires in a city under ground, but the cost is enormously increased, being five times as much as a pole line, even in Paris, where no separate piping or chambers to contain the wires are necessary. To put such a system as one of our telephone exchanges under ground would place the cost of the instruments entirely out of reach of the subscribers. While it thus seems impracticable to put all of the wires underground in cities, much may be done by putting the heavier lines, where a large number of lines run side by side for a considerable distance, under the streets. Our American telegraph and telephone companies have recognized this fact, and several underground lines have recently been constructed by them. The American Bell Telephone Company has two short lines of such wires in the business section of Boston, about a quarter of a mile long each. On account of the short distance, it was considered best to use single-line service, trusting that the induction and the retardation would not be serious. The system is constructed by laying eight wrought-iron pipes, three inches in diameter, side by side in two rows, about four feet below the surface. At each street-corner a brick chamber is built, large enough to admit a man, and with a cover flush with the street. The cables run out from the basement of the central office, through the pipes and up the side of buildings to the roof, from which they spread out to the subscribers by means of ordinary overhead lines.

The speaker then showed samples of the different kinds of cables that are in use, and referred briefly to the underground lines in use in Washington, Pittsburgh and Chicago.

At the conclusion of Dr. Jacques's paper, Professor Cross referred to the conditions necessary for the successful operation of underground wires; viz., high conductivity and larger section of the wire, a thick coating of a good insulating material, and low specific inductive capacity of this insulator.

Professor A. E. Dolbear said that what Dr. Jacques had said had shown that the use of any very considerable length of underground wire would be almost impossible, or at least impracticable. There was a great difference between telegraph and telephone wires as regards the difficulties met with, and with the telephone there was no advantage gained in increasing the strength of the battery beyond a certain point; neither could such increase of strength do anything in the way of obviating the difficulties of retardation or induction. Only a weak current was necessary for telephonic purposes, and no increase above what was necessary to do the real work of transmitting the vibrations would be of any advantage. There was also a great difference, in telephonic work, in working at different ends of the line.

Professor Cross referred at some length to the effect of the electric capacity of the conductor, and the deformation of the electric wave or impulse resulting therefrom. The greater the capacity of the cables, the greater its effect in flattening the wave, thus tending to confuse rapid signals, and rendering a slower rate of transmission necessary in telegraphy. When the telephone is used, as the rate of change of the electric pulses caused by the sound-waves cannot be altered, confusion and indistinctness result. It is universally conceded now that large wires are the best, and they are now universally used in submarine cables, although at the time when the first Atlantic cable was proposed there were two parties among telegraph engineers, one advocating the use of large wires, and the other the use of small ones. A difficulty which has been experienced in telephone-wires arises from the fact that strong pulses travel faster than weak ones. The speaker had made some experiments on this point, with the experimental cable, five miles in length, laid near Attleborough by the American Bell Telephone Company. He had found that the sounds of short steel bars of very high pitch could be transmitted readily, even when their number of vibrations was far above the most rapid vibrations that ever occur in articulate speech, and through circuits in which the indistinctness due to electrical retardation was very decidedly manifested. From this he inferred that with intense sounds the change in the cable was abundantly rapid and sufficiently strong to affect the telephone receiver, even when the capacity was very great, and that the indistinctness probably arose in great part from the overlapping of the electric pulses, caused by the stronger ones overtaking and fusing with the preceding weaker pulses.

After some further discussion, the meeting was adjourned.

George F. Swain, *Secretary.*

ARCHITECTURAL SCHOOLS.

Milwaukee, Wis., December 6, 1884.

To the Editors of the American Architect: —

Dear Sirs, — I am a draughtsman, and have been connected with some of the leading architects of the West for the past two years; I have acquired a fair knowledge of architecture, and skill in general design; but being desirous of obtaining a more thorough training in architectural and decorative design, modelling and water-color drawing, I would solicit your advice as to the most efficient means of reaching this end. What course would you point out to a young man of limited means, who has resolved to devote about two years to earnest study, in the above-mentioned branches; what are the conditions on which students are admitted to an art school, which you might propose; and how great would the annual expenses be which instruction, etc., at such a school will involve? An early answer through your journal would oblige,

Yours truly Subscriber.

[The best way to obtain the instruction which "Subscriber" desires is to enter some good architectural school, such as exists in connection with Columbia College, New York City; Cornell University, Ithaca, N. Y.; the Illinois Industrial University, at Champaign, Ill., or the Massachusetts Institute of Technology, in Boston. All of these give instructions in architectural drawing and design, and water-color drawing and color decoration are taught in one or two, and perhaps in all. We do not know whether modelling forms a part of the course in any, although it would be a very desirable feature.

The conditions of admission to these institutions, with the cost of tuition, and other particulars, may be learned by addressing the Secretary of any of them. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Anecdote of an Italian Sculptor. — "One day, in the studio of Magi, I and another young man were modelling together a man's *torso* which had been cast from nature. A friend of Magi, a painter, as he passed by us, paused, and, after looking at our two copies, said, turning to my rival and patting him gently on the shoulder, 'I am delighted; this is an artist!' Then turning to me with an expression of regret, he said, '*A rivederla.*' My good reader, do you think that made me despair? No, by the Lord! I tell you rather that these words were seared upon my brain as with a red-hot iron, and there they still remain, and they did me a great deal of good. The professor who spoke them (yes, he was a professor) three years afterwards embraced me in the Accademia delle Belle Arti, before my 'Abel.' My rival is perfectly sound in health, and is fatter and more vigorous than I am, but he is not a sculptor. So, my dear young artist, courage!" — *From the Autobiography of Giovanni Duprè.*

From London to Bombay by Rail. — There is a proposition to build a continuous line of railway from London to Bombay, a distance of about 5,000 miles. The line would cross into Africa at Gibraltar, and from Tangiers connect with lines already in operation in Algeria, across Morocco via Tunis and Tripoli to Cairo, thence by way of the Isthmus of Suez down the River Euphrates and along the Persian Gulf shore to a connection with the Indian system of railways which runs to Bombay. The project has been devised by a joint commission of English and French engineers, and it will be a continuous land line from London, excepting the crossing of the Straits of Dover and Gibraltar. When it is completed America will be compelled to get Gould and Vanderbilt to combine long enough to build a railway line to South America via the Isthmus of Panama, in order that the new world may not be eclipsed by the old. — *Philadelphia Press.*

A Chef de Cuisine's Tombstone. — The question of tombstone inscriptions is very important for the public in Paris. There exists a permanent committee, composed of cemetery inspectors, whose special permission is necessary before an inscription can be placed on a tombstone. The inscriptions themselves are often a source of trouble and anxiety to heirs and executors, inasmuch as the wording laid down by a testator in his will is sometimes of such a nature that the committee refuse to sanction its reproduction on his tombstone. A case in point arose last month, when an old man of seventy-five, Felix Durijet, once a great celebrity in the culinary art, died in Paris. He had been assistant to the head-cook of Louis Philippe, and afterwards chief of the famous Frères Provencaux Restaurant, in which establishment he amassed wealth, which was further increased by successful speculations on the Bourse. Instead of the usual headstone to his grave, he required of his heirs that they should erect a marble column, merely inscribed with his name, and supporting a frame containing a movable board. "Every day," said the will, "my heirs shall affix on said board, and in a legible manner, a recipe for the kitchen. For this purpose I leave a list of 365 recipes, which will be found in my cash-box. In this manner, while paying a visit to the graves of relatives, people desirous of acquiring information may obtain it in the cemetery." So far the clause had nothing very terrible about it; but the following rider threw the heirs into a cold perspiration: — "Should my heirs fail to carry out said clause, the whole of my estate shall revert to the public charities." The Committee on Inscriptions unanimously rejected the "broken column surmounted with the frame containing a recipe for each day," and the notary intrusted with the execution of the will refused to put the heirs in possession of their inheritance. The latter had nothing left but to submit the case to the courts. It will soon be before the civil tribunal.—*Philadelphia Bulletin.*

A Gypsum Pueblo, Sonora, Mexico. — Remarkable remains have been found on a hill or mountain four leagues south of Magdalena, in Sonora. The hill is about seven hundred feet high, and half-way up there is a layer of gypsum, which is as white as snow, and may be cut into any conceivable shape, yet sufficiently hard to retain its shape after being cut. In this layer of stone are cut hundreds upon hundreds of rooms, from six by ten to sixteen or eighteen feet square. So even and true are the walls, floors and ceilings, so plumb and level, as to defy variation. There are no windows in the rooms, and but one entrance, which is always from the top. The rooms are but eight feet high from floor to ceiling; the stone is so white that it seems almost transparent, and the rooms are all dark. On the walls of these rooms are numerous hieroglyphics and representations of human beings cut in the stone in different places, but strange to say, all the hands have five fingers and one thumb, and the feet have six toes. Charcoal is found on the floors of many of the rooms; implements of every description are to be found. The houses or rooms are one above the other, two, three or more stories high, but between the stories there is a jog or recess, the full width of the room below, so that they present the appearance of large steps leading up the mountain. — *Chihuahua Enterprise.*

To prevent Elevator Accidents. — One of the most severe trials ever made to test the safety of elevators was undertaken by Mr. John Hodges, on the 20th inst., at a house on Madison Avenue and Fifty-first Street, belonging to Mr. E. D. Adams, of the firm of Winslow, Lanier & Co. The car was allowed to fall *one hundred and one times*, and not the least injury resulted therefrom to either the occupant or the elevator, Mr. Hodges riding therein at every trial. On a former occasion we have alluded to this safety appliance as being a decided departure from the contrivances now in use, the invention consisting of movable iron dogs a few inches apart, which fall out under the car the moment it passes them. The car can only descend by means of buffers, or shoes, which are kept in position by a light weight, and these push the dogs in and allow the car to come down, provided everything is working in its normal condition, but the instant a fall takes place, the relation between the car and weight is disturbed, and the buffers fail to push the dogs in, consequently the car rests thereon. The fact that this invention has withstood such extraordinary tests — it having been tried seventy-eight consecutive times at Messrs. Millers' factory, 349 West Twenty-sixth Streets a few months ago — justifies the good opinion we entertained for it, and we predict for the inventor a general introduction of his safety appliance as its simplicity and certainty must soon commend itself to the public. — *Engineering News.*

The Washington Aqueduct.—The project of supplying the capital with water by forming a tunnel through several miles of rock from the distributing reservoir above Georgetown to a much larger one in the vicinity of Howard University, is now rapidly advancing at all points. The great subterranean cylinder, when finished, will be eleven feet wide, seven-and-a-half feet high, and nearly 22,000 feet long, and will be able to furnish a liberal supply for many years in the future. Along the course of the new aqueduct, at convenient distances, five large shafts have been sunk to the average depth of nearly one hundred feet. The shafts are sunk about ten feet deeper than the floor of the tunnel, forming wells to receive the springs that flow through the interstices of the rock. Compressed air is the motive power employed for all the pumping, drilling, hoisting, and ventilating. A substantial edifice has been built at a central point upon the Chesapeake & Ohio Canal, where fuel is delivered at least cost. This building contains six 100 horse-power boilers, arranged in one battery, and these are worked incessantly, night and day, except Sundays, for the compression of air. Four 150 horse-power compressors receive the air, which, during the process of compression, is cooled by a spray of water injected into the air-cylinder, and in this condition passes into the air-receiver. A complicated and singular process then forces the compressed air through a 12-inch pipe, into a body of water, which experience has shown to be the easiest way of extracting the moisture that would cause it to freeze in the machine using it. The concentration of the power at one point necessitates the use of five miles of 12 and 6-inch pipes to convey and distribute the compressed air. There are in operation in the several shafts twenty-eight rock drills, which work under a pressure of sixty pounds to the square inch, and enable the contractors to proceed with the tunnel about fifty feet per day. Twice in twenty-four hours there is a temporary cessation of the boring apparatus. After detaching and protecting the machinery, the blasts are set, and all the workmen ascend the shaft. The blasts are discharged simultaneously by a battery, the foul air and smoke are driven out by turning on the air, another gang of workmen descends, and boring again begins. Nearly 300 men are employed at the different shafts, in addition to a Ledgerwood hoisting-engine, and a Knowles pump stationed at each shaft. Appliances are at hand for graduating the pressure, and a stop-valve can instantly separate any one shaft from the rest of the works. The débris produced by blasting is removed on cars, propelled on rails to the shaft, where it is hoisted, emptied, and the car returned, there being a double track of rails in the tunnel. The broken rock is conveyed to the site of the new reservoir, where it is utilized by more than 350 men, who are at work on the construction of that immense tank. The whole enterprise was to be finished before the middle of next year; but it is now conceded that at least another year must be added to the time. — *New York Tribune.*

GELATINE EDITION.

During the year 1885 a series of Gelatine Pt ints, (Heliotypes) photographed from the natural object, will be published in the AMERICAN ARCHITECT AND BUILDING NEWS.

These gelatine prints will be issued once a month to those subscribers only who will pay a dollar extra for the twelve prints.

SUBSCRIPTION PRICES.

[IN ADVANCE.]

REGULAR EDITION: — $6.00 per year; $3.50 per half year.

GELATINE EDITION (the same as the regular edition, but including 12 Gelatine Prints): — $7.00 per year; $4.00 per half year.

MONTHLY EDITION (identical with the first weekly issue for each month, contains no Gelatine Prints,): — $1.75 pei year; $1.00 per half year.

IMPORTANT NOTICE.

IT will greatly simplify our book-keeping and prevent future complaint, if those of our present subscribers who wish to receive the gelatine plates will make their remittances cover the *entire* year to January 1, 1886, by remitting at the rate of fifty cents for each month, in addition to the dollar for the gelatine prints.

Example: X. whose subscription naturally would end October 1, 1885, should, if he desires the gelatine edition, remit $2.50 additional — that is, $1.00 for the gelatine prints and fifty cents for each of the remaining months of the year.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

308,614. HOT-AIR FURNACE.—George Kamp, Utica, N. Y.

308,648. BRIDLE FOR PAINT-BRUSHES. — William L. Barnes and G. Byron Sibley, Bennington, Vt.

308,656. OPERA-CHAIR.—John Du Bois, Dubois, Pa.

308,678. ALARM-LOCK. —Jacob W. Kohn, Newark, N. J.

308,698. SHUTTER-WORKER. — Edwin Prescott, Arlington, Mass.

308,703. FRET-SAW HANDLE. — Christopher Richardson, Newark, N. J.

308,707. REAMER. — Peter E. Shirk, Spring Grove, Pa.

308,709. GLASS-CUTTER GUIDE.—Philip Sinsz, Baltimore, Md.

308,710. TILE-MACHINE.— John S. Smith, Jackson, Mich.

308,717. BIDET FOR COMMODES. — David Watson, New York, N. Y.

308,721. FIRE-ESCAPE. — Samuel Whitehouse and Scott R. Frye, Bath, Me.

308,728. SASH-HOLDER. — Sherman E. Anthony, Stillwater, N. Y.

308,735. WEATHER-STRIP. — Geo. W. Bell, St. Joseph, Mo.

308,738. PILE-DRIVER.—Chas. Bliven, Norfolk, Va.

308,739. HINGE. — Bernard P. Bogy, St. Louis, Mo.

308,742. COAL-CHUTE AND VAULT-COVER.—Harold Borup, St. Paul, Minn.

308,746. CARPENTER'S GAUGE. —Augustus J. Burger, New London, Wis.

308,749. DOOR-SPRING. — Enoch H. Clark, Greenland, N. H.

308,768. DOOR-STOP. — Levi P. Hazen, Cincinnati, Ohio.

308,773. SASH-BALANCE.—W. Haskell King, Athol, Mass.

308,786. PIPE-WRENCH.—William S. Morrison, Fort Worth, Tex.

308,812. ATTACHMENT FOR KNOB-ROSES. — Garret Van Winkle, North Plainfield, N. J.

308,820. COMBINED ANVIL AND VISE.—Joseph Austin, Rutland, Vt.

308,823. DOOR-SECURER. — William J. Bitter, Toledo, O.

308,825-826. STRUCTURAL SHAPE FOR COLUMNS, PILASTERS, ETC.—Edward M. Butz, Allegheny, Pa.

308,827. METAL COLUMN, PILASTER OR GIRDER. —Edward M. Butz, Allegheny, Pa.

308,828. STRUCTURAL SHAPE FOR COLUMNS, PILASTERS, AND GIRDERS. — Edward M. Butz, Allegheny, Pa.

308,829. METAL COLUMN, PILASTER OR GIRDER. —Edward M. Butz, Allegheny, Pa.

308,833. PORTABLE STRUCTURE. — Johan G. C. Döcker Copenhagen, Denmark.

308,837. SPIKE.—Stiles Frost, Boston, Mass.

308,842. CUTTER AND REAMER. — Eldon B. Hunt, Delaware, O.

308,850. LATHING-APPARATUS. — Jas. Oppenheimer, Shenandoah, Iowa.

308,861. CUT-OFF FOR CISTERNS. — Daniel S. Troy, Montgomery, Ala.

SUMMARY OF THE WEEK.

Baltimore.

DWELLINGS. — Frank E. Davis, architect, has prepared drawings for James Thompson, Esq., for 2 three-st'y brick buildings, with Cheat River and marble trimmings, each 18' x 50', to be erected on Laurens St., near Park Ave., to cost $11,000; Jackson Holland, builder.

BUILDING PERMITS. — Since our last report seventeen permits have been granted, the more important of which are the following: —

A. L. Gorter, 5 three-st'y brick buildings (square), n s Preston St., bet. Charles St. and Lovegrove Alley; and 5 three-st'y brick buildings, s e Hoffman St., bet. Charles St. and Lovegrove Alley.

Otto Goldbach, 5 three-st'y brick buildings, e s Wolfe St., s of McElderry St.

James J. Brown, three-st'y brick building, w s Greenmount Ave., bet. Preston and Biddle Sts.

Aug. Krebs, 2 three-st'y brick buildings, w s Hanover St., bet. Clement St. and Fort Ave.

Wm. J. Clendiven, 3 three-st'y brick buildings, n s Preston St., bet. Broadway and Bond St.; and 2 two-st'y brick buildings, s s St. Joseph St. in rear.

ALTERATIONS.—Geo. Archer, architect, has prepared plans for alterations to the Central Savings Bank, cor. Charles and Lexington Sts., to cost $2,000; John Haswell, builder.

Boston.

BUILDING PERMITS.—*Marlborough St.*, No. 188, Ward 11, for Jas. J. Minot, brick dwell., 24' x 62' 2", mansard; B. D. Whitcomb, builder.

Brookline St., near Maple Ave., Ward 22, for City of Boston, brick gate-chamber, 21' x 54', pitch; Park Department, builder.

Huntington Ave., near Tremont St., Ward 22, for A. Geiger, 2 brick dwells. and stores, 37' 6" x 53' 2", flat.

East Fifth St., Nos. 708, 710 and 712, Ward 14, for H. B. Stratton, 3 brick dwells., 22' x 50', pitch; H. B. Stratton, builder.

East Eighth St., No. 579, Ward 14, for W. G. Fogg, wooden dwell., 28' x 38', flat; Clark & Lee, builders.

Huckin Ave., No. 17, Ward 20, for A. Hutchins, wooden dwell., 23' x 26', pitch; W. Ballantine, builder.

Draper St., cor. Holmes Ave., Ward 24, for A. Crawford, 2 wooden dwells., 15' x 30', pitch; A. Crawford, builder.

Carruth St., cor. Beal St., Ward 24, for Mrs. L. F. & R. W. Humphrey, wooden dwell., 13' x 17' and 20' x 33', pitch.

Leonard St., near Norfolk St., Ward 24, for Samuel Rockwell, wooden dwell., 14' x 15' and 29' x 31', pitch.

Butler St., near Vose St., Ward 24, for Jos. Pope, 2 wooden dwells., 15' x 18' and 22' x 30', pitch; Jos. Pope, builder.

Savin St., near Warren St., Ward 21, for R. M. Gooch, 2 wooden dwells., 20' x 45', mansard; Jno. Patton, builder.

Rogers St., No. 33, Ward 15, for W. L. Lewis, wooden dwell., 20' x 40', flat; W. L. Lewis, builder.

Fairfax St., near Carruth St., Ward 24, for H. S. Carruth, 2 wooden dwells., 31' x 31', pitch; F. M. Severance, builder.

Eliot St., near Hagar St., Ward 23, for F. C. Adams, wooden dwell., 25' x 28', pitch; A. A. Ayers, builder.

Lamartine St., near Wyman St., Ward 23, for J. A. Frampton, wooden dwell., 28' x 36', flat; J. Linphold, builder.

North Beacon St., cor. George St., Ward 25, for H. P. Goodnough, 4 wooden dwells., 19' x 27', pitch; H. M. Perry, builder.

Brooklyn.

BUILDING PERMITS.— *Fifty-fifth St.*, s s, abt. 20' e Second Ave., 4 two-st'y frame dwells., tin roofs; cost, each, $1,800; owner and builder, J. G. Carroll, 103 Thirty-ninth St.; architect, S. M. Bogert.

North Second St., No. 380, s s, abt. 175' e Union Ave., rear, two-st'y frame bakery and wagon-house, tin roof; cost, $2,650; owner, John H. Albohn, 380 North Second St.; architect, Leonhard F. Graetter; builder, Jacob Schoch.

Cedar St., s s, 126' 6" w Myrtle Ave., 3 three-st'y frame tenements, tin roofs; cost, each, $3,500; owner and builder, Fr. Herr, 778 Broadway; architect, John Herr.

Bedford Ave., s e cor. Hancock St., 4 three-st'y brown stone stores and flats, tin roofs; cost, corner, $7,000; other 3 $5,000 each; owner and builder, R. O. Frost, No. 1 Hunterfly Road; architect, Amzi Hill.

High St., n s, 90' w Adams St., two-st'y and basement brick dwell., tin roof, wooden cornice; cost, $3,500; owner, Mrs. E. O'Connor, cor. High and Adams Sts.; builders, John Guilfoyle and R. J. Brown.

Hull St., n s, 150' e Rockaway Ave., 5 two-st'y brick dwells., gravel roofs; cost, each, $3,000; owner, W. H. H. Robins, 110 Patchen Ave; architect, B. T. Robbins; builders, E. K. Robbins and Jno. Remsen.

Manhattan Ave., No. 84, e s, 365' 10" n Van Cott Ave., four-st'y frame tenement, tin roof; cost, $5,000; owner, James MacFarlane, 117 Milton St.; architect, Fred'k Weber; mason, John Cashman.

Herkimer St., n s, 100' e Hopkinson Ave., 5 two-st'y brick dwells., gravel roofs; cost, each, $4,000; owner, etc., Matthew Nolan, Pacific St.

Wyckoff St., s s, 75' w Nevins St., four-st'y brick tenement, tin roof; cost, $9,000; owner and architect, Robert Dixon, 219 Montague St.; builder, Owen Nolan.

Jackson St., No. 98, s s, 100' e Leonard St., two-st'y frame dwell., tin roof; cost, $2,250; owner, Henry Nitz, 98 Jackson St.; architect, Julius I. Smith; builder, A. Kunzweiler.

Carlton Ave., e s, 206' 3" n Myrtle Ave., two-st'y brick stable and dwell., gravel roof, brick cornice; cost, $7,500; owner, J. M. B. Caruthers, 180 Washington Park; architect, M. J. Morrill; mason, P. J. Carlin; carpenter, not selected.

Chicago.

BUILDING PERMITS. — L. Weick, 2 two-st'y dwells., 337-337½ Mohawk St.; cost, $7,000; architect, A. M. F. Golden.

C. G. Bode, four-st'y store and dwell., 428 Twelfth St.; cost, $10,000; architect, C. G. Bode.

L. B. Otis, two-st'y rear addition, 2427 Michigan Ave.; cost, $3,000.

M. W. Ryan, 3 three-st'y stores and flats, 428-430 Van Buren St.; cost, $17,000; architect. G. Vigeant; builder, J. McGinnis.

E. S. Esty, 2 two-st'y stores and dwells., 615-617 Van Buren St.; cost, $8,000.

Wm. A. Hansberg, two-st'y flat, 94-96 Dayton St.; cost, $2,500.

J. Kubel, two-st'y dwell., 3120 Wentworth Ave.; cost, $2,500; architects, Gutrich Bros.

J. L. Campbell, 4 two-st'y dwells., Wilcox Ave.; cost, $12,000; builders, Campbell Bros. & Co.

Mrs. S. J. Steadman, two-st'y flats, 1272 Monroe St.; cost, $2,500.

F. C. Lang, 2 two-st'y dwells., 62 Pearson St.; cost, $6,000; architect, C. H. Gottig; builder, J. McCurty.

J. Hanziger, two-st'y flats, 598 South Western Ave.; cost, $3,000.

New York.

The armory competition having been settled, as reported in our last issue, little of general interest will be started until after January 1. Work is now being finished as rapidly as possible, and outside of ordinary speculative buildings nothing is reported.

The appointment of a new Commissioner of Public Works is waited for with interest, as important work will be under the control of the next incumbent.

BUILDING PERMITS. — *Courtland Ave.*, e s, 50' n One Hundred and Forty-ninth St., 2 four-st'y frame tenements, tin roofs; cost, each, $6,000; owner, Wm. Spieker, 183 Third Ave.; architect, John Rogers.

Ninth Ave., n w cor. Eighty-second St., four-st'y brick dwell. and store, tin roof; cost, $14,500; owners, E. A. Cruikshank & Co., 163 Broadway; architect, Ralph S. Townsend; builders, I. A. Hopper and R. Townsend.

One Hundred and Fiftieth St., n s, 325' e Morris Ave., three-st'y frame dwell., tin roof; cost, $4,000; owner, Patrick Kelly, 505 West Fifty-sixth St.; architect, Geo. W. Hughes.

One Hundred and Seventh St., n s, from Fourth St. to Lexington Ave., one-st'y brick skating-rink, fire-proof roofing material; cost, $25,000; lessee, Jane B. Muxlow, 200 East Seventy-fourth St.; architects, J. B. McElfatrick, Sons & De Band.

One Hundred and Forty-ninth St., n s, 125' w of Courtland Ave., three-st'y frame tenement, tin roof; cost, $4,000; owner, Michael Vetter, One Hundred and Fiftieth St., near Courtland Ave.; architect, Adolph Pfeiffer.

West Fourteenth St., No. 542, three-st'y brick office, gravel roof; cost, $2,500; owner, H. K. Thurber, 146 West Twelfth St.; builder, J. G. McMurray.

Walker St., Nos. 88 and 90, seven-st'y brick store, metal roof; cost, $40,000; owner, John Bornhoeft, 30 St. Mark's Pl.; architect, John B. Snook; builder, C. Eberspacher.

One Hundred and Eighteenth St., n s, 87' e Third Ave., 2 four-st'y brick flats and stores, tin roofs; cost, each, $20,000; owner and builder, James Wood, 341 East One Hundred and Sixteenth St.; architect, M. V. B. Ferdon.

Seventieth St., e s, 125' e Madison Ave., 5 four-st'y brown-stone front dwells., tin roofs; cost, total, $90,000; owners, architects and builders, Chas. Graham & Sons, 305 and 307 East Forty-third St.

First Ave., n e cor. One Hundred and Twenty-first St., 7 five-st'y brick tenements and stores, and 2 one-st'y brick stores, tin roofs; cost, total, $100,000; owner and builder, Patrick Sheridan, 124 Race St., Elizabeth, N. J.; architects, Will. Alan O'Hea.

One Hundred and Twenty-third St., s s, Eighth St. to St. Nicholas Ave., 6 brick dwells. and 2 brick dwells. with stores, tin roofs; cost, dwells. each, $9,000; stores and dwells., each $14,000; owner, H. Josephine Wilson, 325 East Fourteenth St.; architect, D. T. Atwood; builders, Patrick Childs and J. G. Scheel.

ALTERATIONS. — *East Forty-second St.*, Nos. 32 to 38, eight-st'y brick extension, fire-proof roof; cost, $9,000; owner, Lincoln Safe Deposit Co., Thomas L. James, President, on premises; architect, John B. Snook; builder, D. H. King; iron-work, A. J. Campbell.

Pine St., No. 73, repair damage by fire; cost, $5,000; owner, Amos R. Eno, 8 Pine St.; builders, A. G. Bogert & Bro.

Thirty-fifth St., n s, 35 West Broadway, two-st'y brick extension, tin roof; cost, $3,000; lessees, Hyde & Behman, 22 Eighth Ave., Brooklyn; architect, John Sexton.

COMPETITIONS.

AMERICAN ARCHITECT COMPETITIONS.—NEW SERIES.

As the busy season for this year has nearly passed, the younger men who have in past years evinced an active interest in the little competitions we have held from time to time, may be ready to test once more their skill in design in competition with their fellows. Therefore we take pleasure in inviting their attention to the following

PROGRAMME.

Most people who live in the country, or in the suburbs of a large town, and have sufficient means, usually feel obliged to "set up their carriage," and of course a carriage implies horses, and a building in which the entire establishment can be housed. Therefore we propose as the subject of the present competition a barn such as the dweller in a house that has cost $5,000 would consider an appropriate adjunct of his establishment; but as this may be somewhat ambiguous, seeing that some men think more of their horses than they do of their families, we will say that the proprieties would be best observed if the cost of the barn should range between $1,000 and $1,500.

The barn must furnish accommodation for two horses and a cow; the carriage-room must be large enough for two wheeled vehicles and a sleigh; and proper provision must be made for harness, feed and hay, and the stableman must not be overlooked. Water and ventilation must also be kept in mind.

Required:—A perspective drawing of the barn, elevations of the sides not shown in the perspective, a plan or plans, and a reasonable amount of detail; all to be included on a single sheet, 21" x 33" within the framing lines. A short description and the result of a *bona fide* estimate must also be furnished. For the best three designs we will pay equal prizes of thirty dollars each.

Conditions: — Drawings must be received at the office of the *American Architect*, on or before Saturday, December 20, 1884.

The three prize drawings are to remain the property of the publishers.

All designs submitted are subject to publication in the *American Architect* at the pleasure of the editors.

All designs must be sent in signed only by a motto —*not a graphic symbol*—the name and address of the author being sent enclosed in a sealed envelope, endorsed with a duplicate motto.

The jury of award will be composed of three architects.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

A BILL has been introduced into the National House of Representatives, which provides for some important changes in the method of obtaining designs for public buildings. The bill is described as being one "defining the duties of the Supervising Architect, and for other purposes," and begins by specifying the manner in which a supervising architect and an assistant supervising architect shall be appointed, going on further, in Section Four, to say that "Plans and designs for buildings, or additions to buildings, costing fifty thousand dollars or over, shall be obtained by open and general competition by architects of the country who are engaged in the practice of their profession." Designs for buildings or portions of buildings intended to cost less than fifty thousand dollars are to be prepared in the office of the Supervising Architect, but neither this official nor his assistant is allowed even to compete for works of greater importance. Architects are to be notified by advertisement in three newspapers, one published in the place where the proposed building is to be erected, one representing the interests of the profession in the United States, and one to be selected by the president of the Board having charge of the competitions, of the opening of a competition for designs, the advertisement stating the limit of cost fixed by the act authorizing the erection of the building. Within a given time after the last publication of this advertisement, the architects who desire to compete must send their plans, under motto, by mail to the supervising architect, who is to place them before the Board, which is constituted by the Postmaster-General, the Attorney-General, the Chief Engineer of the Army, the Supervising Architect, and one other architect of good standing in his profession, and of at least ten years' experience in active practice, who shall not be a competitor, or interested in any way in any plan submitted. After examining the plans submitted, the Board is to adopt the one which seems to be best suited for the building to be erected, provided it shall be considered worthy of adoption, and on the further condition that the official computer employed by the Board shall report that it can be carried into execution without exceeding the limit of cost fixed by law. On being notified of his success, the author of the selected design shall give a bond in such sum as may be required by the Board, obliging him to prepare, in duplicate, within the time which the Board may fix, all the working-drawings and specifications for the proposed building, one set to be filed in the office of the Supervising Architect. On the delivery of the working drawings and specifications to the Supervising Architect within the allotted time, the successful competitor is to receive payment for them at the rate of three per cent of the estimated cost when this does not exceed two hundred thousand dollars, two per cent when the cost is more than two and less than five hundred thousand dollars; one and one-half per cent when the cost is more than five hundred thousand and less than one million dollars; one and one-quarter per cent when the cost is more than one and less than two million dollars; and one per cent when the cost exceeds two million dollars.

IN addition to this, the Board may, if it sees fit, award not more than six prizes to meritorious designs, amounting in the aggregate to not more than one per cent of the estimated cost for buildings of one hundred thousand dollars' value or less; three-quarters of one per cent if the cost is more than one and less than five hundred thousand dollars; and one-half of one per cent if the cost is more than five hundred thousand dollars. If the successful competitor shall fail to furnish to the Supervising Architect the working-drawings and specifications within the stipulated time, his bond is to be forfeited, and the Board may adopt the second in merit of the competing designs; or, if the second is not, in the opinion of the Board, of sufficient merit, or if no suitable plan should have been presented, a second competition shall be called for in the same way as the first, and if this fails to secure a suitable plan, the Supervising Architect shall be required to prepare the plans for the building. In case of a successful issue to the competition, and the selection of a design, the execution of the plans and specifications prepared by the victorious competitor shall be entrusted to the Supervising Architect, who will make all contracts, appoint resident superintendents, and provide for the payments to the contractors; but he is not allowed to make any change, alteration, omission or addition in the accepted plan, except by the authority of the Secretary of the Treasury, and after the designer of the plan has had an opportunity of expressing his opinion in regard to the alteration; and the author of the design, or some competent architect appointed and paid by him, is to make frequent visits to the building, and is to report to the Supervising Architect whether the plans and specifications are being complied with in its erection, and whether the materials and workmanship are such as they should be, and is to receive one per cent on the cost of the building, as compensation for this service, payable at such times during the progress of the work as may be agreed upon.

THIS bill, introduced by Mr. Stockslager of Indiana, gives expression to the idea, which has now become very general, that the present system of designing public buildings does not give the most successful results, in point either of design or economical execution. The Government has been fortunate in securing the services of a succession of highly-trained and faithful Supervising Architects, but even these, in their official reports, have repeatedly called attention to the fact that no single architect, however skilful and experienced, can design at his best with sufficient rapidity to furnish for all the buildings erected by the Government plans calculated to reflect credit upon himself and the public service. There is, moreover, a feeling, which may or may not be well founded, that the position of the Supervising Architect, as the minister, so to speak, of the higher Government officers, confuses the responsibility for the administration of public building business, so that structures, the expense of which is strictly limited by law, often cost two or three times as much as was intended, not from any fault of the Supervising Architect, but through the necessity, under which he is placed, of adapting his work, not to the requirements of the statute, but to the directions of those whom the law places over him, and who, perhaps, are confident of possessing influence enough to secure the passage of amended bills, increasing the appropriation to the amount which they think desirable. From such influences as this an unofficial architect, selected under a special Act of Congress, and performing a limited duty in strict conformity with the Act, would be free, and it seems quite possible, in the way which the proposed law describes, to secure for the Government buildings the advantage of designers, not only willing and able to devote an adequate amount of time and study to the planning of each, but independent of the local or political influences which may act through the Administration upon the officials who form a part of it, without giving up anything of the systematic and really economical method by which the public building business is now carried on. Considered with due regard to the limitations necessary in the public service, Mr. Stockslager's bill seems to us judicious and well considered. Its provisions for the conduct of competitions, for example, although reserving to the Board in charge the right, which should never be conceded in private competitions, of rejecting all the designs submitted, simply express a limitation, which, as we suppose, the members of Congress would be nearly unanimous in regarding as indispensable in such important matters; while the constitution of the jury which is to pass upon the designs is at least substantially in accordance with the capital requirement of a fair contest, that the majority shall be composed of experts. In fact, as the special knowledge of the Postmaster-General would be of great service in weighing the merits of most buildings now constructed for Government use, it is difficult to see how the jury could, as an official one, be improved. The portion of the bill to which we should be most desirous of offering amendment is that specifying the compensation to be paid to the architect whose design may be selected by the jury. For buildings to cost less than two hundred thousand dollars, the proposed fee of four per cent upon the estimated cost for working drawings and specifications, and general supervision, is entirely satisfactory, but we can see no reason why the percentage should be diminished as the cost of the building increases; still less why it should be diminished in so rapid a ratio that the fee to be paid for drawings and specifications of a building to cost, let us say, five hundred and ten thousand dollars, is only about one-fourth more than that offered for the plans and specifications of one to cost two hundred thousand; and the fee for a two-million dollar building is only about one-third more than that for a one-million dollar structure. It is undoubtedly true that there are architects who will prepare plans for a building to cost two million dollars with the expenditure of only one-third more time and thought than for one to cost one million dollars; but these are not the architects whom persons of experience find it wisest to employ, nor are their works such as confer the most distinction upon those who are served by them. It has long been agreed by all architects whose opinion is worth anything, as well as by the public authorities of the most enlightened countries, that the difficulty of mastering thoroughly the design of our complex modern structures increases in substantially the same ratio as their cost. A large building does not now mean four walls and a portico, but a congeries of scores, perhaps hundreds of rooms, to be arranged in a compact, convenient and beautiful form; all to be warmed and ventilated, not by makeshift appliances, but efficiently and economically; at the same time that the whole structure is to be kept stable and strong. For each new arrangement that can be made with fifty rooms, a thousand may be made with a hundred rooms, and the difficulty of choosing the best possible arrangement is just so much increased, while problems of lighting, heating, construction, and ventilation multiply in geometrical ratio as the distance between the centre of the building and the external walls increases. In private practice this rule is generally recognized here, and our best modern churches, theatres, and hospitals challenge comparison with any in the world in consequence. If our public work is to be made an exception to the usual practice, we shall undoubtedly get our most important buildings done somehow, but they will neither be better nor cheaper than if it had been made worth while for the best architects to spend their best thought upon planning them.

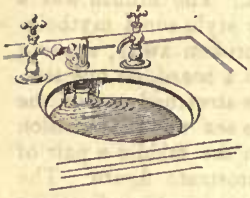
AN old process for preserving iron against the effects of rust has been revived, under a new name, and with a patent saddled upon it, in Germany. Every one has seen old musket and gun barrels covered with a handsome brown coating, which was obtained by repeated rubbings with an acid solution, followed by linseed oil, and the same operation, slightly modified, forms the subject of the German patent. According to the *Revue Industrielle*, the objects to be treated, whether of cast or wrought iron or steel, are first cleaned or polished, then heated, and afterwards dipped in an acidulated water, or "pickle," to remove the coating of oxide formed by the last heating. The browning process is then commenced by immersing the articles in a liquid composed of one part of some inorganic acid, probably nitric or hydrochloric, diluted with five parts of water. As soon as the coating of rust produced by the action of the acid has extended over the whole surface, the iron is removed, dipped in water, and wiped dry with brushes or cloths. It is then subjected to a second bath in the same liquid, and is finally removed, dried, slightly heated, coated with linseed oil, and put in a warm place to dry. After the oil is hard, the article can be varnished; or, as is done with cast-iron, it may be subjected to a strong heat in an oven, which changes the color of the surface to a rich and durable black.

THE *Builder* relates a rather pretty archæological story about Dr. Furtwängler, a pupil of the great Curtius, who had occasion some time ago to make a critical examination of a bronze fragment picked up at Olympia. The bronze was a very ancient one, representing in archaic style some mythological subject, but most of the plate was broken away, nothing remaining but a rude male figure, without a beard, on one side, a portion of a draped figure, with its arms stretched out, on the other, but so worn away that neither the sex nor the position of the hands could be determined; and in the middle a pair of knees, apparently belonging to some prostrate figure. The interpretation usually deduced from these scanty indications was that the bronze represented Ariadne coming to crown Theseus after the death of the Minotaur, to whose prostrate body belonged the knees in the middle of the group. Dr. Furtwängler, however, dissented openly from this explanation, and proposed another, by which the knees belonged, not to a bull, but to the young Prince Hector, while the naked youth was Achilles, and the bunch of clothes with two stumps of arms represented, not the beautiful Cretan girl, with a wreath, but the old King of Troy extending his hands over his unfortunate son. Except the general probability of the bronze founder having had one story in his mind rather than the other, there was absolutely no evidence particularly favoring either theory, and no one, perhaps, expected that the dispute would ever be settled. As it happened, however, a sale of curiosities took place some time afterwards in Rome, and Dr. Furtwängler was obliged to attend it on business. Among the objects to be sold, he found some old pieces of metal of small value, thrown into a drawer together, and among these was an ancient Greek mirror, having a circular disk, and a square projection which formed the handle. On the handle was a bas-relief, which was, in miniature, the counterpart of the design upon the Olympian bronze, but with the difference that the whole was in perfect preservation. Every portion of the subject was distinct: the aged Priam in full robes, and leaning on a staff, was holding out to Achilles the ransom of the body of Hector, which lay extended between them; while, to make the story complete, the god Hermes, who guided Priam through the Grecian camp, stood near.

THE *Scientific American* describes a new vessel, built for the Chilian Government, which, although not iron-clad, is the most formidable war-ship now afloat for all purposes except that of attacking fortifications. In the rage for iron-clad ships it has been forgotten that the commercial interests of a nation require protection almost as much as its seaport cities, and that while an invulnerable portable fortress, like the *Duilio*, or the other enormous modern armored vessels, was making itself disagreeable to the seacoast of a hostile country, its own proprietors might have their merchant ships driven from the ocean by cruisers which the *Duilio* could never overtake in the open sea; and with the intention of providing against the possible consequences of this error, the Chilians, who already possess one or two very powerful iron-clads, have made their new craft, the *Esmeralda*, extremely swift, surpassing in that respect almost any steamer afloat, and have armed it with weapons which would enable it to engage successfully a whole fleet of the light vessels now usually built for cruising in the open ocean. The principal features of the armament are two immense breech-loading guns, one at the bow, and the other at the stern, each of ten inches calibre, carrying projectiles weighing four hundred and fifty pounds, and fired with a charge of two hundred pounds of powder. Each of these guns is mounted in a steel enclosure, which serves to protect the pivot and moving machinery from hostile shot, and the loading part is covered by a house, also of steel plates, proof against rifle-balls and small projectiles, in which the operations of loading, pointing and firing can be carried on calmly and safely. In order to guard against accidental explosions of ammunition among the artillerists, the cartridges are kept in the hold, and are taken up to the gun, as required for loading, by small hydraulic elevators, which run within the steel house, and are thus protected from injury. Besides the bow and stern guns, either of which is capable, at close quarters, of breaking through armor plating twenty-one inches thick with its heavy shot, the vessel is furnished with six other breech-loading guns, of six inches calibre, carrying an eighty-pound projectile, and various other small pieces and machine-guns.

SANITARY PLUMBING.[1] — XXXII.

(c) Valve-Outlet Basin.



OUR next type of wash-basin corresponds in principle with the valve water-closet. The outlet is closed by a valve working in a small chamber or receiver, which like the water-closet receiver, is liable to become clogged with sediment. Moreover, the concealed machinery necessary to work the valve, complicates the apparatus, and, like all machinery, especially that which works under dirty water is liable to get out of order.

We have further sub-divided this type into three kinds, *i. e.*, those with (1) chain movement; (2) lever movement; and (3) gravity movement.

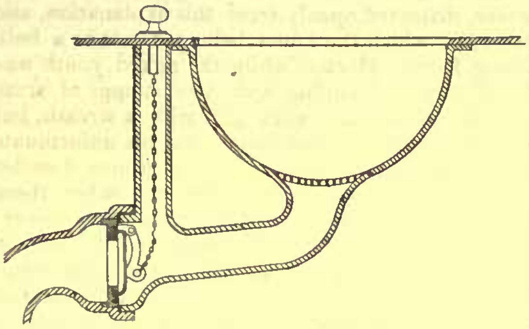


Fig. 247. — Valve-Outlet Basin with Chain Movement.

The first kind is illustrated by Figure 247. We have here the two elongated cesspools described in connection with the preceding type, and open to all the objections of the latter; besides this, we have a third cesspool in the receiver. The overflow passage is not shown in this drawing, though provision for overflow is, of course, as necessary as in any of the preceding examples. A valve arranged as shown here would never work satisfactorily. The slightest impurity adhering to it or its seat, would cause it to leak, and a little roughness or corrosion on the hinge might prevent its closing altogether.

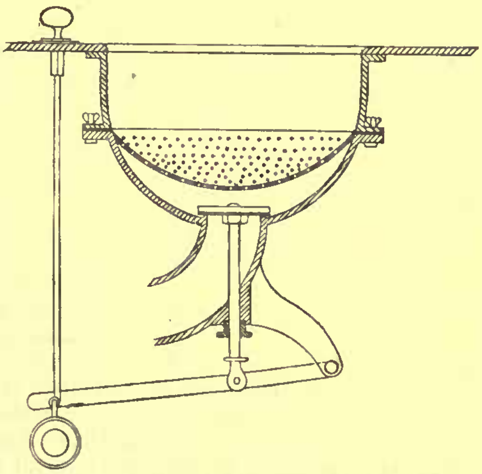


Fig. 248. — Valve-Outlet Basin with Lever Movement.

Figure 248 represents a valve-outlet basin, operated by lever movement. The drawing shows a double bottom, the upper one being perforated throughout its entire extent, and forming an enormous strainer. The valve receiver occupies the whole space between the two basins. The amount of inaccessible fouling surface is here very large and of peculiarly objectionable form, the many perforations and corners being calculated to retain a great deal of filth. The waste water escaping through so many holes would pass without force or scouring effect, and the cleansing of such a strainer would be practically an impossibility. Some overflow passage, not shown in the drawing, would be required.

Figure 249 shows a basin of the same kind with a smaller receiver.

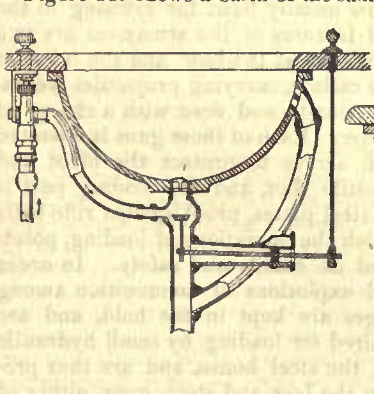


Fig. 249. — Valve-Outlet Basin with Outlet-Supply.

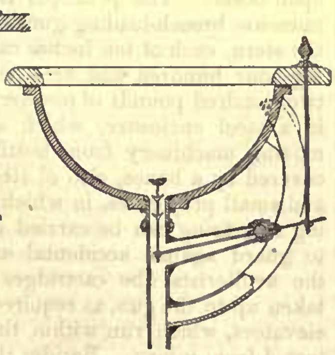
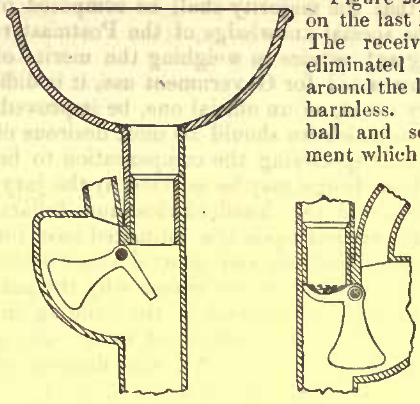


Fig. 250. — Valve-Outlet Basin with Improved Lever Movement.

The supply enters below the strainer. This is objectionable, for several reasons. In case of fluctuation in the water-supply pressure, foul water might be drawn from the basin into the supply pipes in the manner described in connection with water-closets. Moreover, the dirty deposits in the valve receiver would always be mixed with the first clean water entering the basin.



Figs. 251 and 252. — Valve-Outlet Basin with Grevity Movement.

Figure 250 shows an improvement on the last kind of valve-outlet basin. The receiver above the valve is eliminated altogether, and that around the lever arm is comparatively harmless. This arm works with a ball and socket joint, an arrangement which is better than that shown in the previous drawing. For a basin of this type this kind is probably the best and simplest that could be devised.

Figures 251 and 252 give the third subdivision of our valve outlet basin, namely, that in which the valve is operated by the weight of the water falling upon it. Comment on such a device is scarcely necessary, it being sufficiently evident that its action would be extremely unreliable and unsatisfactory. The valve is made flat or cupped on its upper surface. In the latter case water held in the cavity of the valve is supposed to assist in forming a seal.

(d) Plunger-Outlet Basin.

Our plunger-outlet basin corresponds with the plunger water-closet, and has its defects. Like the valve-outlet basin, it has several inaccessible fouling chambers. The type may be subdivided into two styles, namely: (1) that having a solid plunger, and (2) that having a hollow plunger.

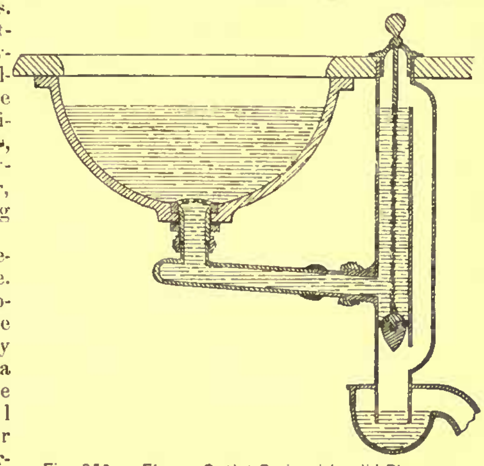


Fig. 253. — Flange-Outlet Basin with solid Plunger.

Figure 253 represents the first style. The plunger is supposed to retain the water in the basin by the friction of a packing-ring of some elastic material against the inner walls of the plunger-chamber. A D-trap appropriately used under the plunger, completes a device which for extent of fouling surface cannot easily be surpassed.

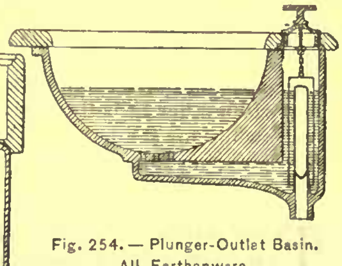


Fig. 254. — Plunger-Outlet Basin. All Earthenware.

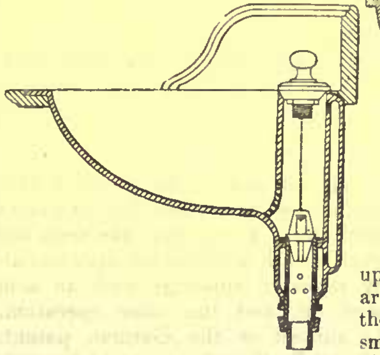


Fig. 255. — Plunger-Outlet Basin with Perpendicular Back.

Figure 254 is an improvement upon the last fixture. There are less fouling surfaces, and the outlet-passages are made of smooth earthenware. The plunger-chamber is made accessible by unscrewing the plate at its top, and the horizontal channel below the strainer is the only part that cannot be reached.

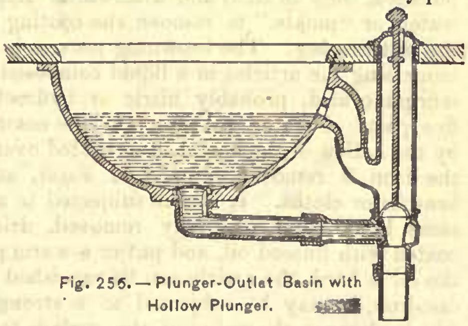


Fig. 256. — Plunger-Outlet Basin with Hollow Plunger.

Figure 255 is a still further improvement, inasmuch as the horizontal chamber is done away with by having a perpendicular back to the bowl. The overflow passage is faulty. It should have been constructed after the principle of the preceding fixture.

Figure 256 represents the second style of plunger-outlet basin, in which the plunger is hollow.

[1] Continued from page 281, No. 468.

(e) *Floating-Plug-Outlet Basin.*

The object of this device is to do away with the special overflow-pipe. The plunger or plug has a hollow vessel at the upper end of its stem, and the receiver is enlarged at this point to give room for it. When the water in the basin approaches the point of overflowing, the plunger is buoyed up by the float (the water seeking its level in the plunger and float chamber), and the outlet is opened, letting the superfluous water in the basin escape.

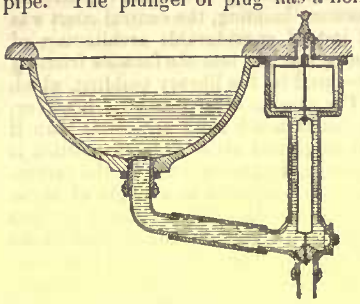


Fig. 257.—Concealed-Stand-pipe Outlet, with Float Overflow.

(f) *Stand-pipe-Outlet Basin.*

The object of this arrangement is the same as the floating-plug in the preceding apparatus. It enables the special overflow-pipe to be dispensed with, the hollow plunger-rod serving instead. Figure 258 shows the stand-pipe as constructed in a metallic chamber, and Figure 259 shows it in an all earthenware chamber.

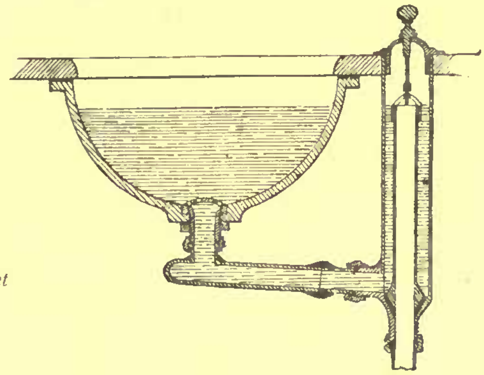


Fig. 258.—Concealed-Stand-pipe Outlet. (Concealed overflow in s. p.)

(g) *Receiver-Outlet Basin.*

The principal object of this device is to obtain a quick discharge. It consists of two basins, one within the other, the inner one pivoted, as shown in Figure 260, in such a manner that it may be revolved by lifting the basin by the projection on the front edge, and its entire contents instantly emptied into the lower basin or receiver. Only half of the receiver is accessible; hence it is liable to become fouled in use.

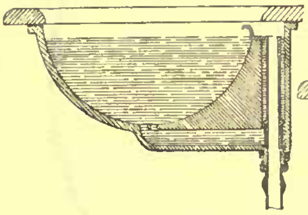


Fig. 259.—Concealed-Stand-pipe Outlet.

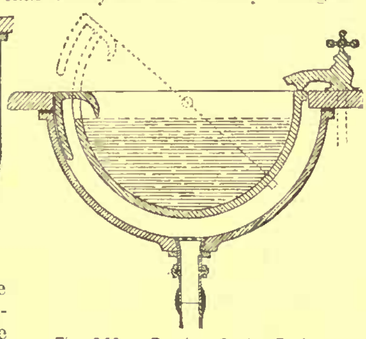


Fig. 260.—Receiver-Outlet Besin.

II. BASINS HAVING ACCESSIBLE OVERFLOW-PASSAGES.

In this class of fixture every part, both of the basin proper and of its fittings and passages, is visible and easily accessible, and kept clean from top to bottom, even as far down as to the interior of the trap itself, without unscrewing or undoing any part. We find only two subdivisions, namely: (*a*) the Funnel-Outlet Basin and (*b*) the Stand-pipe-Outlet Basin.

(a) *Funnel-Outlet Basin.*

Figure 261 illustrates our first subdivision. In general form the arrangement is similar to the one just described, but it has the advantage of enabling the entire surface of the lower basin to be reached for cleansing purposes. The interior of the outlet-pipe may be inspected, and, if desired, periodically cleansed as far down as to the trap. It is intended that the upper basin should be lifted after use, and the waste water emptied into the lower basin or funnel. In case of overflow, the water runs over the edge of the upper basin and falls into the lower, whence it escapes into the waste-pipe. It is evident that, to avoid the trouble of *lifting* the upper basin, it may be provided with lugs or pivots upon which it may be revolved, as in the preceding example. The important matter is that the upper basin be made portable, and the lugs or pivots adjusted in such a manner that they may be lifted with the bowl at any time from their sockets.

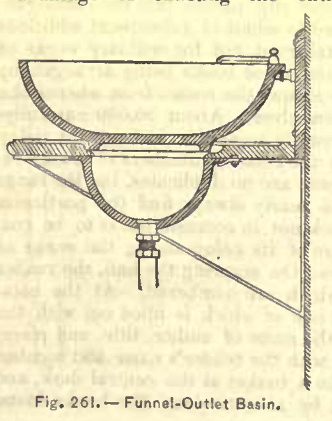


Fig. 261.—Funnel-Outlet Basin.

(b) *Stand-pipe-Outlet Basin.—General Considerations.*

It is not sufficient that every part of our apparatus should be visible and accessible from without, and devoid of all fouling chambers and corners, but it is above all necessary that, combined with the utmost convenience and simplicity of action and economy of construction, it should be so formed as to ensure the *complete automatic scouring of its waste-pipes and trap*, without detriment to the water-seal of the latter.

A suitable enlargement of the basin-outlet is all that is necessary to produce the requisite scouring action; but the force of the outflowing water-column is so great when the pipes are charged full-bore, that it will siphon out and completely destroy the water-seal of an ordinary S-trap, unless it be *fully* ventilated at or very near the crown, and it will dangerously lower it even then. This is the action which we have called "self-siphonage." No injurious effect is produced on the seal of the anti-siphon trap by self-siphonage, but the water is somewhat reduced in the trap below its normal level. It is therefore desirable, and, when S-traps must be used, extremely important that such a basin should be so constructed as to enable it automatically to restore this water, and in the following description it will be seen that this has been accomplished.

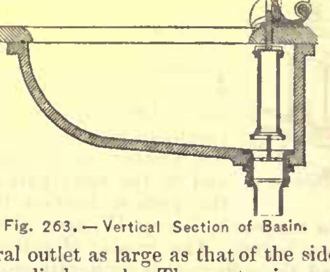
The next important point is to provide for an overflow-passage which shall be both visible and accessible. It is evident that to enable the basin to be emptied by tilting or tipping, as in the last two examples, a double basin or some sort of receiver is required. To avoid the trouble and expense involved by this, we have established as the second datum of our problem that the basin be *fixed* and *single*.

It is important both for convenience and economy that the opening in the marble slab covering our basin should be circular or elliptical. These openings are cut by machinery, and any form other then these requires manual work, and at once increases the cost of manufacture. Moreover, this form of opening occupies the least space on the slab, and presents the most agreeable effect. A third datum in our problem is therefore that the usual round or elliptical form of the opening in the basin-slab be retained.

Finally, as the overflow outlet must be near the top of the basin, some form of passage-way which shall extend from the top to the bottom must be provided, and since this cannot be on the *outside* of a fixed basin without being concealed by the slab, it must be on the *inside*. Hence, as a fourth datum, our overflow must have the general form of a stand-pipe, and to be completely out of the way of the user, it must set in a recess under the slab, at the back of the basin, which must be perpendicular at this point to receive it.

Figure 262 represents the plan of our stand-pipe-overflow basin, designed in accordance with these data. The opening in the marble slab is circular. A smaller circle represents the stand-pipe in a small recess at the rear of the bowl under the slab. The recess is large enough to allow of easy cleansing without moving the stand-pipe; and yet not so large as to injure the appearance of the bowl. Figure 263, shows the apparatus in vertical section. The bottom of the basin pitches slightly from the centre towards the outlet; enough to thoroughly drain off the water at each discharge, and yet not so much but that the last part is retarded until the siphon formed by the main body is broken by the air. The result is a restoration of the water-seal of the trap, in case the trap be of a kind which would in basins of the ordinary form be destroyed by self-siphonage.

Fig. 262.—Plan of the Stand-Pipe-Outlet Basin.



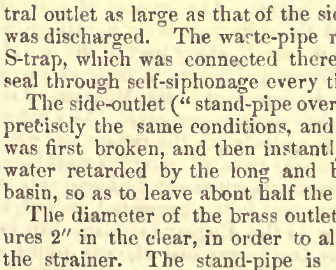


Fig. 263.—Vertical Section of Basin.

For the purpose of thoroughly testing this, a basin with a central outlet as large as that of the side-outlet basin under consideration was discharged. The waste-pipe ran full-bore, and an ordinary $1\frac{1}{2}''$ S-trap, which was connected therewith in the usual manner, lost its seal through self-siphonage every time the discharge was made.

The side-outlet ("stand-pipe overflow") basin was then tested under precisely the same conditions, and with the same S-trap. The seal was first broken, and then instantly partly refilled by the last rills of water retarded by the long and but slightly-inclined bottom of the basin, so as to leave about half the normal depth of seal in the trap.

The diameter of the brass outlet at the bottom of the basin measures 2″ in the clear, in order to allow for the obstruction caused by the strainer. The stand-pipe is raised and lowered by a simple weighted cam, arranged as shown in Figure 264. The cam is pivoted close to the rod which raises the stand-pipe, and its bearing surface has the form of a parabola. Its proportions and arrangement are such as to enable it to raise the stand-pipe without perceptible friction. The weight of the handle, about six ounces, under a leverage of only an inch and a half (the length of the horizontal bar) is sufficient to overbalance the stand-pipe, and hold it raised. When the weight is lifted, the stand-pipe is lowered, and the outlet closed. In this position the weight is directly over the pivot, so that the plug and stand-pipe overbalance the weight and remain closed. Thus a single movement of the hand will open or close the outlet, and cause it to remain in the position in which it is left.

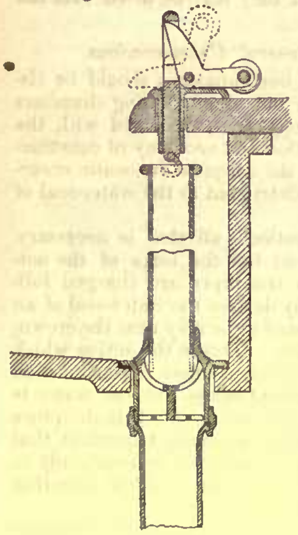


Fig. 264.

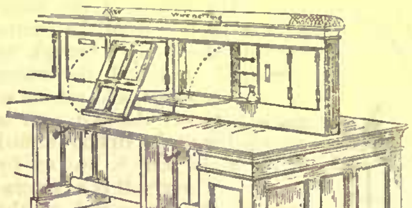
In the drawing, the cam is shown in full line in the position it occupies when the outlet is open, and in dotted line as it appears when closed. The stand-pipe rod passes through, and is guided by a short tube threaded on the lower end, and provided with a nut by which the brass-work is secured to the marble slab. This renders the brass-work adjustable, that is, permits it to be used with slabs of any thickness, the slabs being perforated by a single hole, as is usual, for the chain-post of ordinary basins. The centre of the hole in the slab comes over that of the basin outlet.

In order to ensure the plug on the stand-pipe falling always into its socket, the strainer is attached permanently to the stand-pipe plug, as shown in the drawing. It thus serves as a guide for it, and allows of its being lifted out at pleasure for cleansing purposes. It is thus possible to remove the strainer, and reach the inner surface of the waste-pipe as far down as to the trap itself. Thus we have an apparatus, every part of which, both inside and outside, is visible and accessible without unscrewing or taking down any part of the set fixture.

The stand-pipe with its plug and strainer, may be lifted out by simply unhooking it from the stand-pipe rod. The initial cut shows the appearance of the apparatus in perspective, and Figure 264 gives the details of the brass-work. By the former it will be observed that the recess in the basin and the stand-pipe are covered by the marble, and do not interfere with the general form seen from above. The stand-pipe measures about 4″ in height, and 1¼″ in diameter. Hence, its exterior surface measures 44 square inches. Its superficial area is therefore, not so great as that of the ordinary basin-chain. But while the chain cannot be cleansed on account of its intricate form, the smooth surface of the stand-pipe, on the contrary, can be surrounded and polished by a single movement of a cloth or sponge. Ample room for the scrubbing-cloth is provided between the stand-pipe and the walls of its receiver, so that both may be cleansed without lifting out the former.

Referring now to our classification of requirements for an ideal basin, we find in the basin under consideration all the points satisfied. The discharge is rapid enough to fill the pipes "full-bore," and every part of the apparatus is visible and accessible. Its construction is simple and economical, its operation convenient, and its appearance pleasing.

THE BRITISH MUSEUM AND THE BIBLIOTHEQUE NATIONALE READING-ROOMS.

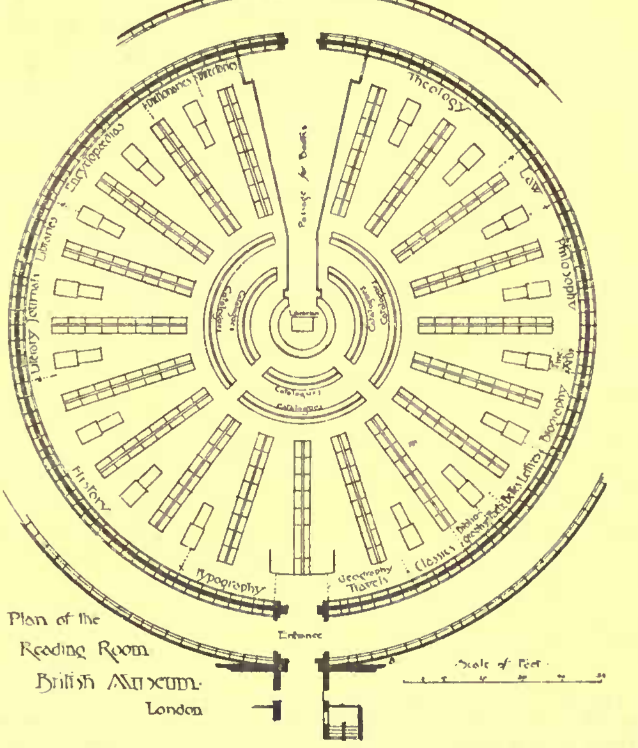


·Reading Desks· ·British Museum·

THE British Museum, from the first days of its existence, included a public library; indeed, the nucleus was formed by the acceptance on the part of the government of the library and collections bequeathed by Sir Hans Sloane in 1753. Numerous other bequests and purchases helped to swell the number of volumes, and in the early part of the present century the king's library was presented to the trustees by George IV, upon which the present museum buildings were begun. The number of printed books is now about 1,300,000, and the collection is constantly growing by reason of purchases made in nearly every part of the world, and by contributions from the British publishers, a copy of every new book being required by law to be deposited in the Museum. The increase is at the rate of about 5,000 volumes per year. As a reference library, the British Museum is undoubtedly the richest and most available of any in the world. Students from all countries meet here, since in certain lines of study the best authorities can be found only in this collection. American works are very fully represented, indeed, it is almost true that any publication in the English language can be found here. The library is entirely free to any one who can secure a recommendation from a householder. Books are not allowed to be taken out of the reading-room, but every facility is afforded for reading, writing or sketching from the books, and by an easily obtained permission tracings can be made over the plates or engravings, a liberty seldom granted in other European libraries.

A plan of the museum was published in the *American Architect*, for October 18th last, at the same time with an account of the system of heating and ventilating the reading-room. By reference to this plan it will be noticed that the space devoted to the storage of books is quite restricted in area. This could hardly have been intentional, as by the original plan of the museum building, the central court was to have been left entirely open; indeed, considerable architecture of a somewhat questionable excellence was put into the façades fronting the court, all of which is now obscured by the library building, which was not completed until 1857. The present arrangement is, however, very compact, and renders the books much more accessible than if the building had been allowed more ground area. The disposition is practically as follows: The circular reading-room occupies the centre. The walls of the room are lined with bookcases to a height of about 30 feet. Immediately outside is a circular passage about 10 feet wide, lined on both sides with cases to the same height as those in the reading-room. Besides this, the rooms at the corners, and across the rear of the building are filled with bookcases as indicated on the general plan, these cases reaching nearly as high as those in the circular gallery. Access is had to the shelves by light iron platforms, continuous through all the book-rooms, and connected with galleries which extend around the inside of the reading-room.

A detailed plan is given herewith, showing the interior arrangement. The reading-room is 140 feet in diameter, and is covered by a very cleverly-designed dome, designed with iron ribs and brick filling. The clear height is 106 feet. The room is lighted by a row of high windows immediately above the bookcases, cutting up into the spring of the dome. There is very little architectural effect aimed at, though the interior is by no means unpleasing. The superintendent's desk is at the centre; around him is a circular desk at which application is made for books and beyond this are the catalogue-stands in



Plan of the Reading Room British Museum London

two rows, with the nineteen rows of readers' desks, radiating to the wall. The catalogue is contained in about 2000 volumes. The alphabetical arrangement is entirely by names of authors, and although there are catalogues of subjects which are more or less complete one often experiences considerable difficulty in finding works on a given subject, unless the names of the authors are known. In the catalogues the date of publication, publisher, size, and full title of each book are given, usually on a printed slip pasted into the catalogue-book, the slips being widely spaced to admit of subsequent additions to the list. All the books are catalogued, but for ordinary works of reference the catalogue is little used, these books being arranged by subjects in the lower tier of cases around the room: from whence the readers are at liberty to help themselves. About 20,000 carefully-selected volumes are thus made readily accessible without any delay or formalities. The plan shows the relative numbers of books relating to the various subjects. There are no duplicates, but the range of authors is so wide that one can nearly always find the particular work desired. If, however, a book not in common use is to be consulted, or if the reader is not sure of its being among the works of reference, it is obtained as follows: On entering the hall, the reader secures one of the desks, all of which are numbered. At the catalogue-stands are printed blanks, one of which is filled out with the press-mark of the book wanted, the name of author, title, and place, and date of publication, together with the reader's name and number of seat. These tickets are put in a basket at the central desk, and at stated intervals are collected by an attendant, the books found and brought into the room by the passage at the back of the librarian, where they are sorted by sections, and distributed to the readers' desks. The books are returned to the central desk, and the blanks surrendered to the readers. This seems expeditious, but practically one frequently has to wait from twenty minutes to an hour-and-a-half, as the number of attendants is limited, and the books are not always sent for at once.

The reading-room has accommodation for 304 persons at the larger rows of desks, and eight at each of the sixteen intermediate tables, or 432 in all. The desks are in double rows, as shown by the initial sketch. Each reader has a space about 4 feet wide. In the upright portion of each desk is a small recess, containing quill and steel pens, ink, and pen-wiper, and on either side are two book-racks, the larger one strong enough for the heaviest folios. Blotting-pads are also provided. Under each desk is a peg and rack for hats. Half of the chairs are upholstered in leather, and half have cane seats and open backs. The floor of the room is covered with linoleum. It will be seen that the readers have very little cause to grumble on the score of accommodation. The sketch of the reading-desk is from memory, but is believed to be substantially correct.

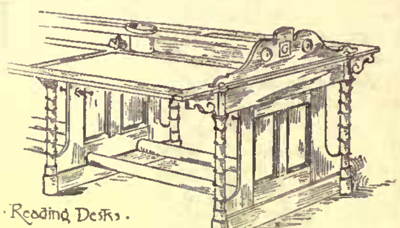
As at present arranged, not only books, but manuscripts, periodicals, and newspapers are supplied to readers from the main room. These departments are shortly to be transferred to the new wing nearly completed, fronting on Montague Street.

The Bibliotheque Nationale at Paris, has a continuous history running back as far as the time of François I, who was the first king to found a public library. He gathered together at Fontainbleau what in those days passed for a very extensive collection, though most of the works were in Latin, and a great many had been copied in Italy especially for him. He also was the first to provide that a copy of every new book published in France, should be deposited in the Bibliotheque du Roy. The library changed quarters repeatedly, being at one time in the Abbey of Clermont, until 1724, when the printed books numbered 40,000, at which time Louis XIV appropriated to its use the palace built by Cardinal Mazarin. The French Government, always ready to foster the liberal arts, has given every possible aid to the library, and the collections have grown until the books alone have attained the enormous number of more than 3,000,000, while the manuscripts number over 150,000. Besides this, the library possesses a collection of some 300,000 maps, charts, etc., and a collection of engravings, including upwards of a 1,000,000 plates. The old Palais Mazarin long ago became too small to hold so much, and has been enlarged on all sides, while still further extensions are contemplated to provide for future growth. The collection of books is increasing at the rate of 50,000 volumes each year.

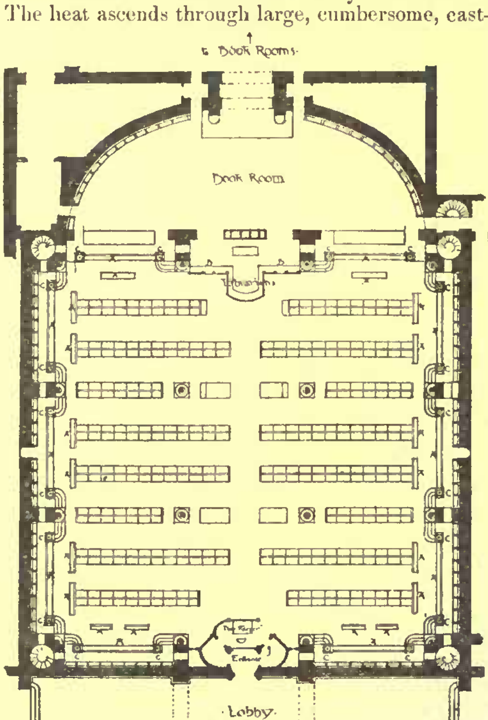
The library proper, as at present open to the public, has two distinct reading-rooms. The first known as the Salle de Lecture, fronting on the rue Colbert, contains some 20,000 volumes, including works of fiction and history, and a limited number of foreign publications. No formalities are necessary to read therein; consequently on stormy days the attendance is apt to be of a rather miscellaneous character. This room has no connection with the main library, and is intended only for transient readers. The second reading-room, known as the Salle de Travail, is reserved for serious research, admission being had only by cards granted by the administration. In the case of foreigners a ministerial recommendation is necessary. The interior of this room is considered one of the masterpieces of the late M. Labrouste, architect. It is about 112 feet square, with a large semi-circular apsis at the rear, and perhaps 60 feet high in the clear. A plan is given herewith. The room is lighted by three large windows across the north end; also, by lights in the ceilings. The interior has a very marked and pleasing architectural effect, which is quite different from the rather utilitarian appearance of the British Museum Reading-Room. The bookcases extend all around to a considerable height, the wall-spaces above them being decorated simply. The construction of the ceiling is very bold: iron girder arches are thrown from column to column, and the square spaces thus formed are covered by pendentive domical surfaces of English glazed terra-cotta, simply banded with iron. The whole of the construction shows inside.

The facilities for consulting the books are not nearly so perfect as those of the British Museum. A Government commission has been spending 50,000 francs a year ever since 1853, in the preparation of a printed catalogue, but thus far only the French works have been catalogued, and it is often difficult to get at even the best known of the foreign works. On one occasion the writer had to wait over three-quarters of an hour before Fergusson's "*History of Architecture*" could be found, and then it was only after the librarian had hunted through two large partial catalogues. In the administration of public affairs, the French are apt to consider ease of manipulation and control by the officials, rather than convenience and readiness of access by the public, and the Bibliotheque Nationale is no exception to the rule. On entering the hall the reader is given a printed slip, or *bulletin personnel*, on which he puts only his name, address, and number of seat. The catalogues and a limited number of lexicons and reference-books are contained in low cases, marked A, on plan, from which the reader is at liberty to help himself. For any other work, a *bulletin de demande* is filled out with the name, address, and desk number of the applicant, and the name of author, title, and date of the book desired. This is given to the librarian who adds any press-mark necessary to find the work, and also notes the name of the book on the reader's *bulletin personnel*. The book is brought to the reader's desk by an attendant, and returned to the desk B by the reader. The *bulletin personnel* is then stamped by the receiver, and given up to the door-keeper, when the reader leaves the hall. No one is allowed to carry from the building any book, portfolio, or package, without a *laissez passer* from the librarian, a regulation which often makes unnecessary trouble, and seems quite vexatious after the entire liberty of the British Museum. Tracing from the books is not allowed.

The readers sit at plain flat tables, two hot-water pipes beneath serving as foot-rests. Each desk has a space for pens, and a bottle of ink. Blotters and book-racks are not furnished. There is a hat-peg underneath. The table-space allotted to each person measures 24″ x 37″. The desks have plain painted oak tops. There are seats for 328 readers, besides 16 places at the smaller detached tables, or 344 in all. The chairs have cane seats and arms. The floor of the room is covered with linoleum. The space for the storage of books is at the back of the reading-room, and in the upper story on the right, extending the whole length of the building. It will be readily seen that the reading-room is not placed centrally with reference to the book-rooms; indeed, in order to get at some of the books the attendant would be obliged to go nearly twice the length of the building, and ascend three flights of stairs. However, in spite of the absence of proper catalogues, the officials seem to know the books pretty thoroughly, and in most cases the service is accomplished nearly as promptly as in the British Museum.

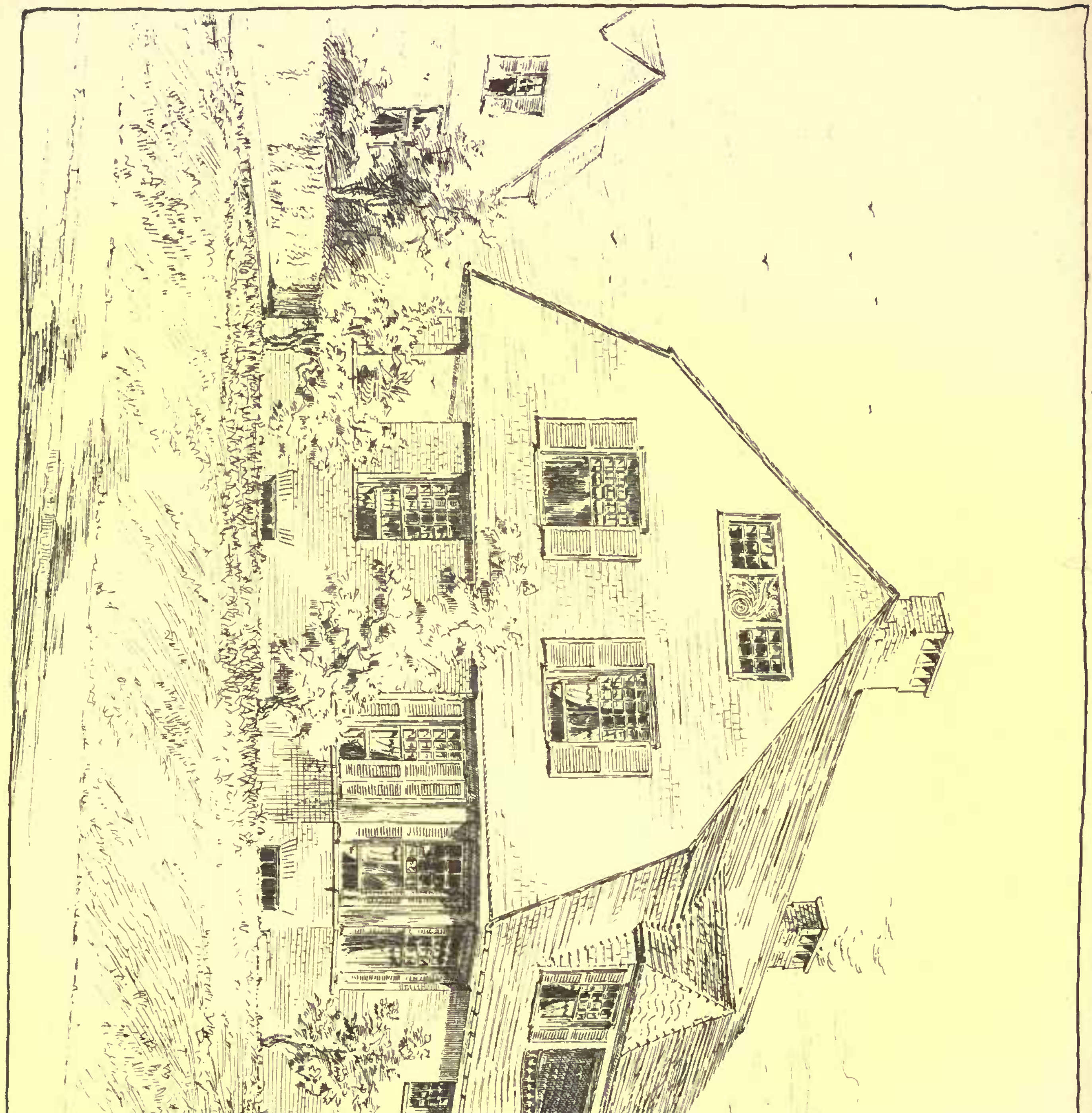

·Reading Desks.·
·Bibliotheque Nationale·

The Salle de Travail is heated by hot-air furnaces in the cellar. The heat ascends through large, cumbersome, cast-iron arrangements like old-fashioned stoves, placed at C in plan. Heat is also supplied by the hot-water pipes under the readers' desks. The ventilation is effected by drawing air from the room through gratings in the base of the cases A, down into the cellar, and to a high shaft, the current being assisted by a gas-flame when necessary. The manuscripts are kept entirely distinct from the printed books, though they are shortly to be lodged in a new hall, recently completed near, and readily accessible from the Salle de Travail. The Salle de Lecture is also to be moved to an inner court, and the collection pertaining thereto considerably enlarged, the intention being to keep the Salle de Travail as free as possible from mere cursory readers. A separate hall is also to be constructed for newspapers and periodicals.



Plan of the Salle de Travail — Bibliotheque Nationale Paris.

Comparing the two libraries, the Bibliotheque Nationale can be said to have the richer and more extensive collection of books, and by far the better-looking reading-room; while the British Museum has a more thoroughly systematized catalogue, by the aid of which every work in the collection is made available to the readers, at the same time that the reading-room is much the better arranged for the convenience of the reading public, and ease of circulation of the books. The 20,000 reference-books, so readily accessible to the student without any delays, add greatly to the efficiency of the library, and the high divisions between the rows of desks help to keep the reader shut off in a measure from any disturbance that may take place in another part of the hall; while in the Bibliotheque Nationale one constantly feels subordinated to the architecture, and it is impossible to get behind any screen, or be in any sense removed from the come-and-go of other readers. Besides, the Bibliotheque National has one main passage, while the British Museum has twenty, and a noise or the passage of an attendant does not attract attention in the latter library. Could the Paris collection be properly catalogued, and a



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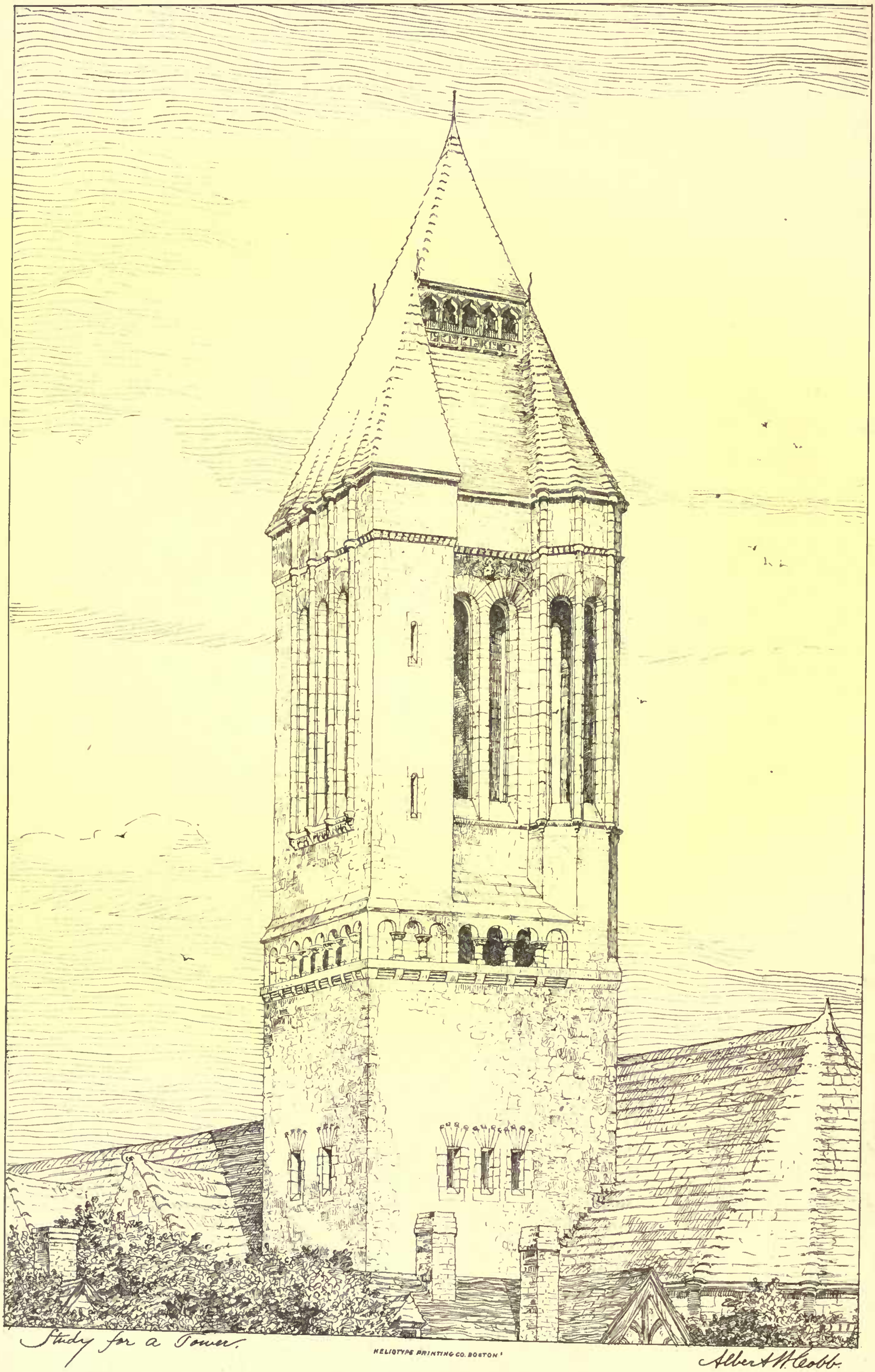

Study for a Tower.

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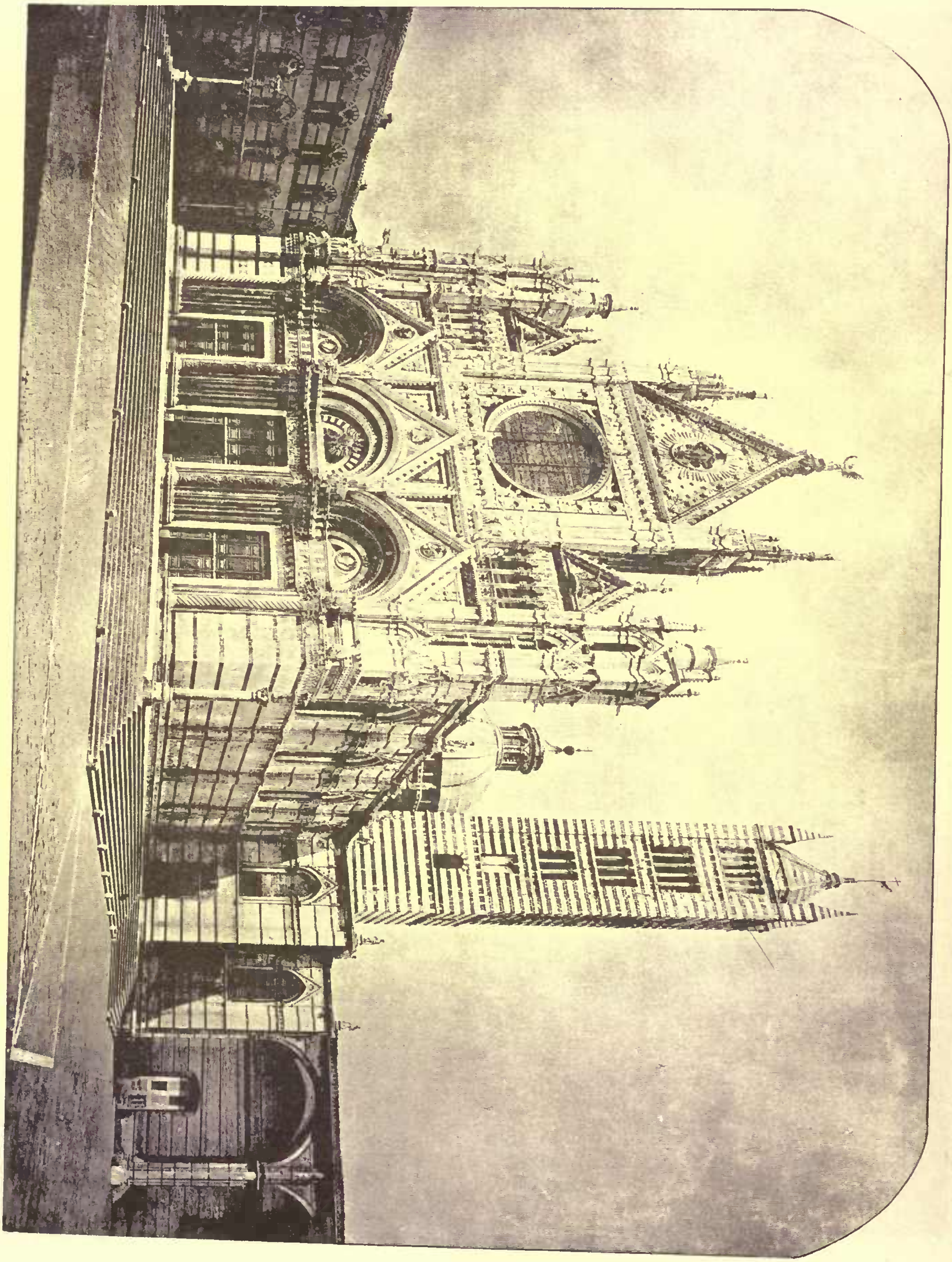
Albert W. Cobb.



Cathedral, Siena, Italy.

PHOTO CAUSTIC HELIOTYPE PRINTING CO. BOSTON.

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Ely Cathedral. - West Front.

Greenman Building
Utica N.Y.

G. Edw. Cooper, Arch.t

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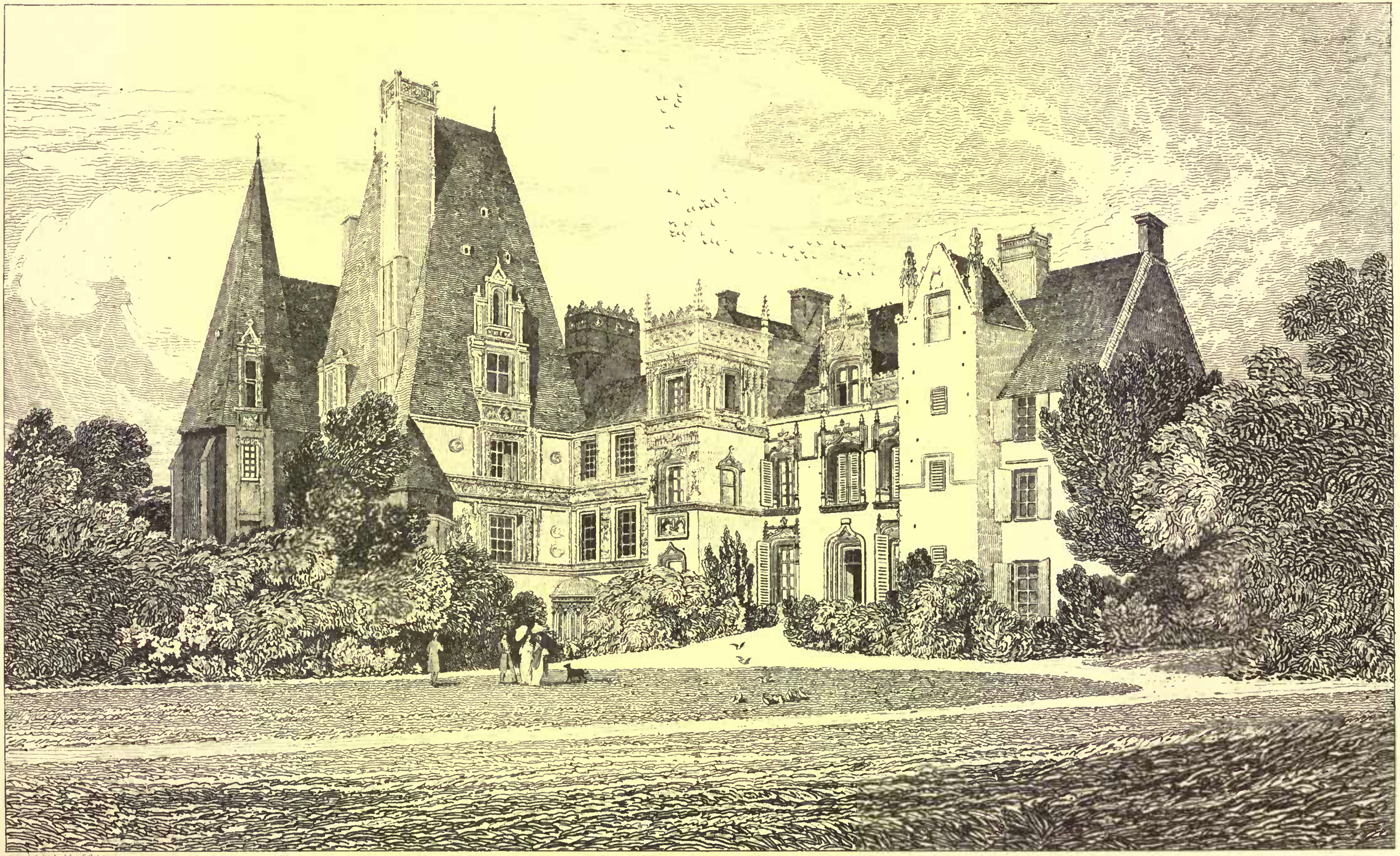

Drawn & Etched by J. S. Cotman.

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CHÂTEAU AT FONTAINE-LE-HENRI, NEAR CAEN.

few of the superfluous regulations dispensed with, or at least simplified, the Bibliotheque Nationale would be the best place in the world to pursue literary investigations; but as the conditions are now, the British Museum seems to offer the most advantages.

C. H. BLACKALL.

A MUSEUM OF GALLIC ANTIQUITIES.

I HAVE just returned from a visit to a museum of which I imagine few of our visitors to Paris know even the name, viz.: that containing the prehistoric collections and special Gallic antiquities at St. Germain-en-Laye, a forty minutes' railway journey from Paris. It is certainly the most admirably arranged museum I have ever seen, and to an archæologist or ethnologist it is certain to be of great interest, out of all proportion to its magnitude, indeed. It begins with the first indications of human existence, — the burnt flints, which possibly denote the introduction of fire, but hardly, I am persuaded, any intentional operation on the stone itself through fire. But the prolonged action of fire as we see it in these examples can be attributed only to its employment for the use of man. From this, through the (in some cases) dubiously fractured flints, the series of the results of palæolithic as well as neolithic art, the gradations are perfectly shown by the finest degrees, finishing in polished stone lances of the most admirable workmanship, and so large and delicate in proportion that they seem to be really rather made for state and display than in view of any definite use. In a separate series are specimens of art works, engraved or carved bone, stone, etc.; then the bronze implements in immense variety, some of them being the most remarkable for quality of metal and beauty of form that I have ever seen; one in particular, a small axe, keeping its fine cutting edge with almost the hardness of tempered steel.

The prehistoric collection contains contributions from all the countries thus far explored, and we can thus compare the beginnings of civilization in various quarters of the earth with those results which are most profitable in general anthropology. But the special value of the museum is, as might be expected, in the Gallic divisions, owing in great measure to the exact notation of all the conditions of discovery, the lack of record of which, on the spot and at the moment, has rendered of little value so many researches crowned with success, which might also have been important but for this failure. In this respect the excavations in France have been generally most admirable, and the series of bronze and polished stone implements catalogued in this museum, with all their circumstances of discovery, give us the outlines of ethnical history with a curious lucidity. Every specimen is marked, and all the finds are so preserved that the relation of each object to the other is clear, and this tabular arrangement, made with all the characteristic French clearness and largeness of generalization, gives the museum its value to the student of archæology. There are, especially from the examination of the tomb series, certain most suggestive and surprising deductions to be made, viz., that the period of copper implements, in France at least, is later than that of bronze, and that every advance in the conditions of civilization, as far as they are shown in these implements, was a sudden one and evidently due to an invasion of some more advanced race; the most perfect implements in every case coming from the earlier interments, while the successive deposits show a technique slowly degenerating in quality of material as well as skill of execution, as if the traditions were gradually becoming obscured and lost, when another advance comes on suddenly with a new invasion.

I have no intention of writing an essay on the development of civilization, but desire simply to call attention to the museum of St. Germain, which, in its system and clearness of grouping, for all purposes of instruction, shames both the Louvre and the British Museum. The series of hatchets, revealing all the minutest changes in form from improvements in the method of mounting, is curiously complete, and those of swords and lances very abundant, the swords showing, in one case which I noticed especially, the adaptation of the forms from those of the small-handed invading race to the uses of the large-handed and technically inferior race, which we may suppose to have finally absorbed and assimilated the invaders, without learning all they brought of arts and manufactures.

There are models of the menhirs and dolmens which were the depositories of the implements in the various modes of interment, and the date of the beginning of that measure of respect for the abandoned body is shown to be of the second period, since no indication of interment, either as burying or burning, is discoverable in the first, all the tombs and tomb-finds belonging to the second and later periods. There are certain curious correspondencies in the ornament and forms of various objects with objects found at Mycenæ by Dr. Schliemann, and these in France are supposed to date from not before the third or fourth century B. C. The engraved tombstones which were found above the graves at Mycenæ are very like similar stones of Gallic inhumations, and there are bronze swords inlaid with iron, which are apparently the precursors of those found in the tombs at Mycenæ.

The museum follows French civilization down to the Carlovingian epoch. M. Mortillet, the director, gave me a curious instance of the impositions which are inflicted on the museums by the dealers in antiquities, in the history of a celebrated Roman bronze horn, of admirable preservation apparently, and of the form known from the ancient bas-reliefs, not unlike the French *cor de chasse.* This was sold to the late emperor by Castellani, and given to the museum as an inestimable and unique treasure, and kept as such until some time since, when, in moving it, it fell to the floor, and, breaking in many pieces, was seen to be an ingenious falsification, made up of pieces of various bronze instruments and implements. — *W. G. Stillman in the N. Y. Evening Post.*

THE ILLUSTRATIONS.

CHATEAU OF FONTAINE-LE-HENRI.[1]

THE château is a noble building, and a very characteristic specimen of the residence of the French nobility, during the latter part of the fifteenth century, at which period there is no doubt of its having been erected, although no records whatever are left upon the subject.

Fontaine-le-Henri was then still in the possession of the family of Harcourt, whose fortune and consequence might naturally be expected to give rise to a similar building. As compared to the mansions of the English nobility, the château at Fontaine-le-Henri may be advantageously viewed in conjunction with Longleat, in Wiltshire, the noble seat of the Marquess of Bath. The erection of the latter was not commenced till 1567, thus leaving an interval of at least a century between them; a period, probably, much the same as may be presumed from other documents to have intervened between the introduction of the Italian style of architecture in France, and in England. Longleat was built by John of Padua, who is stated by Mr. Britton, "to have been an architect of some note at the time; as is evinced by his being termed *Devizor of his Majesty's buildings*, and by the grant made by Henry VIII, and renewed in the third year of Edward VI." Fontaine-le-Henri was also the production of trans-alpine architects. Both of these bear decided marks of the nation to which they owe their origin; but in the English mansion, the Italian features are most decidedly enounced; while, in the French, they are strikingly modified by the peculiarities of their adopted country.

ELY CATHEDRAL, ENGLAND. — WEST FRONT.

THE foundation of the existing cathedral was laid between 1082–1094 on the site of the Convent of St. Etheldreda, which had been destroyed by the Northmen. The different parts of the building were built at the following dates: —

1174–1189. *Norman.* — The building finished as far as the west end, and the tower nearly to its summit.

1198–1215. The Galilee or western porch is built.

1235–1254. The Norman choir is pulled down and rebuilt; the four eastern bays are now in Early English, and the three western bays in Decorated work, built 1338–1362, after the fall of the centre tower.

1332. The central tower (Norman) falls, and work is immediately begun on the present octagon, which is finished in 1342. The lantern is of wood.

1321–1349. *Decorated.* — The Lady-chapel is built.

The cathedral originally had western transepts, but the northern one of these fell at an unknown date, caused, possibly, by the building of the upper stories of the great western tower.

The lower (Norman) part of this western tower was built 1174–1189. The middle (Early English) stages were built 1189–1198. The octagon and its turret buttresses are Decorated. The original crowning spire has never been replaced.

The building has been continually in the hands of the restorer, one of the latest of these being Sir G. G. Scott.

Measured from the exterior of the west porch to the outer face of the eastern buttresses, Ely Cathedral is the longest Gothic church in Europe.

THE CATHEDRAL, SIENA, ITALY.

THE Cathedral at Siena is one of the most complete and interesting examples of Italian Gothic architecture, and is somewhat earlier in date than the Cathedral at Orvieto, with which it is so often associated in description: It was begun in 1243, from designs by Giovanni Pisano, and was completed by Agostino and Agnolo, Sienese sculptors and architects. The dome is of a rather unusual form, being hexagonal on plan.

HOUSE OF JOHN CALVIN STEVENS, ARCHITECT, PORTLAND, ME.

STUDY FOR A CHURCH TOWER, BY MR. A. W. COBB.

[1] From Cotman's "*Antiquities of Normandy.*"

PROPOSED BILL DEFINING THE DUTIES OF THE SUPERVISING ARCHITECT.[1]

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled: —

SECTION 1. That there shall be in the Department of the Treasury a Supervising Architect, who shall have charge of the construction, repair, and furnishing of all public buildings which have been or may be erected under the direction of the Treasury Department, under the general direction of the Secretary of the Treasury; and he shall be an architect of acknowledged good standing in his profession. He shall be appointed by the President, by and with the advice and consent of the Senate, and shall hold his office for the term of four years, unless sooner removed by the President; and he shall have a salary of five thousand dollars a year, and his actual expenses when travelling on the business of his office.

SEC. 2. That there shall also be an Assistant Supervising Architect, who shall be appointed by the Secretary of the Treasury, who shall receive an annual salary of three thousand dollars, and who shall also act as chief clerk and perform such other duties as the Supervising Architect may direct.

SEC. 3. That there shall be also the following clerks and employés in the Supervising Architect's office: one principal clerk, at an annual salary of two thousand dollars; photographer, at two thousand dollars; two clerks of class three; three clerks of class one; one clerk, at nine hundred dollars; and one messenger, at seven hundred and twenty dollars; and as many draughtsmen and copyists as are necessary for the work of the office.

SEC. 4. That plans and designs for buildings, or additions to buildings, costing fifty thousand dollars or over, shall be obtained by open and general competition by architects of the country who are engaged in the practice of their profession. If the cost of the building or addition is less than fifty thousand dollars, the designs shall be prepared in the Supervising Architect's office. Competitors shall send their plans to the Supervising Architect by mail, who shall place them, unopened, before a Board composed of the Postmaster-General, Attorney-General, the Chief Engineer of the Army, the Supervising Architect, and one architect appointed by the President, who shall be of good standing in his profession and of not less than ten years' active practice, and who shall not be a competitor nor interested in any way whatever in any plan submitted. Said architect shall receive a compensation of twenty dollars a day while employed on the Board, with his actual travelling expenses. Said Board shall meet in Washington City on the first Monday of April, eighteen hundred and eighty-five, and, after choosing a President and Secretary, shall prepare such rules governing the competition as to them shall seem proper.

SEC. 5. That neither the Supervising Architect nor any one employed in his office shall send any plans before said Board. The names of the designers shall in all cases be withheld, and the plan of any one who shall cause it to be known that he is a competitor shall not be considered. The competition must be strictly impartial, and that plan selected which the Board deems the best, unless the Board shall conclude that no plan submitted is worthy of being adopted.

SEC. 6. That said Board shall meet at the call of the President thereof, and consider the plans which are properly before them in pursuance of their advertisement. That plan which seems to be best suited for the building to be erected shall be adopted, if found worthy, the Board having first ascertained that the plan proposed can be executed within the limit fixed by law. The successful competitor shall give bond in such sum as may be required by the Board, conditioned that he shall prepare all plans, working-drawings, and specifications of said public building, in duplicate (one set of which shall be filed in the Supervising Architect's office), within the time fixed by the Board. He shall receive a compensation of three per centum of the estimated cost of the building when the same does not exceed two hundred thousand dollars, two per centum on the estimated cost when the same exceeds two hundred thousand dollars and is less than five hundred thousand dollars; one and one-half per centum on the estimated cost when the same exceeds five hundred thousand dollars and is less than one million dollars, one and one-quarter per centum of the estimated cost when the same exceeds one million dollars and is less than two million dollars; and one per centum of the estimated cost when the same exceeds two million dollars, payable when the working-drawings are delivered to the Supervising Architect. The Board may award not exceeding six prizes to meritorious designs, amounting in the aggregate to not more than one per centum of the cost of said building if the estimated cost is one hundred thousand dollars or less, three-quarters of one per centum if the cost is over one hundred thousand dollars and less than five hundred thousand dollars, and one-half of one per centum if the cost is more than five hundred thousand dollars. If the successful competitor shall fail to furnish to the Supervising Architect the plans, working-drawings, and specifications within the time appointed, his bond shall be forfeited, and the Board may adopt the second-best plan in competition for said building; or if such plan is not of sufficient merit, in the opinion of the Board, or in case no suitable plan is presented, the Board shall again, by public advertisement as provided for in the next section, request architects to present plans in competition for said building; and if the Board fails to obtain a plan after advertising a second time, the Supervising Architect shall be required to prepare plans for said building, under the limit fixed by law as to the cost thereof.

SEC. 7. That when any public building is ordered to be erected, or additions ordered to those already erected, the cost of which shall exceed fifty thousand dollars, the President of said Board shall, by public advertisement in three newspapers, one in the place where the building is to be erected, one representing the interests of the architects of the United States, and one to be selected by the President of the Board, for three successive weeks, the last publication to be at least one month previous to the meeting of the Board to select plans for said building or addition, request competition by the architects of the country, under the rules adopted by the Board, which rules shall be set forth in the advertisement. Said advertisement shall also state the limit of cost fixed by law for the erection of the building for which the plans advertised for are to be made, with the statement that no plan will be considered the cost of the execution of which will not come within the limits fixed by law. If several buildings are to be erected, the advertisement for each shall be published at such time as to enable the Board to have the plans for all before them at the same session.

SEC. 8. That when a plan for the erection of any public building has been selected, the work shall be carried on by the Supervising Architect; and no changes, alterations, omissions, or additions to the accepted plan shall be made or permitted except by the authority of the Secretary of the Treasury, and he shall only order such changes after the designer of such plan has had an opportunity to be heard upon such proposed changes, alterations, omissions or additions. But no change shall be made until the cost of making the same shall have been ascertained; and if it shall affect any contract, the increased cost, if any, shall be agreed upon by the contractor and the Supervising Architect before such change is ordered: *Provided,* That in no case shall the cost of the change increase the cost of the building beyond the limit fixed by law. The architect designing the plans of said building, or some competent architect appointed and paid by him, shall frequently visit said building, and report to the Supervising Architect if the plans and specifications are being complied with in its erection, and if the material and workmanship are in accordance with what they were required to be. Such reports shall be filed with the Supervising Architect, who, in case they show that the work is not being done according to the plans and specifications, or that the material or workmanship is not according to contract, shall investigate the matters complained of, and, if the statements are found to be true, shall take such measures as are necessary to have the defective portions of the work remedied, and to prevent departures from the plans and specifications in the future. The architect designing the plan of the building shall receive as compensation for such supervision one per centum of the cost of said building, to be paid at such times as may be agreed upon, as the work progresses.

SEC. 9. That the Supervising Architect shall appoint as many superintendents as may be necessary to take charge of the erection and repair of the several public buildings, who shall have a practical knowledge of the construction of buildings. The superintendents shall each receive an annual salary of two thousand five hundred dollars, and shall give bond in such sum as the Secretary of the Treasury shall approve. Each superintendent shall appoint one clerk, at one thousand dollars a year salary, and, if the building shall cost over two hundred thousand dollars, one inspector of material, who shall receive five dollars a day while employed, subject to the approval of the Supervising Architect. The superintendent shall see that each building he has charge of shall be erected according to the plans and specifications furnished by the architect of the building, and that the material is such as the contractors have agreed to supply, and that the workmanship is the very best; and he shall perform such other duties as may be assigned him by the Supervising Architect.

SEC. 10. That the Supervising Architect shall report annually to the Secretary of the Treasury all the work of his office up to and including September thirtieth; and he shall give a list of all buildings under his charge, the amount expended upon each during the year and the total amount of such expenditures, the cost of each building, the cost of the site, the cost of the superintendence of each building, the cost of repairs on each building for the preceding year, and the total cost of site, building and repairs, the names of all persons employed by him in the erection or repair of public buildings, the amount paid each during the year, the rate of salary paid, and the time each was employed. He shall also report the names of places from which applications have been made for the erection of public buildings, the probable cost of a public building at each of said places, including site, grading, fencing, and furnishing, together with the amount paid for rents at said places, the number of persons employed in the public service, the amount of the public revenues and the sources from which they are derived, the expenses of collecting the same, the population and rate of increase of same during the previous ten years, and such other information as may be a guide to Congress in determining if a public building may be erected at any of said places.

SEC. 11. That any one feeling aggrieved at the decision of the Supervising Architect may appeal to the Secretary of the Treasury, whose decision shall be final.

SEC. 12. That the Supervising Architect shall cause all building materials sent to him for that purpose from any part of the United States to be examined and thoroughly tested, and a statement of the result be given to the persons sending them, free of charge. Such statements shall be published in his annual report, and a sample of such materials shall be deposited in a collection in his office for the benefit of the public.

SEC. 13. That whenever plans and estimates or specifications shall be prepared and approved for the erection of any building for the United States, it shall be the duty of the Supervising Architect to advertise once a week for at least six weeks in one or more of the principal papers published in the place where such building is to be erected, and in such other papers or journals as he may select, for sealed proposals for the work, and materials necessary in the erection of said building. Said advertisement may be for any part or kind of the work or materials, and shall refer bidders to the Supervising Architect's Office for copies of the plans and specifications for said work and materials. All such proposals shall be kept sealed until the day specified in such advertisement for opening the same, when they shall be opened by or under the direction of the Supervising Architect. The person offering to do the work, or furnish the materials described in the advertisement for the lowest sum bid, and giving satisfactory security for the performance of the contract, under a forfeiture, to be fixed by the Secretary of the Treasury, at least fifty per centum above the contract price, shall be awarded the contract for the work and material so advertised: *Provided,*

[1] A bill introduced in the House of Representatives, December 4, 1884, by Mr. Stockslager, defining the duties of the Supervising Architect, and for other purposes. Read twice, referred to the Committee on Public Buildings and Grounds, and ordered to be printed.

That the Supervising Architect may reject any bid which he may deem excessive, or which he may for other cause deem contrary to the best interest of the Government: *And also provided*, That the Supervising Architect may have the foundation of any public building laid by day's work, if he thinks a better foundation may be secured thereby.

SEC. 14. That every advertisement under the preceding section shall specify a reasonable time within which the work or materials therein mentioned shall be done or furnished; and every proposal for work or materials as hereinbefore provided, shall be accompanied by a written undertaking or guarantee, signed by one or more responsible persons, to the effect that he or they undertake that the bidder, if his bid be accepted, will, at such time as may be prescribed by the Supervising Architect, give bond, with good and sufficient sureties, said bond to be approved by the Secretary of the Treasury, to do said work or furnish said materials according to the plans and specifications furnished, and within the time named in said advertisement. No proposal shall be considered unless accompanied by such guarantee. If, after the acceptance of a proposal, and a notification in writing to the bidder of its acceptance, he fail to give bond within the time prescribed by the Secretary of the Treasury, the Supervising Architect shall proceed to re-advertise for proposals for said work or materials as hereinbefore provided; and after contracting with some other person as set forth in this and the preceding section, the Secretary of the Treasury shall forthwith cause the excess, if any, of the amount contracted to be paid by the Government over and above the amount of the first bid to be charged up against the first bidder and his guarantor or guarantors; and the same may be recovered by the United States for the use of the fund appropriated for the erection of said building, by action of debt against either or all of such persons.

SEC. 15. That when any proposal for work and materials shall be accepted by the Supervising Architect as hereinbefore provided, the person making such proposal shall, within a time to be prescribed by the Secretary of the Treasury, execute a bond, with two or more solvent sureties, in a sum at least fifty per centum above the amount of the contract price, conditioned that the work and materials shall be as required by the plans and specifications furnished, and that the said building shall be completed within the time named in the advertisement. Before approving and accepting said bond, the Secretary of the Treasury shall be satisfied that the sureties thereon are unquestionably solvent, and the owners in fee of unencumbered real estate to the value of the amount named in the bond as a penalty. In the event of a failure to furnish the work and materials according to the requirements of the bond, the principal and sureties therein shall be liable for the penalty of said bond as liquidated damages, to be sued for in the name of the United States.

SEC. 16. That all proposals provided for in this act shall be preserved and recorded in the Supervising Architect Office; and the Supervising Architect, in his annual report, shall give the amount of each bid, and the persons making the same, and shall state what bids have been accepted.

SEC. 17. That all repairs or improvements upon any public building amounting in cost, according to the estimates, to more than five thousand dollars, shall be subject to the provisions of this act, and the same proceedings shall be had with reference thereto, as are herein required for the erection of an entire building.

SEC. 18. That the members of the Board provided for in this act for the purpose of selecting plans for the several buildings to be erected by the United States who shall approve of any plan before it has been ascertained that the cost of the execution of said plan will not exceed the limit of cost fixed by law, and any competing architect who shall prepare a plan for a public building, knowing that the cost of executing said plan shall be greater than the limit of cost of said building fixed by law, and any computer employed by said Board who shall falsely estimate the cost of executing any plan so as to make it appear to said Board that such cost will be less than the computations make it to be, so that the cost of said building will be greater than the limit fixed by law, shall, on conviction thereof, before any court of the United States in whose jurisdiction the said building is located, or in the District of Columbia, where said plan was approved, or the false computation made, shall be fined in any sum not less than five hundred dollars, to which imprisonment may be added, in the discretion of the court. Any person so offending may be indicted within two years after said building is completed. And it shall be the duty of the Supervising Architect to cause all offenses against this act to be reported to the Department of Justice as soon as the offense is discovered, that the parties so offending may be prosecuted.

SEC. 19. That any superintendent, clerk, inspector, or other employee of the Bureau of Public Buildings who shall neglect the performance of any duty assigned him by the Supervising Architect, by which the cost of the erection of the building upon which he is employed shall be increased, or who shall receive any material inferior to or different from that called for by the plans and specifications, or who shall permit the plans or specifications or the building to be departed from, shall, on conviction thereof, be fined in any sum not less than five hundred dollars.

SEC. 20. That any contractor who shall construct the building on which he is engaged in a different way from that prescribed by the plans and specifications, or who shall supply different or inferior material from that called for in the specifications, or who shall cause the work to be done in a manner different from that called for in the specifications or in his contract, shall, on conviction of such offense, be fined in any sum not less than five hundred dollars.

SEC. 21. That the Supervising Architect shall be held responsible for the proper enforcement of this act; and if he shall neglect any duties which he is required by law to perform, or if he shall permit the limit of cost of any public building to be exceeded, or if he shall permit any contract for the erection or repair of any public building to be violated by supplying inferior or different material, or by permitting the work to be done poorly, or different from that called for in the plans and specifications, or by changing said building from the plans and specifications accepted by the Board, except as in this act provided, or if he cause any work to be done on any public building contrary to any of the provisions of this act, he shall, on conviction thereof, be fined in any sum not less than five hundred dollars, to which imprisonment for not more than two years may be added, in the discretion of the court.

LUMINOUS PAINT.

BALTIMORE, MD., December 6, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sir, — Can you give me any information about the *luminous paint*, of which there was an account in one of your papers some time ago? Can it be used for lighting a room sufficiently to move around in when it is dangerous to use a light? Who are the manufacturers? Yours truly, A. H. B.

[LUMINOUS paint is used in England for lighting — to a degree — powder-magazines, and we suppose it might be used safely in similarly dangerous situations. As the luminous quality of the paint must be refreshed at intervals by exposure to the direct sunlight, the illuminating surfaces must be movable, so that they can be exposed to the sun out of doors. Luminous paint can probably be obtained of any large general dealer in paints and colors in Boston or New York, or from the general agents, Messrs. Ihlee & Horne, 31 Aldermanbury, E. C., London. — EDS. AMERICAN ARCHITECT.]

ADULTERATED PAINTS AND OILS.

NEWARK, N. J., December 5, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,— Will you please inform me, through the *American Architect* or otherwise, how to detect inferior paint, and of what the same is composed? Also, when mason-work is properly done. I have specified for linseed oil and white lead, and I find the work all spotted. Yours truly, A. CONNELLY.

[THE most common adulterants of white lead are baryta, whiting, chalk, zinc, white-sulphate of lead, etc. To discover the quality of a paint, take equal small quantities of it and of a paint known to be pure, and spread thin on a bit of glass; on holding the glass up to the light it can be discovered whether the suspected paint excludes the light and therefore "covers" as well as the pure article. The cause of the spotted appearance our correspondent complains of is probably due to inferior oil. Oils may be adulterated with fish-oil, cotton-seed oil, resin oil and mineral oil. These, except fish-oil, which can generally be discovered by the fishy odor it gives off on being slightly heated, are not easy to detect: but the fact of adulteration can be determined by pouring a little of the suspected oil and a little pure oil each into separate test-tubes; after these have been brought surely to the same temperature, by resting a sufficient time in the same vessel of tepid water, the contents of one tube is poured into the other. If the suspected oil be pure, it will mix with the pure oil and make no sign; but if it be adulterated, layers will be formed, because of the difference of specific gravities, and will be easily seen through the glass. — EDS. AMERICAN ARCHITECT.]

ARCHITECTURAL IRON-WORK.

NEWPORT, R. I., December 8, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — I have read with interest the article on "Cast-Iron Buildings," taken from the *Architect*, and republished in your journal on December 6th. With the technical and practical details of applying cast or wrought iron to the requirements of architectural or engineering works, I will not attempt to deal in this article; laying aside for the time all questions of adjustings strength to weights, or to the counteracting of tensional and transverse strains.

Iron construction is becoming an ever-increasing necessity in city building. Wide spans must be roofed-in with the minimum of material and the least possible weight. Lofty buildings require columns, beams, and girders of cast or wrought iron, and their designers are constantly engaged in devising such details of construction as shall, while fulfilling all the requirements of good building, render their iron sinews integral parts of a well-defined and pleasing whole.

The era of so-called, iron fronts, resplendent with wreaths, festoons, and grotesques has almost passed away. Solid walls and piers of brick and stone have taken their places in the best city work, and iron has been relegated to its more natural and not less useful sphere. This is to be commended. When the use of iron as a building material first began to claim the attention of architects, Mr. Ruskin spoke of it in the severest terms. In the "*Seven Lamps of Architecture*," he tells us, "It may perhaps be permitted to me to assume that true architecture does not admit iron as a constructive material, and that such works as the cast-iron central spire of Rouen Cathedral, or the iron roofs and pillars of our railway stations, and some of our churches are not architectural at all."

I will here suggest, with all modesty, that much may be said on the other side: At the present day it does not seem probable that Mr. Ruskin would write in the same vein. He adds, "Metals may be used as a *cement*, but not as a support." Such a use of iron is bad in the extreme. Every practical constructor has long since recognized the fact, that as a cement or tie between the jointing of masonry iron is the worst possible material that can be employed; its operation is to disintegrate and separate by its oxidation and expansion, and to destroy rather than support. The spire of Rouen Cathedral may well be anathematized for its incongruous and tasteless design, but not merely because it is built of iron. Thirty years ago, Mr. Ruskin might well declare that iron roofs and pillars were not architecture, but times and methods have alike undergone a change.

We now regard the roof of Westminster Hall, framed of oak (or of chestnut as some authorities maintain), as a signal example of skill and beauty in construction. Spanning a hall sixty-eight feet in width, nothing could be more perfect in conception, or give a greater appearance of security and durability, apart from our knowledge of its age.

We now turn to the iron roof of St. Pancras Railway Station in London, four times the span of Westminster; to the roof of the Grand Central Railway Station in New York, and to many others of like character. These roofs exhibit construction in which simplicity and skilful manipulation have produced results satisfactory to the eye on the score of strength and stability; while the sweeping lines of their gigantic curves fill the mind with the sense of harmony and repose. Are we to deny to such structures the term "true architecture?" Surely, the foundation of truth in architecture is the using of all materials within our reach in such a manner as will bring out their capabilities most effectually for strength, beauty, and economy. It is on such a foundation of truth and applicability that all true architecture has been super-imposed. What can be more opposite at first glance than the pure Greek of the age of Pericles, and the pure Gothic of the thirteenth century? They are, however, equally the development of truth. The Greek used marble, which he could cut into forms of the utmost delicacy and refinement. Under a clear and sunny sky, the most delicate members of his cornices and his shallow cavettos were effective, and a bolder treatment would have been harshly repugnant to our sense of fitness. No less truthful was the Gothic of northern Europe, with its pointed arcuation, built of coarse hard stone, difficult to work. Standing under a cold and cloudy sky, its location as well as the nature of the materials available combined to render necessary, bold and deeply-cut mouldings marked by a strong strong play of light and shade. Can we doubt, when studying by the lamp of reason the genius that wrought these mighty edifices of the south and north, that the men who designed the Parthenon, or reared aloft the nave of Amiens, would have been equally successful in the design of a metallic structure, had they had the means at their disposal, and known the necessity for such edifices, as are to-day required for the complex civilization of this busy nineteenth century? It seems but reasonable to believe that they would have firmly grasped the problem of art-building in metal, particularly, when we recall the exquisite bronzes of the Greeks, and the small works in hammered iron wrought by the smiths of the Middle Ages.

Respectfully, George C. Mason, Jr.

THE BOSTON PUBLIC LIBRARY COMPETITION.

New York, December 13, 1884.

To the Editors of the American Architect: —

Dear Sirs, — As the time has come for some action, direct or indirect, on the part of the competitors for the Public Library, Boston, I must ask your valuable assistance. You know the circumstances, and probably the amount of work called for in the prospectus of the project; you must also see that it is a piece of great discourtesy on the part of the Common Council (whose right or ability to act as adjudicators or assessors I cannot see) to put the question aside, week after week, while they are (to clean off the slate for the year) making up parties to visit the opium-joints of other cities (see Friday's Boston *Herald* Proceedings of Common Council). Would it not be well if you could obtain, privately, from the twenty-one competitors their names, so that some concerted action might be come to, if you cannot do something for us. The sets of drawings ought to be open to inspection, if not for publication. This is a matter concerning the whole profession, outside of party or anything else. I have a vast respect for the American press and its power; I trust you will expend some of yours on this very Common Council of crooked councilors. Yours truly, G. Palmer Graves.

[We have examined this discreditable affair from several points of view and decided that the right-minded members of the Council had their hands fully occupied without our adding to their difficulties by exasperating their opponents by our comments. — Eds. American Architect].

NOTES AND CLIPPINGS.

Salt for Drying Lumber. — The process of drying lumber by surrounding it with common salt is just now attracting attention.—*Exchange.*

Mounting Prints on Muslin. — At a recent meeting of the Rochester Photographic Society, Mr. J. M. Fox gave the following account of his method of mounting prints on cloth. He said: "After trying many experiments in double-mounting on muslin, I have adopted the following method: I prepare several yards of cloth at a time by sizing with starch, and always keep a roll of it on hand ready for use. While damp, the cloth is stretched not too tightly on a frame, and sized plentifully with warm starch paste made rather thin, and spread on evenly. Where large quantities of muslin are used, perhaps tenter bars might be employed to advantage for stretching. When dry-cloth is cut to the size required before mounting, allowance being made for the expansion of the prints, if the starch for mounting be used while warm (which I think is preferable), it should be as stiff as can be conveniently spread on the print, for the reason that it will expand the cloth less and dry quicker. From the moment the first print touches the cloth dispatch is important; therefore both prints are first pasted, one being laid aside ready to be picked up quickly. The first print is rubbed down with a hand roller, which can be done more expeditiously than with the hands. When the second print is properly laid on the side there is less occasion for haste, and rubbing down by hand is preferable; because although the roller does the work perfectly on the first print mounted, it is liable to leave air bubbles in rolling down the second one. To avoid bubbles in the hand rubbing, the strokes should be toward the middle of the print, and not in every direction from the centre. When the mounting is completed, the prints are placed between papers, and covered immediately with several folds of cloth of sufficient weight to keep them in place. To facilitate drying they may be aired after an hour or two, and placed between dry papers, and again covered with the cloth."

The Ages of Trees. — The eminent botanist, De Candolle, set the age of an elm at three hundred and thirty-five years. The ages of some palms have been set down at from six hundred to seven hundred years, that of an olive tree at seven hundred, that of a plane-tree at seven hundred and twenty, of a cedar at eight hundred, of an oak at one thousand five hundred, of a yew at two thousand eight hundred and eighty, and of a baobab tree at five thousand.—*Exchange.*

The Saratoga Monument Bill. — On motion of Mr. Wemple, of New York, the House, by unanimous consent, considered and passed without debate, on December 4, the Senate bill appropriating $40,000 to be expended by the Saratoga Monument Association, in statuary and historical tablets, "within and upon the monument" at Schuylerville, N. Y., commemorative of Burgoyne's surrender. The money is to be paid to the Association upon the certificate and receipt of its president. The bill now goes to the President, and doubtless will receive his approval.—*N. Y. Tribune.*

Improving the Port of Lisbon. — The Portuguese Government is just now issuing proposals of a most extensive scheme for improving the docks of the port of Lisbon. This improvement will take the form of a long quay extending about six miles, which will be furnished with basins of different sizes, with railway swings, swing-bridges, and all the paraphernalia of a first-class commercial port. This quay will extend from the railway station to the bank of Tagus, alongside, to the tower of Belem. The estimate of outlay is between sixteen million and seventeen million dollars. There is no reason why Lisbon should not take, from geographical and other causes, a vastly different position with reference to commercial matters, and there seems to be no good reason why a good deal of trans-Atlantic commerce should not be handled from and in connection with Lisbon.—*Exchange.*

Yellow *vs.* White Pine. — Yellow pine, when first put upon the Chicago market to compete with the white pine, was of choice quality and found a ready sale. Lower freights and an increasing demand have enlarged the business until it is believed that twenty million feet are sold in that market annually. But recently the mistake has been made of sending a poorer quality, and that is carrying coals to Newcastle. Chicago, as the great centre of the white-pine trade, the main characteristic of which, owing to the depleted condition of the forests is the excessive percentage of low-grade stuff, is the last place in the world to which a prudent man will send any but the best stock he has, especially when he has to freight so far as from the South. The chief uses for which yellow pine is in demand are for flooring, for the sills and plates of railroad cars, and for inside finishing. Its great breaking strength — said to be equal, when of good quality, to that of the best white ash or oak, while many give it even higher rank—makes it valuable for car work, for bridge building, and for all other work where resistance to transverse strain is required. When "quarter-sawed," it is perhaps the best wood for floors. It does not discolor and does not stain deeply, and can therefore be kept clean and handsome without the expense of paint. As an inside finishing material it is likely to gain in favor the more it is used, and until the yellow-pine forests have deteriorated in the percentage of quality, the first and second grades can be sold in any Northern market from ten to twenty dollars per thousand cheaper than white pine. It is clear, however, that since the yellow-pine has to pay ten dollars, and the white not more than two dollars to Chicago, and to other leading northern markets in proportion, it is folly for the southern mill-men, to send poor stuff. Every northern wholesale dealer will, until white pine is practically gone, have more of such material to handle than he will know what to do with. — *N. Y. Evening Post.*

Modern Indian Carving at South Kensington. — In one of the roughly-fenced inclosures in front of the South Kensington Museum there are now lying the *disjecta membra* of a very interesting work of modern art, which on every account deserves very different treatment. These are the ponderous carved stones of a gateway executed in the Hindoo style, by modern Hindoo workmen, for the recent Calcutta Exhibition, at the cost of the Maharajah Scindia of Gwalior, and subsequently sent over by him as a gift to the South Kensington Museum. The idea of encouraging modern native workmen to execute a work in emulation of their ancestors, originated, we believe, with Major J. B. Keith, who was commissioned by Sir Lepel Griffin to look after the work. Having been engaged in the work of conserving the ancient monuments of Central India, it occurred to Major Keith to give the work a practical significance, as showing that the descendants of those who had executed the massive carved gateways of the Gwalior district retained something of the same cunning. The native art-workmen threw themselves into the work with enthusiasm, and executed it in the space of six months, a very short period, considering the massive character and the elaboration of the work. The arch (so-called) alone is a solid piece of eight tons' weight, the spandrels and jambs being covered with delicate carving. Well, this piece of work, executed by the men of our great Indian dependency as an example of their skill, presented to our national museum by an Indian dignitary, has been for some months lying, in pieces swathed in hay bands, in a back-yard, as one may say, of the South Kensington Museum. The arch-shaped door-head is set up to see how it looks, apparently, and it seems that a considerable number of the bud-like pendants of the soffit have been knocked off in transit. The jamb-columns and capitals are uncovered, lying on the ground, and show beautiful workmanship. The whole thing would be of the highest interest, and it is left lying on the ground, like another Burlington Colonnade business, because the authorities cannot make up their minds where to put it. Is this creditable? — *The Builder.*

GELATINE EDITION.

During the year 1885 a series of Gelatine Prints, (Heliotypes) photographed from the natural object, will be published in the AMERICAN ARCHITECT AND BUILDING NEWS.

These gelatine prints will be issued once a month to those subscribers only who will pay a dollar extra for the twelve prints.

SUBSCRIPTION PRICES.

[IN ADVANCE.]

REGULAR EDITION: — *$6.00 per year; $3.50 per half year.*

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IMPORTANT NOTICES.

It will greatly simplify our book-keeping and prevent future complaint, if those of our present subscribers who (having already paid to various dates of 1885) wish to receive the gelatine plates will make their remittances cover the *entire* year to January 1, 1886, by remitting at the rate of fifty cents for each remaining month, in addition to the dollar for the gelatine prints.

Example: X. whose subscription naturally would end October 1, 1885, should, if he desires the gelatine edition, remit $2.50 additional — that is, $1.00 for the gelatine prints and fifty cents for each of the remaining months of the year.

Advertisers, whose contracts run through the entire year, receiving the *American Architect* free can secure the gelatine plates by remitting $1.00 for the entire year.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

308,868. Cabinet-Commode. — Quimby S. Backus, Winchendon, Mass.

308,880. Door-Check. — Ernst F. Decker, Albany, N. Y.

308,883-884. Hinge. — Wm. M. Ducker, New York, N. Y.

308,885. Lock. — George M. Eames and Freeland W. Ostrum, Bridgport, Conn.

308,887. Spring-Bolt. — Peter Forg, Somerville, Mass.

308,927. Water-Heater for Stoves, Ranges, etc. — John A. Price, Scranton, Pa.

308,935. Water-Closet and Similar Structures. — Henry C. Weeden, Boston, Mass.

308,936. Guard for Elevator-Shafts. — Charles Whittier, Boston, Mass.

308,938. Cock or Faucet. — William J. Wilson, Chelsea, Mass.

308,947. Rock-Drilling Machine. — Bror F. Bergh, New York, N. Y.

308,964. Fastening for Meeting-Rails of Sashes. — Horace L. Heaton, Indianapolis, Ind.

308,967. Sash-Fastener. — Marcel Joubert, Lawrence, Mass.

308,969. Wrench. — Joseph Lussier, Minneapolis, Minn.

308,973. Calcemine Composition and Method of Preparing the Same. — George A. Marsh, Jr., Sandusky, O.

308,995. Auger-Handle. — Henry Sager, Girardville, Pa.

309,015. Window-Screen. — Henry E. Willer, Milwaukee, Wis.

309,021. Machine for Framing Timber. — Wm. S. Bley, Silver King, Ariz.

309,024. Window Blind or Shutter. — Melancton B. Bristol and Orange A. Page, Oskalooska, Io.

309,030. Portable Dry-Dock or Coffer-Dam. — Frank Cox, Philadelphia, Pa.

309,031. Fire-Escape. — William Craddock, New York, N. Y.

309,037. Brick-Machine. — Charles A. Tarragon, Portland, Oreg.

309,038. Scaffold-Clamp. — Arthur B. Flach, New York, N. Y.

309,039. Hinge. — John P. Foster, Arlington, N. J.

309,059. Shutter-Fastener. — Bernhard Jacob, Selma, Ala.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report fifteen permits have been granted, the more important of which are the following: —

Caroline Kemp, 2 two-st'y brick buildings, s s Elbow Lane, between Green and Warner Sts.

Jas. Thompson, 2 three-st'y brick buildings, square, n s Laurens St., between Park Ave. and Bolton St.

Chas. Gantz, 7 three-st'y brick buildings, s s Preston St., between Ensor and Holbrook Sts.

W. Dashields, 2 two-st'y brick buildings, s s Cross St., e of Battery Ave.

J. G. Bramble, 7 three-st'y brick buildings, w s Patterson Park Ave., between Lombard and Pratt Sts.

John Kearn, Jr., & Co., three-st'y brick warehouse, w s Wicomico St., s of Cross St.

Wm. E. Wood & Co., 10 two-st'y brick buildings, e s Sassafras St., s of Cross St.

Virginius Gaddess, four-st'y brick warehouse, s s Charles St., between Camden & Perry Sts.

Boston.

Building Permits. — *Bradstreet Ave.*, Ward 23, for Jno. Dolan, 2 wooden dwells., 22′ x 30′, pitch; D. McDonald, builder.

Woodman St., near Custer St., Ward 23, for M. Mahan, wooden dwell., 14′ x 18′ and 26′ x 30′, pitch; D. McDonald, builder.

Sims St., cor. Fairview St., Ward 23, for J. P. Pheley, et als., wooden dwell., 24′ x 28′ 9″, pitch; W. S. Mitchell, builder.

Unnamed St., s of Norfolk St., Ward 23, for Winslow Chappell, 2 wooden dwells., 19′ x 24′, pitch.

Clarendon Ave., cor. Kittredge St., Ward 23, for J. Rydstrom, 2 wooden stables, 18′ x 28′, pitch; M. Jones, builder.

Mansfield St., near Cambridge St., Ward 25, for H. Dupee, wooden dwell., 25′ x 33′ 6″, pitch; C. Leake, builder.

Cobden St., near Walnut Ave., Ward 21, for A. R. Todd, dwell., 26′ 2″ x 31′, hip; Thos. Clune, builder.

Unnamed Pl., near Blue Hill Ave., Ward 21, for D. & W. Jamieson, 7 wooden dwells., 20′ x 38′, flat; H. J. Bartlett, builder.

Englewood St., cor. Roxbury Ave., Ward 25, for F. F. Morton, wooden dwell., 25′ x 41′ 6″, pitch; Morton & Chesley, builders.

East Fourth St., No. 585, Ward 14, for L. Locke, wooden dwell., 22′ 6″ x 38′, mansard; L. Locke; builder.

Elm St., No. 29, Ward 1, for E. Russel, wooden dwell., 22′ x 31′, pitch; G. Dempsey, builder.

Unnamed Pl., near Tremont St., Ward 25, for P. Carr, 6 wooden dwells., 18′ x 28′, hip; Lamson & William, builder.

Call St., near Childs St., Ward 23, for Jas. Smith, wooden dwell., 22′ x 32′, flat; J. Keefe, builder.

Paris St., cor. Marion St., Ward 2, for R. Pinckham, wooden mechanical building, 15′ x 20′, pitch; R. Pinckham, builder.

Nelson Pl., near Norfolk St., Ward 24, for A. J. Brennan, wooden dwell., 15′ x 17′ and 28′ x 32′, mansard; A. J. Brennan, builder.

Park St., near Washington St., for Wm. Hannam, brick green-house, 10′ x 12′ 6″, pitch; Allen McNabb, builder.

Halborn St., near Blue Hill Ave., Ward 21, for C. Newhall, 2 brick apartment-houses, 42′ x 63′, flat; Geldert & White, builders.

Brooklyn.

Building Permits. — *Bleecker St.*, n s, 125′ e Evergreen Ave., two-st'y frame dwell., with one-st'y extension, tin roof; cost, $3,000; owner, John E. Wade, 104 Kosciusko St.; architect, Frank Holmberg.

Broadway, Nos. 710 *and* 712, w s, 175′ s Lewis Ave., 2 four-st'y frame tenements and stores, tin roofs; cost, each, $6,000; owner, Ludwig Levy, 113 Ewen St.; architect, Th. Engelhardt; builders, M. Ruhn and Frank Herte.

Bainbridge St., n s, 100′ w Lewis Ave., 8 three-st'y and basement brown-stone dwells., felt and gravel roofs, cost, each, $5,000; owner and architect, John C. Bushfield.

Hart St., s s, 150′ w Sumner Ave., 5 two-st'y brick dwells., tin roofs, wooden cornices; cost, each, $4,000; owner and builder, Henry Grasman, 142 Marcy Ave.; architect, Frank Holmberg.

Quincy St., s s, 19′ 6″ e Patchen Ave., 5 two-st'y brick dwells., tin roofs; cost, each, $3,000; owner and carpenter, Wm. Godfrey, 548 Monroe St.; mason, Wm. Gibson.

Quincy St., s e cor. Patchen Ave., three-st'y brick dwell., tin roof; cost, $6,000; owner, carpenter and mason, same as last.

Broadway, e s, 75′ s Ellery St., three-st'y frame store and dwell., tin roof; cost, $4,500; owner, C. Loesser, Broadway, near Seventh St.; owner, John Platte; builder, John Rueger.

Marion St., s e cor. Ralph Ave., 3 buildings, three-st'y frame store and dwell., and 2 two-st'y frame dwells., tin roofs; cost, $4,000 and $3,000 each; owner, Michael Sullivan, 482 Hancock St.; architect, Amzi Hill.

Berkeley Pl., *No.* 18, s s, 142′ e Fifth Ave., 2 two st'y brick dwells., gravel roofs; cost, $3,500; owner, George Gein, 336 Pearl St.

Van Buren St., s s, 244′ e Broadway, 4 two-st'y and basement frame dwells., tin roofs; cost, each, $2,600; owner, Anna Fardon, 1132 Lafayette Ave.; architect and builder, A. A. Fardon.

Lafayette Ave., *Nos.* 1128 *and* 1130, 2 two-and-one-half-st'y frame dwells., tin roofs; cost, each, $2,900 owner, architect and builder, same as last.

Floyd St., *No.* 102, s s, 205′ e Marcy Ave., three-st'y frame tenement, tin roof; cost, $3,500; owner and builder, Jacob Ludwig, 106 Floyd St.; architect, Th. Engelhardt.

North Sixth St., *No.* 29, n s, 100′ w First St., two-st'y brick cooper-shop, boiler and engine room and chimney, gravel roof; cost, $12,000; owner, Paul Weidmann, 97 North Third St.; architect, Th. Engelhardt.

North Seventh St., *No.* 228, s s, 125′ w First St., two-st'y brick storage shed, gravel roof, brick cornice; cost, $12,000; owner, Paul Weidmann, 97 North Second St.; architect, Th. Engeldardt.

Hanover Pl., n e cor. Grove Pl., one-st'y brick carpet store, gravel roof, iron cornice; cost, $10,000; owners, Wm. Berris Sons, 526 Fulton St.; architects, Eastman & Davis; builders, Frank Kelley and F. D. Norris.

Twenty-third St., n s, 100′ e Fifth Ave., three-st'y frame tenement, tin roof; cost, $3,200; owner, A. M. White, Pierrepont Terrace; architect, James Pitbladdo; builders, Dumbleton & Sons and James Pitbladdo.

Chicago.

Building Permits. — R. Kroff, two-st'y dwell., 876 Warren Ave.; cost, $2,800.

Wm. Slett, three-st'y shop and dwell., 963 Madison St.; cost, $5,000; builder, Wm. Slett.

F. Fritscher, two-st'y flats, 1036 West Lake St.; cost, $2,500.

F. B. & J. I. Wallace, three-st'y warehouse, 34 Roberts St.; cost, $2,500.

C. Griffin, two-st'y dwell., 1241 South Western Ave.; cost, $6,000; builders, J. M. Dunphy & Co.

H. Steinback, three-st'y store and flats, 785 Milwaukee Ave.; cost, $5,000; architect, H. Kley; builder, F. Hansen.

Lakeside Roller Rink, Ellis Ave. and Thirty-ninth St.; cost, $5,000; architect, J. C. Lane; builder, J. Landquist.

George E. Scaverns, one-st'y elevator, Grove St.; cost, $5,000.

S. L. Williams, three-st'y dwell., 400 Ontario St.; cost, $8,000; architect, Cobb & Frost; builder, L. Weick.

Robinson & Minot, 4 two-st'y dwells., 3641-3645 Prairie Ave.; cost, $14,000; architect, W. L. B. Jenney; builders, Robinson & Minot.

Ira C. Sax, 4 one-and-a-half-st'y cottages, 172-178 Moore St.; cost, $3,200; builder, J. C. Nicholson.

E. Wentworth, two-st'y dwell., 281 West Jackson St.; cost, $5,000; architect, J. H. Moore.

F. B. Clark, two-st'y flats, 449 South Robey St.; cost, $5,000; architect, W. J. Hunter; builders, Lehman & Co.

F. Reuss, 2 three-st'y stores and flats, 615-617 West Twelfth St.; cost, $16,000; architect, P. Ruhles; F. Hoppe, builder.

New York.

Armories. — The letting of the contracts for the new armories may be seriously delayed, owing to the fact that the new Constitutional Amendment will not permit of bonds being issued for amounts required. Other public work may be delayed from the same cause.

Railroad Depot. — The Second Ave. Railroad propose to extend their building on Ninety-sixth and Ninety-seventh St. and First Ave., by an addition, 200′ x 200′, of brick and stone, three and four stories high, to cost about $100,000; Mr. John G. Prague is the architect.

House. — Mr. C. O'D. Iselin proposes to build a 25′ front residence on the north side of Fifty-second St., 175′ w of Fifth Ave.

Stable. — At No. 116 East Sixty-sixth St., Mr. C. F. Clark proposes to build a stable, to be designed by Messrs. C. W. Romeyn & Co.

Mr. Richard M. Hunt will be the architect for the Vanderbilt Mausoleum, on Staten Island.

Building Permits. — *Eighty-sixth St.*, n s, 200 e Avenue B, two-st'y brick refrigerator building, tin roof; cost, $15,000; owners, G. F. & E. C. Swift, West Washington Market; architect, Fred. C. Miller; builder, B. F. Bailey.

Eleventh Ave., w s, 49′ 4″ s Thirty-eighth St., three-st'y brick vinegar factory, gravel roof; cost, $18,000; owner, Oswald Budenbach, 368 West Fifty-seventh St.; architect, J. M. Forster.

East Tenth St., *No.* 372, five-st'y brick and stone tenement, tin roof; cost, $17,000; owner, Peter Lyding, 175-179 Second St.; architect, F. W. Klemt.

Grand St., *No.* 81, five-st'y brick and stone store, tin roof; cost, $18,000; owner, George Theiss, 136 East Fourteenth St.; architects, Schwarzmann & Buchman; builders, J. & L. Weber and J. F. Moore.

East Eighty-third St., *Nos.* 159, 161 *and* 163, 3 five-st'y brick tenements, tin roofs; cost, each, $12,000; owner, B. C. Wandell, 157 East Eighty-third St.; architect, D. J. MacRae.

One Hundred and Thirty-fourth St., s s, 119 w Brown Pl., 3 three-st'y brick dwells., tin roofs; cost, each, $4,000; owner, Thatcher M. Adams, 15 West Seventeenth St.; architect, David S. Davies; builders, Davies & McOwen.

Tenth Ave., e s, 50′ One Hundred and Fifty-seventh St., four-st'y brick dwell. and store, tin roof; cost, $7,000; owner, Chas. A. Briggs, One Hundred and Fifty-second St., near Harlem River; architect, H. Kreitler; builder, C. R. Terwilliger.

West Fifty-fourth St., *No.* 100½, four-st'y brick dwell., tin and slate roof; cost, $7,000; owner, Aug. Brakman, 963 Sixth Ave.; architects, Miller & Rickert.

Third Ave., e s, 36′ s One Hundred Fifty-fifth St., three-st'y frame tenement, and two-st'y frame stable, tin or gravel roofs; cost, $4,200, and $250; owner, Fred. Kurtz, 246 Avenue A; architect, Adolph Pfeiffer.

Norfolk St., *No.* 98, five-st'y brick and stone tenement and store, tin roof; cost, $17,000; owner, Rudolph Boehm, 392 Broome St.; architect, Wm. Graul.

Norfolk St., *No.* 100, five-st'y brick and stone tenement and store, tin roof; cost, $17,000; owner and architect, same as last.

Philadelphia.

Building Permits. — *Bancroft St.*, bet. Dickerson and Tasker Sts., 2 two-st'y dwells., 14′ x 28′; Guthrie & Simpson, contractors.

Frankford Road, above Nicetown Lane, two-st'y dwell., 16′ x 46′; Atkinson & Pinker, contractors.

Poplar St., *No.* 1618, three-st'y dwell., 18′ x 24′; Jas. I. Sanders, contractor.

Second St., above Columbia Ave., two-st'y stable, 18′ x 30′; Michael J. Quinn, owner.

Monmouth St., bet. Edgemont and Thompson Sts., two-st'y slaughter-house, 21′ x 27′; P. Boyce, owner.

Stillman St., n of Jefferson St., 6 two-st'y dwells., 15′ x 45′; E. E. Nock, owner, 2813 Gerard Ave.

Hope St., above Cambria St., two-st'y dwell., 17′ x 38′; Joseph Firth, contractor.

Fifth St., above Huntington St., two-st'y stable, 20′ x 36′; Wismer and Eisentrager, owners.

Wharton St., bet. Twentieth and Twenty-first Sts., two-st'y dwell., 15′ x 38′; Henry R. Coulomb, owner.

Jefferson St., bet. Ridge Ave. and Mitchell St., 2 three-st'y dwells., 16′ x 34′; Wm. Cole.

Chestnut St., *No.* 923, one-st'y office, 30′ x 30′; Marriner & Buckingham, contractors.

Cambria St., bet. Eleventh and Twelfth Sts., three-st'y boiler-house; John Dunlap, contractor.

Clarion St., *No.* 1210, three-st'y dwell., 17′ x 30′; Geo. A. Fry, contractor.

Kelly Ave., *No.* 4535, two-st'y dwell., 22′ x 40′; Jos. A. Sykes, owner.

Nineteenth St., n of Dickinson St., 2 two-st'y dwells., 16′ x 44′; Wm. Martin, owner.

Twenty-fifth St., n e cor. Hamilton St., dye-house, 51′ x 68′; S. B. & M. Fleisher, owners.

Atmora St., w of Thirteenth St., 3 three-st'y dwells., 15′ x 26′; Myers & Campbell, contractors.

Gordon St., e of Belgrade St., 7 two-st'y dwells., 12′ 4″ x 27′; Snyder & Menous, owners.

Fillmora St., e of Main St., 2 two-st'y dwells., Eliza O'Brien, owner.

There is no change in quotations this week.

St. Louis.

Building Permits. — Fifty-seven permits have been issued since our last report, nineteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Rector, wardens and vestry of Grace Church, two-st'y parsonage; cost, $2,500; J. H. Moulton, contractor.

Wm. Sinon, two-st'y dwell.; cost, $5,400; C. May, architect; Rothe & Ratterman, contractor.

D. Cavanagh, 3 adjacent two-st'y dwells.; cost, $4,400; contract sub-let.

E. Horn, two-st'y brick store and dwell.; cost, $7,900; A. Anderson, contractor.

S. P. Johnson, 3 adjacent two-st'y brick dwells.; cost, $,7000; S. P. Johnson, contractor.

Henry Menke, two-st'y dwell.; cost, $3,000; A. Beinke & Co., architects; Shildemann & Gross, contractors.

Chas. Sleviu, three and four-st'y stores and rooms (alterations); cost, $3,000; Geo. I. Barnett, architect; contract sub-let.

F. Trandt, 3 adjacent two-st'y tenements; cost, $5,000; C. Gerhardt, contractor.

AUTOMEDON AND THE HORSES OF ACHILLES.

From the Painting by Alexandre Georges Henri Regnault, [1843-1871.]

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XVI. No. 470.

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CONTENTS.

WE take advantage of the publication of a gelatine print in this issue to call attention once more to the announcement we have made that during the next year subscriptions may be made at the present rate, for the "regular edition" — that is, the journal in its present shape, size and quality, or for the "gelatine edition" at a slightly increased cost. As we regard this as a purely experimental change — though one which we greatly desire to have successful — we trust our subscribers sufficiently understand what the opportunity now offered really means in the way of possible future development to be willing to support the movement at this most important stage. At the risk of seeming unnecessarily importunate, we must ask those of our subscribers who desire the gelatine prints next year to notify us of the fact, within the next fortnight, so that we may be able to gauge with reasonable accuracy the size of the edition which will probably be needed.

THE test of electric motors for use upon the New York elevated railways promises to be a very interesting affair. Mr. Edison, who, for ingenuity and practical intelligence, stands at the very head of his profession, intends, as we understand, to enter the contest with the electric motor put in service several years ago by him at his workshops in New Jersey, and the improvements which his subsequent experience would suggest to him will probably make his share in the competition an important one. The managers of the contest have had the good sense, and the good fortune, to secure Sir William Thomson, perhaps the most distinguished scientific man in Europe, as one of the jury which is to render the award. Professor Cross, of Boston, a physicist of high reputation, and the head of the school of electrical engineering in the Massachusetts Institute of Technology, is to be another member of the jury, and three more are to be appointed. Besides the five members of the expert jury, a number of electrical and mechanical engineers are to be employed, who will make tests, under the direction of the jury, for ascertaining the capacity of the different machines under various circumstances. Although, considering the importance of the subject to the railway companies, whose income for the next fifty years will depend in great measure upon a wise choice of motors now, the thoroughness of the preparations for a full and convincing test are entirely justified, there is something unusual in such care about matters which are often left by railway directors to chance. According to the New York *Mail and Express*, the tracks of the Second Avenue Railway, which is much less used than the others, is to be prepared at once for the test, and although the decisive contest will probably not take place before May or June, preparations for it will occupy most of the intervening time.

A UNIVERSAL Exposition is to open in Paris on the fifth day of May, 1889, and those of our readers who propose to go to see it will have, through the timely notice given by the French Government, leisure to pack their trunks and get ready for their journey without hurrying. As the Exposition is, however, intended to be the largest ever held, four years and a half is not, perhaps, too long notice to give to those, at least, who propose to participate as exhibitors, or too long a time to prepare the immense buildings which will be needed. In the Exposition of 1878, it will be remembered, Germany refused to take any part whatever, and the complications of the war then going on in the territory between the Russian and English possessions in Asia affected another important department of the exhibition; but it seems to be assured that five years hence the whole world will be at peace, and accommodations are to be provided for the arts of all nations, and even the great tract of the Champ de Mars, with the adjoining Trocadéro, is believed to be too small to contain the buildings which will be required. As this, however, is the only open space now available in Paris for the purpose, the matter of the selection or formation of another, in or near the city, presents a problem very similar to that which so distracted the minds of real-estate agents in New York a few years ago. It would be possible to cut down trees, and pull up shrubs, and otherwise devastate the Garden of the Tuileries and the Champs Elysées, so as to make a site for the exhibition-buildings, but the most enthusiastic amateur of the industrial arts would think twice before consenting to the destruction of a pleasure-ground which has been three hundred years in process of formation, and it is not likely that the Parisians will agree to the sacrifice. The next place to be thought of is naturally the Bois de Boulogne, but the trees are thicker and older here than in the Champs Elysées, and there are more of them, so that the conversion of the forest into a building site would do almost as much violence to the feelings of the Parisian lovers of Nature as the destruction of the Tuileries Gardens. Except these two spaces, there is no unoccupied plot of ground in the city of the size which is supposed to be requisite, and the suburban towns offer the only alternative. In most of these there is room enough, but nothing else. The beauty of Fairmount or Hyde Park, as well as the accessibility of the suburbs of London or Philadelphia, are wanting, and unless a site is chosen so far out in the country as to be almost inaccessible, the exhibition-buildings must be surrounded with factories, tenements, and other objectionable structures.

A PAINTER whose career, though short, has been one of the most remarkable of the present time, Jules Bastien-Lepage, died in Paris on the eleventh of the month, at the age of thirty-six. There is a certain romance about the name which he has rendered so famous, which deserves mention, as characteristic of a man who, beyond all others, was admired and loved in the community of enthusiastic artists among whom he lived. Born of a peasant family named Bastien, he showed early in life a strong inclination for drawing, which, however, his circumstances gave him little opportunity of indulging, and he would probably have been obliged to renounce his pencil for the plough, if his uncle, a stern old peasant named Lepage, had not interested himself in his nephew's fancies, and sent him at last to Paris to study his beloved art. The young artist determined to justify his uncle's kindness, and studied and worked quietly, but with extraordinary assiduity until, just as he was ready to try his strength in public, the Prussian war broke out and he took up arms for his country. At the close of the war he resumed his work and exhibited, at the Salon of 1873, a picture to which he signed his uncle's name with his own, as if desiring in his public name, Bastien-Lepage, to associate his benefactor with himself in all the honors which the education given him might enable him to win. This picture created a great sensation by a display of technical skill so marvelous as to win the enthusiastic admiration of his fellow-artists. Unfortunately, perhaps, the jury did not set so high a value on skilful work as the painters, and the honors of the year were awarded to a rival; but from that time Bastien-Lepage was regarded by French artists, as well as by the Americans who study the French school, as the master of scientific painting, and although the recompenses of the Salon have repeatedly been taken from him by other men, his reputation in the profession has steadily advanced, and his death will be universally regarded as cutting short a career which had just begun with extraordinary promise.

WE have had a very curious and unexpected evidence of the business character of the period through which the country is now passing, in the shape of a very avalanche of designs submitted in competition for the prizes we offered for a barn of moderate cost. Ninety-seven designs were received before the hour of closing, and as this is more than twice as many as we ever received under similar circumstances we cannot but interpret this result as an indication that there is less work in architects' offices than is usual even at the slack season of the year. To those who have taken part in this competition we must say that they will probably be kept longer in suspense as to the decision of the jury than is usually the case; for though the plan and design of a small barn is not a very difficult subject to pass judgment on, yet to select the best three from one hundred designs and be able to maintain the propriety of the selection is no light task, the more that, as we discovered when opening the drawings, fully half of them are one as good as another in plan and design. What we shall be able to do in the way of publishing the deserving designs we cannot at present tell; but it seems patent that we cannot publish all such without running the risk of overloading the journal with material of this class, and interfering with the publication of designs submitted in future competitions, which we hope to set afoot shortly. It is possible, however, that we may be able to arrange for a short public exhibition of all the designs we have received.

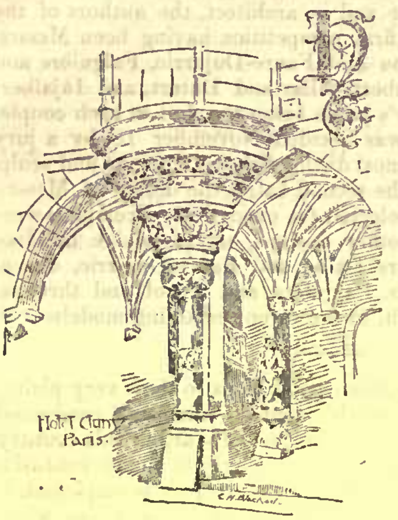
LA Semaine des Constructeurs gives an account of a competition, which recalls so strongly the history of many similar affairs here that we commend it to the attention of our less experienced readers. It seems that the town of Aubervilliers wanted a school-house, or rather a group of school buildings, after the French fashion, to cost about eighty thousand dollars; and it was decided to obtain several plans, by the process of competition. A letter was therefore sent by the mayor to several architects, inviting each to furnish a design, and informing him that no payment would be made for the competitive plans, but that the author of the one adopted would be employed to direct the work, and would receive the usual commission of five per cent on the cost. Three architects accepted this invitation, and sent designs. Two weeks before the time set for receiving the plans an election was held, and a new mayor was chosen. This official, on being inducted into office, found the plans waiting for him, and, apparently desiring to emulate his predecessor before it was too late, engaged a local architect, named Pochet, to make a design for the building. M. Pochet seems not to have been much better versed in the science than in the etiquette of his profession, and his first attempt was so unsuccessful that he was directed to make another, which, two months after the other plans had been sent in, was placed with them as a competing design. Nothing in the way of municipal building can be carried on by local authority in France without Government sanction, and the mayor having been somewhat urgently addressed by two of the competitors, at last sent a request to the prefect of the Seine to have an expert appointed, who should report upon the merits of the four plans. The prefect appointed M. Trélat, one of the most distinguished among French architects, who, a few weeks later, presented a report placing at the head of the list one of the designs first sent in, and advising its adoption by the town. Last in order he placed the project of M. Pochet, which he criticised sharply. The result of the judgment seems to have disappointed the mayor, who had certainly afforded M. Pochet every reasonable facility for winning success, and he delayed for two weeks to communicate with the town council. When this was at last assembled, a discussion took place with closed doors, and after one or two adjournments, it was announced that a vote had been passed to reject all the plans. The grounds for this decision have not been made public, but at the last accounts steps had been taken for inviting new competitive designs. Whether the architects of the neighborhood will offer any more, or what the town will do if no plans are received, remains to be seen.

AN important competition has recently been held for the selection of a design for a monument to the late Léon Gambetta. As is now common, the competition was a double one, the first trial having for its object only the selection of six sketches, the authors of which were invited to try their strength a second time against each other. Such monuments are in France almost always the work of architects and sculptors acting together, and each design was therefore submitted in the name of a sculptor and an architect, the authors of the sketches selected in the first competition having been Messrs. Aubé and Boileau, Dalou and Faure-Dujarric, Falguière and Pujol, Coutan and Lambert, Allar and Dutert, and Injalbert and Laloux, the sculptor's name being the first in each couple. The final competition was decided November 18, by a jury comprising some of the most distinguished architects and sculptors in Europe, and on the second ballot the design of Messrs. Aubé and Boileau was selected for execution. Premiums were then awarded to all the other designs, one of twelve hundred dollars to that of Messrs Dalou and Faure-Dujarric, one of eight hundred to Messrs. Falguière and Pujol, and three, of four hundred dollars each, to the three remaining models.

THE Gambetta competition seems to us to show very plainly the advantages of a double contest, when well conducted. If carried on as competitions usually are in this country, the reduplication of the trial serves only to make confusion worse confounded; but where an expert jury is employed, to judge calmly and intelligently of the merits of works which they thoroughly understand, the competitors enjoy the great advantage of being able to show their idea in a few lines to judges who will give it the place which it deserves, without being dazzled or deceived by the clever tricks of rendering, to say nothing of the artistic frauds on which "competition architects" spend so much money, to such profitable purpose. Even with the assurance of expert judgment on their work, the great cost of ordinary competition drawings deters all except architectural speculators from entering such contests, but with such assurance the reduction of the work necessary for obtaining a fair footing in the competition to a pencil sketch would attract many of the ablest men, who know their own powers but dislike the air of gambling which characterizes most competitions. The selection of six or ten out of the whole number to join in a second and paid competition would confer an honor on each of the selected ones practically superior to that implied in the direct award of a second or third premium. To have been placed second to the great Mr. X, in a competition of the ordinary sort, does not imply that there may not have been a long interval between the first and second, but the fact of having been selected to fight on equal terms with a dozen renowned champions conveys to each competitor, and to all his friends, the idea of a similarity of merit, which operates on all as a powerful stimulus in the second contest, and leaves each, even of the defeated ones, with a comfortable feeling of having been appreciated.

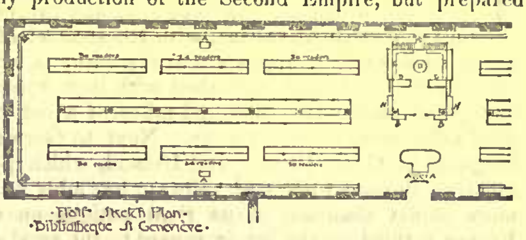
THE French Ministry of Public Works has published a little table showing the total length of the railways in the various European countries, with the number of miles built in 1883, from which it appears that Germany is, of all Continental countries, the best furnished with iron roads, having now more than twenty-two thousand miles, of which nearly six hundred miles were built last year. Next to Germany comes the kingdom of Great Britain and Ireland, which possesses about nineteen thousand miles of railway, but adds to its lines much more slowly than any of its rival nations on the Continent. France is third on the list, in regard to the total extent of road, having now eighteen thousand five hundred miles, five hundred of which is the work of 1883; and Russia is next, with fifteen thousand seven hundred. The railway fever seems to have abated in Russia, and only four hundred and fourteen miles were built last year in that vast empire, while Austro-Hungary although possessing only thirteen thousand miles in all, has been wise enough to promote the amalgamation of the diverse races which make up its population by an activity in railroad building surpassing even that of France, and second only to Germany among all European nations. Italy, a country of skilful engineers, constructed in 1883, two hundred and fifty-seven miles out of the fifty-nine hundred which now serve so well its restricted territory, and Spain, under good government, has kept pace almost exactly with the rival peninsula. Greece, under the impulse of some sudden fit of enthusiasm, built in 1883 more than half of its entire railroad system, but as its railway system, even with that addition, amounts now to less than fourteen miles of road, we need not fear that a revolution in the Greek character has begun.

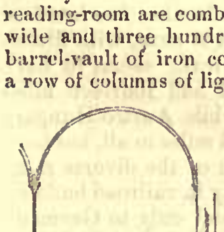
SOME SMALLER PARIS LIBRARIES.



ARDLY a city in the world has as extensive and numerous libraries as Paris. This is not owing especially to a need felt by the people for such collections, for Frenchmen as a rule are not studious by disposition, nor are the masses as well educated as in Great Britain or America. But Parisians take a great pride in public institutions of every kind, and are always ready to found a library, organize a society, or establish any institution which may promise to lend additional lustre to the halo with which the people fondly believe the new republic is covering itself. Besides, while the centralizing influence of Paris is felt through all the country, absorbing the best talent and the finest collections, there is a great deal of local feeling in the metropolis. The people cling very tenaciously to old institutions, and the existence of a dozen libraries in various parts of the city is thought to be sufficient reason for maintaining them, although they may be but little used by the people at large, and though the Bibliothèque Nationale is assumed to contain every desirable book, the smaller collections have been but little disturbed by the growth of the national library, they having quite kept pace with the larger establishment, so that now, including the libraries of the Arsenal, St. Geneviève and the Sorbonne, Paris has over four million two hundred thousand volumes at the disposal of the reading public, besides the extensive collections of the various lysées and colleges, to which a little bowing to red tapeism will generally procure access. Of circulating-libraries, however, the type most sought after in America, there are none whatever. Indeed, the French seem to consider that one never goes to a library merely to read, but is supposed to be consulting the authorities, and is expected to know just what he wants without reference to any catalogue. It is due to this fact that the larger collections, like the Bibliothèque Nationale and St. Geneviève, can be so extensively used while the catalogues are so imperfect. In America a consultation of the catalogue is considered essential before one can read to the best advantage: here a specific work is asked for, and the absence of a catalogue is seldom felt.

One of the oldest of the French libraries is the Bibliothèque St. Geneviève, which was founded by La Rochefoucauld, in 1624. It became national property as a consequence of the first revolution. The building at present occupied by it was erected in 1850, from the designs of M. Henri Labrouste. The exterior is too familiar to every student of architecture to require any description; be it said only in passing that with it began the neo-Grec movement, which has given to France so many noble architectural compositions. It is not equalled by any production of the Second Empire, but prepared the way for the broad spirit of which the Palais de Justice is the best recent exponent. As will be seen by the sketch-plan, the library and reading-room are combined in a rectangular apartment, sixty-six feet wide and three hundred and thirty feet long, covered by a double barrel-vault of iron construction, centre support being afforded by a row of columns of light and graceful design. The room has a clear height of forty-two feet under the vaulting. The plan and the section were both sketched on the spot, and are only approximately correct, but will serve to illustrate the arrangement. The number of printed volumes is about one million two hundred thousand, all of them being contained in the low cases in the centre of the room and the cases, in two tiers, against the walls. The windows have very deep jambs, partially filled with the cases in the upper tier, as indicated on the section. All the windows are set quite high, at least fifteen feet above the floor. The exposure of the building is towards the south, a circumstance resulting from location rather than choice, as a north light is usually considered the best for a reading-room — when a light from above is impracticable. The provisions for readers are quite simple, and hardly equal to the lavishness of the other arrangements, consisting of long, flat tables in two rows, the readers facing each other, a span of twenty-nine and one-half inches in width by twenty-five and one-half inches in length being assigned to each. There are no pens, book-rests or hat-racks, although one inkstand, of uncertain contents, is generously allowed to six readers, and, when the library is open at night, one argand gas-burner answers for the same number. The books are very neatly shelved, and are protected from dust by a fringe of cloth hanging from the shelf above. All the cases are enclosed by an iron railing, there being no books of reference and no opportunity for the readers to help themselves. There are catalogues, but they are not accessible to the readers, being carefully secreted where only the librarian can use them. There are a few of the leading dictionaries, French and foreign, in the case H, at the right, and, by a strange anomaly, a long *cour d'anatomie* in the corresponding case on the left.

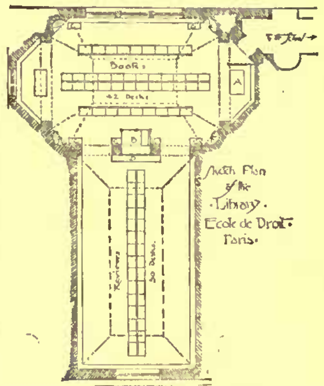

Half Sketch Plan. Bibliothèque St Geneviève.


Half Section. Bibliothèque St. Geneviève.

The library is entirely public. On entering, a blank is obtained of the guardians at *A*, filled out at *B* with description of the work desired and given to the attendant, the books being brought to the reader's desk. On leaving, the book and slip are left at the table, *F*. The librarians are at *D*, and the catalogues at *C*.

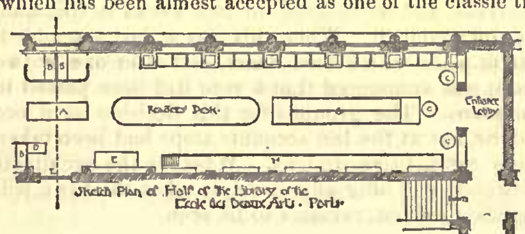
The library occupies the main or second floor of the building. On the ground floor are quite an extensive collection of engravings, specimens of early prints and manuscripts, the last numbering thirty-five thousand.

In the Rue Cujas, but a few steps from the Bibliothèque St. Geneviève, is the Library of the Ecole de Droit, erected a few years since, from the plans of M. Lheureux, architect; an interesting example of a simple, compact arrangement for a small collection and a limited number of constant readers. As will be seen by the sketch-plan, the library is divided into two parts, the first about 22′ x 38′, without the apses, being for books of reference, text-books, etc., and the wing, about 20′ x 46′, for reviews and treatises on special topics. There are places for forty-two readers in the main part, and thirty in the wing. The entrance is rather insignificantly placed in one corner, opening from a corridor connecting with the Ecole de Droit. The exposure is to the north, the windows on that side being placed high up, as in the Bibliothèque St. Geneviève, although the best supply of light comes from openings overhead, the ceiling being vaulted in brick, with iron ribs, as indicated by the dotted lines of the plan. The construction is entirely of iron and masonry, with no plastered surfaces, and wood only about the shelving, and the floors of oak. The library includes about thirty thousand volumes. Of these the ones most in use, or more than a third of the whole, are in the low shelves about the room, as indicated on the plan, from whence the readers are at liberty to help themselves. The remainder are in shelves above, which are reached by two light iron galleries running all around, and connected to the main floor by spiral stairs at the angles of the book-room. At *C* are card-catalogues of books arranged by names of authors, and at *D* are similar card-catalogues arranged by titles and subjects. The readers' desks are much like those in the Bibliothèque Nationale, with the addition that under each is a net attached to a sliding frame, and intended for papers. Baskets would seem preferable. Each reader has a space of twenty-six and one-fourth inches wide by thirty-one and one-fourth long. Pens, ink and blotting-pads are provided.


Sketch Plan of the Library. Ecole de Droit. Paris.

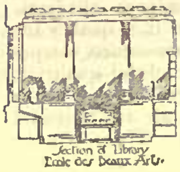
The librarian is at *B*, and an attendant at *A*, who receives the books as the readers pass out. The interior is very simply treated, and has a very good architectural effect. The details are very well chosen, and though money was not lavished very freely on the construction and finish, the effect could hardly be better for the purpose. For a practical, convenient arrangement, there is not a better library in Paris.

Scarcely less interesting is the Library of the Ecole des Beaux-Arts, erected from the plans of M. Duban, about 1838, the façade of which has been almost accepted as one of the classic traditions of the Academy, and has served as a source of "inspiration" for numberless "*projets d'école*. A sketch-plan indicating the general disposition of the interior, and a cross-section, are given herewith. The reading-room is approximately 24′ x 158′. The arrangement of the entrances at each end, with vestibules, is peculiar to this library, and is a very pleasing feature, the vestibules forming part of the main room and at the same time being sufficiently cut off by the high breast-walls to serve as *dégagements*, to use the French term. The exposure is toward the east, the light coming entirely from one side. In the cases before the windows are placed valuable casts from old medals



Sketch Plan of Half of the Library of the Ecole des Beaux-Arts. Paris.

and seals. Underneath and in the large cases at *G*, are the folios, mostly works of students of the school, *grands prix, projets medaillés*, etc. The books, to the number of about thirty thousand, are arranged in the double rows of shelving at *H*. The door at *E* leads into additional storage space for books. At *C* are racks containing drawings. The readers sit at the tables, each person having a space three feet long and two feet five inches wide. The tables have plain oak tops. The chairs are upholstered in leather. A number of book-rests are provided for each table. Ink is not allowed to be used about the books, nor is tracing in any form permitted. Students may consult at will the folios in the cases *G*, but for all other works a written demand must be made out at desk *E*, and given to the attendant at *D*. On leaving the room, the book is left on the table. On the table *A* are a number of the leading art periodicals, and the catalogue, this latter being very complete, and compiled in a clear, explicit manner, which is quite refreshing by contrast with other Parisian libraries. The classification is by subjects, as well as by names of authors. The librarians' desks are at *B*.



Section of Library Ecole des Beaux Arts.

This library is probably the richest art collection in the world, containing all of the best French and foreign works on architecture, and an unusual and exceedingly interesting collection of photographs, etchings and engravings. The prompt service and excellent catalogue make every work practically serviceable. The library is intended primarily for the students of the school, but although there are upwards of eight hundred pupils now enrolled, the forty readers' places in the library are found to be sufficient for all who come to read, and during a period of more than two years the writer has never seen all the places occupied.

Besides the foregoing, there are many libraries in Paris which are interesting historically or from the value of their contents, but as most of them are installed in old palaces or public buildings, they have but slight interest architecturally. The Bibliothèque de l'Arsenal, ranking next after the Bibliothèque Nationale, and containing some four million five hundred thousand volumes, occupies a number of small rooms in a building which has served successively as an arsenal, a palace, a prison and a barrack. The Library of the Institute numbers over two hundred thousand volumes, very meanly housed in the old Palais de l'Institut, but provided with an excellent catalogue which makes one forget the poor accommodations; and finally, the Library of the Conservatoire des Arts et Métiers is lodged in the old refectory of the Convent of St. Nicholas des Champs, a fine example of architecture, and very judiciously restored and decorated, but of little merit as a library or reading-room.

C. H. BLACKALL.

THE ILLUSTRATIONS.

AMIENS CATHEDRAL, AFTER AN ETCHING BY DELAUNEY.

ETCHING has done much for the illustration of architecture, to which it is singularly well adapted. The work of Callot, Hollar, Canaletto and Piranesi in this direction has been worthily supplemented by a long list of etchers, many of whom have also been painters of renown. Among English architectural etchers are George Cuitt, Bonington, Cotman, J. M. W. Turner and Le Keux, and in more modern days Edwin Edwards, Ernest George, Seymour Haden, David Law, Axel Herman Haig (by birth a Swede), J. P. Heseltine, and H. W. Brewer. The American etchers who have paid some attention to architectural work are Whistler, Gilbert Munger, Joseph Pennell, J. A. Mitchell, and others. In France, we have a long and splendid list of names, beginning with Méryon, and comprising such etchers as Jules Jacquemart, Maxime Lalanne, de Rochebrune, Jules Adeline, Brunet-Debaines, H. Toussaint, Tancrède Abraham, Felix Buhot, Lucien Gautier, Léon Gaucherel, Gustave Greux, and Léon Lhermitte. To these must be added Alfred Alexandre Delauney, a most accomplished etcher, whose excellent plate of Amiens Cathedral we reproduce. M. Delauney was born in Gouville (Manche), and has won two medals for etchings at the Salons of 1870 and 1872, respectively. Although, strange to say, not mentioned in the latest edition of Hamerton's "*Etching and Etchers*," he must be assigned high rank amongst artists of the needle as one who succeeds in combining with fine drawing, delicacy of line and strength of color.

We first find his name in the Salon catalogue in 1866, when he exhibited two etchings of flowers and fruit after Van Huysum, since which time his contributions have been mainly architectural subjects. Chief among these are a view of the "Church of St. Pierre at Caen;" two views of the "Ruins of the Palace of the Tuileries;" two plates of "Notre Dame de Paris;" a "View of Harfleur;" "The Street of the *Grosse-Horloge*, Rouen;" "Rheims Cathedral;" "Chartres;" "The Fountain of the Medicis in the Garden of the Luxembourg;" two views of the old "Convent of the Carmelites in the Place Maubert" and many other views in Paris. He has also produced the following plates: "Interior of a Forest;" "A Bull," after Rosa Bonheur; "The Water-Mill," after a picture by Hobbema in the Louvre; "The Ball and Fireworks at the Fête of St. Cloud" and a number of landscapes. Delauney was represented at the Paris Exposition of 1878 by his etchings of the "Church of St. Pierre, at Caen" (Salon, 1870); and the "Ruins of the Palace of the Tuileries" (Salon, 1872). A reproduction of his master-piece, a superb plate of Notre Dame from the rear, was issued in the *American Architect* of December 22, 1877.

The excellent "View of Amiens Cathedral," shows the front of the edifice from a point looking over the roofs of houses which have since been cleared away. The cathedral is among the most imposing Gothic churches in Europe and is considered one of the finest examples of the pointed style. It was built in 1220–69, by the architects Robert de Luzarche, Thomas de Cormont and his son Renault. Its dimensions are, length 444 feet, length of transept 213 feet, width of nave 84 feet. The lofty spire over the transept is 392 feet in height and was rebuilt in 1529. The two uncompleted towers of the western façade belong (the lower) to the thirteenth and fifteenth centuries, the former being 181, and the latter 210 feet it height, but like the central spire they are too small for the edifice. The principal western portal (fourteenth century) is one of the finest parts of the building, also famed for the height of its nave, which attains the unusual altitude of 141 feet (being only surpassed in this respect by the Cathedral of Beauvais), and the 110 beautifully-carved choir stalls, which contain no fewer than 3650 figures.

STUDIO AND OFFICE OF MR. H. H. RICHARDSON, ARCHITECT, BROOKLINE, MASS.

MR. RICHARDSON'S office is a thing *sui generis* in this country, and it has consequently all the charm of novelty to those who have had the good fortune to visit it. Starting out with the assumption that an architect will produce the best work if he treats his profession as an art—to be lived with and known as only hourly companionship can effect, and not as a business, to be locked up and left "down town" each evening, and let out again each morning — Mr. Richardson has established his office at his own house, two miles from the railway station of a small suburban town, without thought or care whether clients may find such an arrangement as convenient for themselves as that most usually adopted by the profession. Here amid perfectly quiet and peaceful country surroundings, pure air and pleasant outlooks a score or more draughtsmen — probably as efficient a working-corps as any in the country — are passing through an ideal stage of their existence, and while doing it are probably doing more in the way of purely architectural effort than they ever did before, or will probably ever do again after they have passed out of reach of the spirit of the man whose designs they are preparing for execution. They lead an enviable life, and fully realize it. We believe it would do much to advance the profession if more men — men of force, of course — would follow this example, which is nothing more nor less than a revival of the Mediæval custom of having your shop or studio opening out of your living-room, and your apprentices always under your roof and eye, ready to do a little overtime work when there is need, and do it, too, with an enthusiasm which is unknown to those who work only with an eye to pay-day. It is small wonder so many of the most interesting commissions in the country are entrusted to this office, and come from it in the guise of truly architectural structures. A glance at the plan will show how much care has been taken to make it possible to get the best work out of each assistant. Inspiration is the key-note of Mr. Richardson's idea in the student's training; and passing along the irregular corridor, on one side of which alcoves are placed, and curtained in for each member of his staff, your eyes are arrested by the choice selection of photographs of mediæval and other architecture which cover every available wall-space, so that the student when wearied with his pencil may refresh his vision and mind by a study of what is around him. Further facilities are afforded him by the fine library. During the relaxation hour at mid-day, those so disposed may enjoy physical exercise in a game at lawn tennis in the grounds, or a delightful ramble through the wooded lanes and roads of the neighborhood. The exhibition-room is the latest addition to the development of the establishment for the use of visitors and students, who may here enjoy a study of his best works already erected, intermingled with a fine collection of photographs of ancient buildings. Mr. Richardson has gathered around him a museum of architecture, which at least will educate the taste of his pupils and assistants, if they cannot in due time find it possible to visit Europe for themselves, study from the originals with their pen and pencil, and so gain a knowledge which is the making of an architect. Mr. Street, a consummate master of his profession, gained his knowledge by sketching and personal study of his favorite styles, and if he had not such a display of photographs, or miscellaneous collections of art, his inspiration was the mighty pile of sketch-books on his library shelves, to which his pupils' eyes longingly looked, hoping, as opportunity afforded, to go abroad and do likewise.

HOUSE FOR MR. E. C. STEDMAN, NEWCASTLE, N. H. MR. E. M. WHEELWRIGHT, ARCHITECT, BOSTON.

THE first floor has one large room, the hall and living-room combined, a small dining-room, a kitchen, shed, and servants' room. The study is in the tower, and gives off a landing three feet above the first floor level. In the second story there are four bedrooms, and a bath-room, and a fifth bedroom is in the second story of the tower. The stonework of the house is of the various colored beach stones gathered on the spot, and laid by local masons.

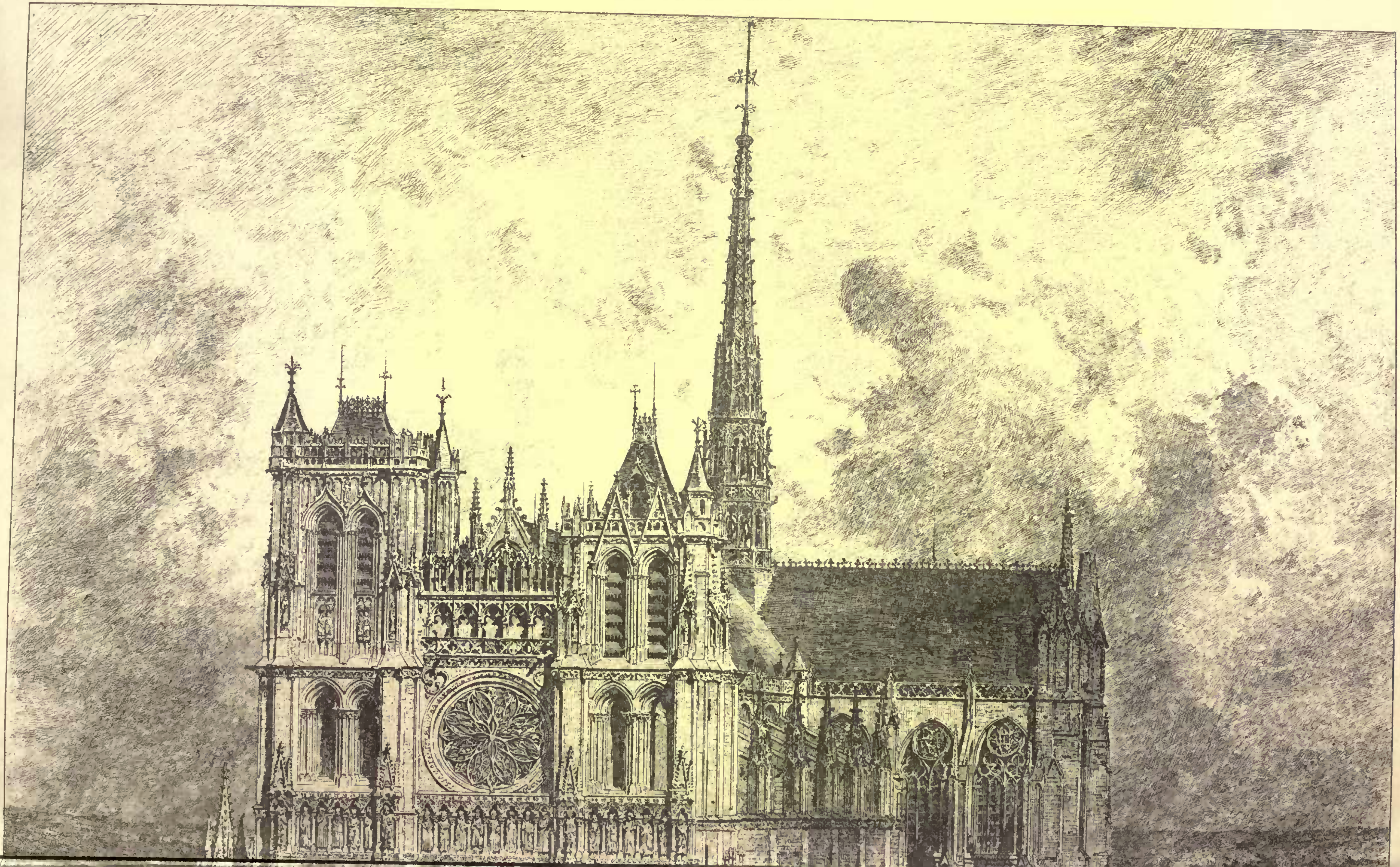
AUTOMEDON AND THE HORSES OF ACHILLES, FROM THE ORIGINAL PAINTING. BY HENRI REGNAULT.

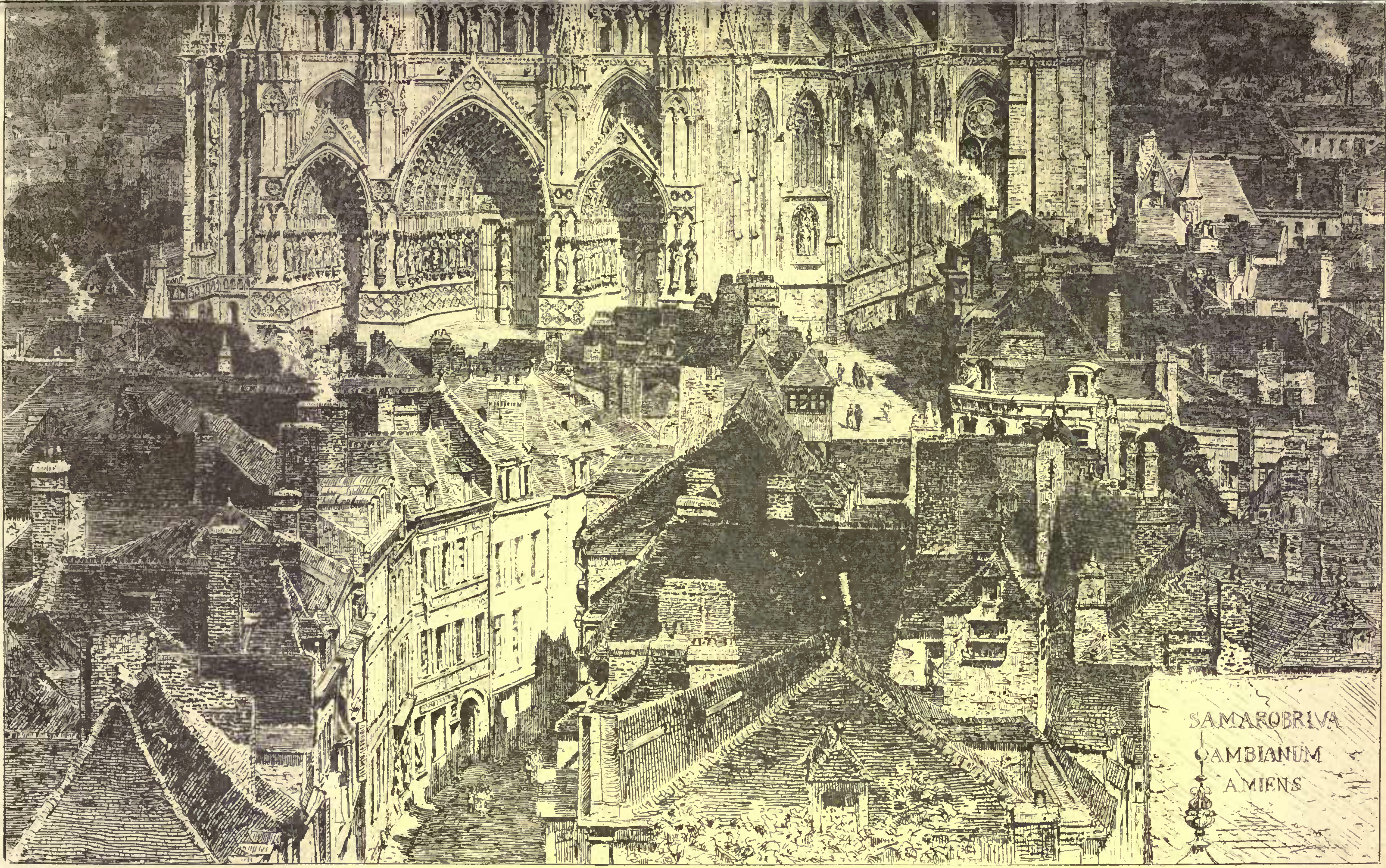
[Gelatine print.]

THIS picture — an "*envoi de Rome*," and therefore painted by Regnault when still in a state of pupilage as it were — is at present hung

PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON.

Joan of Arc, by G. Max.





HELIOTYPE PRINTING CO. BOSTON

American Architect and Building News, Dec. 27 1884 No. 470

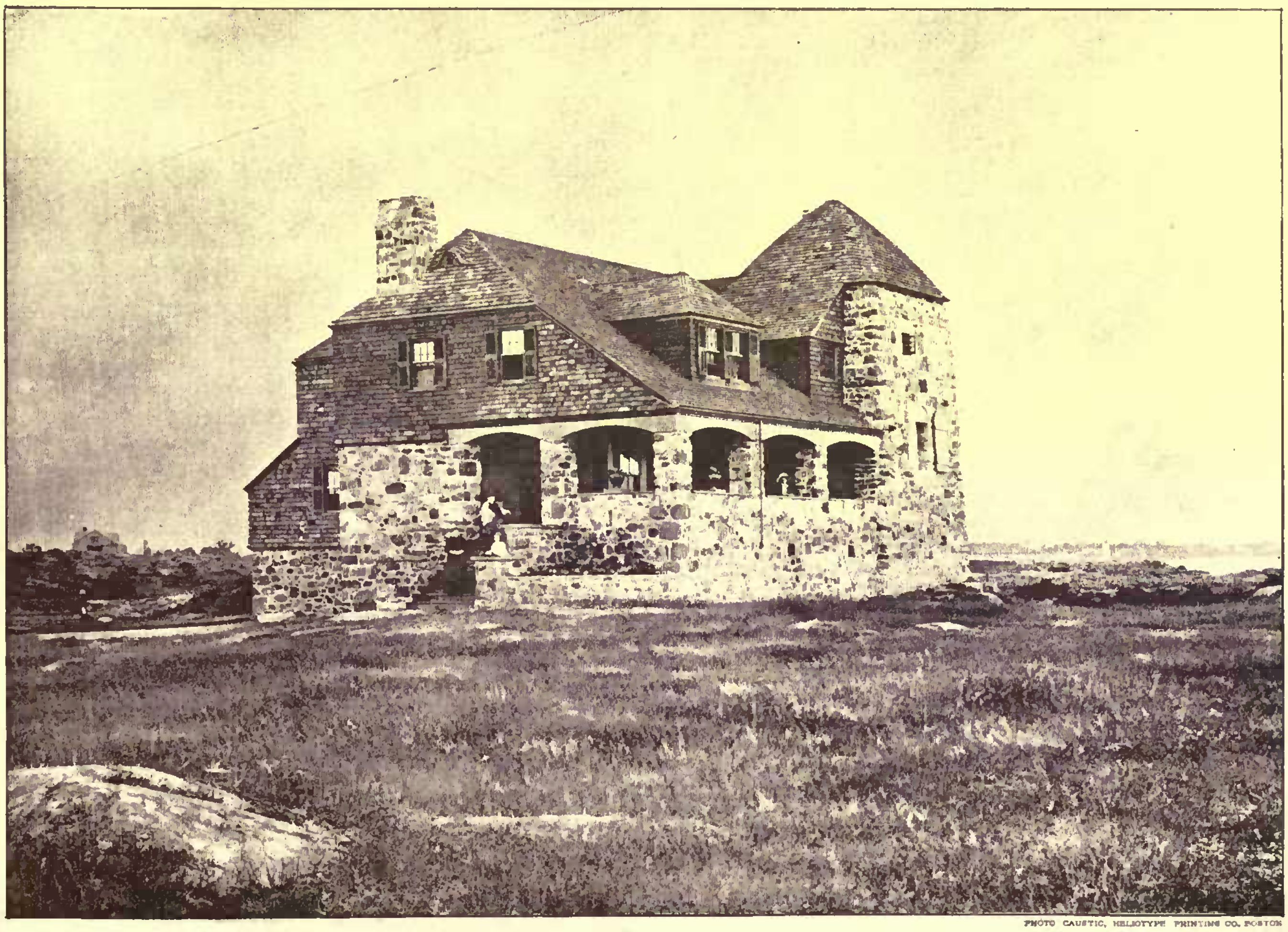


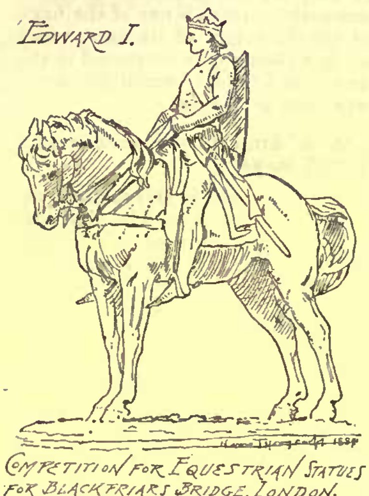
PHOTO CAUSTIC, HELIOTYPE PRINTING CO. BOSTON

House of E. C. Stedman, Newcastle, N.H.
E. M. Wheelwright, Arch't.
Boston, Mass.

in the Museum of Fine Arts at Boston, and we shall be much pleased if this publication shall stimulate the subscription that is making with a view to its definite purchase for the Museum. For an appreciative notice of the picture, and the talent of the artist who fell at the skirmish at Buzenval before Paris, January 19, 1871, at the age of twenty-eight, see the following article.

JOAN OF ARC, FROM A PAINTING BY GABRIEL MOX.

AUTOMEDON AND THE HORSES OF ACHILLES.



COMPETITION FOR EQUESTRIAN STATUES FOR BLACKFRIARS BRIDGE, LONDON. DESIGN BY HAMO THORNYCROFT. A.R.A. SCULPTOR

ALMOST every Bostonian who is wont to express his opinions on matters of taste — and he is not a rare bird — has expressed it categorically on the "Automedon." Some have lauded it to the skies in transcendental periods; more have flouted it in biting terms, while others have economized their logic with a staunch "I like it," or "I don't like it." In an evil day of fresh enthusiasm, several ardent school-boys matured a plan for presenting the picture to the Museum of Fine Arts, a testimony to their benevolence, and a glory to the town. Vain hopes! The pence came slowly, but how the pens flew! Poor, astonished, crest-fallen school-boys; you expected glory, and you got abuse! The mouth of the gift-horse was examined to its remotest molar, and pronounced *bad*. Some there were who pronounced it *good*, the undersigned among the number. This war of words proved an excellent advertisement, and for a moment the dollars came apace. Then weariness supervened; and long since the ring of voice and metal has ceased. The East still exhibits what the West owns. The half-paid-for picture, thanks to the courtesy of its proprietor, hangs in the Allston room at the Museum of Fine Arts.

Now that the smoke of battle has cleared off, and the great guns have had time to cool, certain things perchance may be gingerly written without wounding susceptibilities, or re-opening the cannonade — which Heaven forbid! To many the picture is merely unsympathetic. At times one instinctively hates a first-class work, and it requires real heroism to overcome this antipathy, and render justice where justice is due. Unfortunately heroism is not cheap; and we cannot expect the ordinary hater to reverse his judgment for purely intellectual reasons.

It has been objected that the picture is not Homeric in feeling. Certainly it is not. The restless Regnault was not the man to paint archæology. Did any demi-god of the brush ever paint archæology? Can bounteous, generous, exuberant genius bloom in such arid soil? The dust of ages would dull the lustre of any soul-begotten canvas. What respect did the royal Venetians, the line-loving Tuscans, the sombre Spaniards pay to archæological detail?

Is there anything more odious than a "correct" religious picture? We saw one here not long since, and it was horrible. What man of feeling wants to incarnate the divine type of religion — religion that is for all time and for all nations — after the manner of a Syrian Jew; or limit his dreams of the Garden of Eden to a Mesopotamian landscape? The old painters were guilty of countless archæological absurdities and anachronisms; but their works reek with the spirit of the age. Yes, that is what we always want — the spirit of the age — which, be it understood, is absolutely independent of subject. We may paint the life about us *ad infinitum*, and it will not be of our time unless our vision and handling be of the time. Or we may paint subjects from remotest antiquity, that will be essentially modern, if we see and treat them from a modern point of view. The *style* is the epoch. Far be it from me to abate one iota of the glory that in justice belongs to several archæological painters. Their talent is charming; their works are girdled with a halo of fascination that entrances the student of the classics, the first and strongest love of so many educated men. They have made the old Greeks and Romans live for us, at least as we fancy they lived. Yet turbulent genius rarely abides with such artists. Was Regnault a genius? That question was asked before in his own land; asked at a time when patriotism lauded it over all the virtues; and the answer was made by a cautious, sagacious man: "It seemed as though the portals of art were open to him." Admirable and prudent answer. What a contrast to the preposterous estimates placed upon their contemporaries by many dilettanti of the past, and alas, to the undiscriminating and hyperbolic verdicts of too many modern critics. Regnault was receptive, just as Raphael was, who assimilated "every imaginable idea." At times he was his master Cabanel, at times academic, and later a French Fortuny on a large scale. His talent was scarcely formed when the hostile bullet pierced him. Who can say what he would have been? The portals of art *seemed* open; but 'twixt seeming and being there is a mighty space.

The "Automedon" belongs to the Academic period, pitched in the Géricault key — mellow lights and strong, bituminous shadows. There is not a particle of out-of-doors quality in it, a quality for which we are now sacrificing everything, form, chiaro-oscuro, composition — all, in fact that "makes a picture." A delightful quality it is, too: healthy, invigorating, dazzling, worth a great deal — worth the intoxicating exhilaration that comes from fresh air and splendid sunlight, but not quite worth all we are immolating. There is none of this in the Automedon, but there is something just as good; I feel almost inclined to say, something better. If any Crœsus with a heart should ever see it in the Allston room, he would let it rest there till time removed it. In the quiet, tempered, in-door light that kills the modern picture (how its neighbor, the Joan of Arc, suffers) it looks like luminous gold, the deep shadows melting into the dim environments. Those who have seen the picture only in New York have never seen it. Looking at it towards noon, through the doorways of the hall, it forms a magnificent bit of decoration. There are few more agreeable glimpses in any gallery.

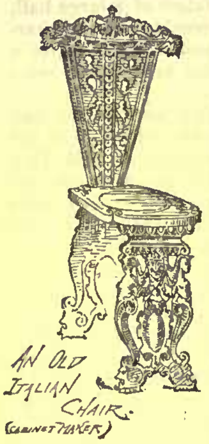
Patience almost shrieks when the "naturalness" of the horses is questioned. Does the questioner know his Homer? His captiousness and ignorance must be commensurate. Regnault was a horseman, and not likely to err unintentionally. His "Marshal Prim," at Paris, is the glorification of a horse, and all the better for it. Yet assuming that the horses are "out," who cares? What does any exalted thing amount to unless it sends shivers down our backs? It is more essential that a man should be true to his dreams than true to facts, if he hopes to thrill the beholder. Masterpieces are masterpieces not because they are without defects, but in spite of their defects. No one will deny, as its opponents assert, that the "Automedon" is melodramatic; but it is passing good melodrama. If the purist standard is to be raised, it would be well to close our gallery-doors at once. It is the function of an art-museum to collect representative works, and is surely this picture is typical. If the popular vote is to be taken on the admission of works of art to our museums, we must forever abandon all hopes of first-rate collections. Even typical paintings of inferior epochs are highly instructive. To know "what not to do" is half the battle in art.

For educational purposes the "Automedon" is very valuable. The nude figure of the charioteer, slightly heroic in size, is without its match in this country. Painted at the close of the author's academic career, it represents the work of the first pupil in France. What a gauge for students! We have no other such example of life-work, to which we can refer the tyro with authority, and life-work is the essence of figure-painting. No man who is unequal to the task of painting the life-sized nude with facility can lay claim to the name of figure-painter, equipped as he should be for all the work, great and small, he may be called upon to execute. This facility is only acquired by years of training; not by an irresponsible year or two in this or that school, with one or two more shallow years in Paris, hovering merely on the limbo of French art—never a good Frenchman, never a good American — but by years of just such sound discipline as men of the Regnault stamp had, with an inspiring climax in Italy and Greece. Our schools are comparatively superficial, and the sooner we recognize the fact the better. The "Automedon" should convince us that something in our system, or rather want of it, is wrong; that our handicraft is weak. Were it only to accomplish this much, the picture would be cheap at a hundred thousand dollars. I am speaking now merely from a mechanical point of view; but how important the mechanism of a painting is! The old masters glorified it. How steadily their hands followed their thoughts! So much interesting work nowadays is marred by a slovenly, or inadequate or labored handling. Posterity will be loth to cherish such things. To compare some of the Anglo-Saxon work, poetic as it is, with the work of Rubens, "is enough to make the gods laugh," if I may quote that eccentric, but genuine and intuitive critic, Mr. Edward Silsbee. In the "Automedon" we have a figure magnificently brushed, vital, and withal anatomically correct. There are those who deem a knowledge of anatomy superfluous, even pernicious, though I never remember to have heard such sentiments from a figure-painter or sculptor. Artistic anatomy is one thing; surgical anatomy another. A profound anatomical knowledge acquired with the scalpel is not exacted from the artist, yet if he has the time and taste for dissection, it won't prove very noxious. Experience has demonstrated pretty thoroughly that it is well-nigh impossible to construct the human figure without knowing more about it than the occasional study of a model is likely to teach. Daily intercourse with the nude, such as the Greeks enjoyed, for example, is tantamount to a knowledge of anatomy. Unfortunately we have no such opportunities, and we are forced to call the researches of others to our aid. Anatomy is a help, just as perspective is. Both were largely instrumental in bringing about the great development in Italy of the fifteenth and sixteenth centuries. Unfamiliar as most people are with our osseous and muscular system, they are not cognizant of anatomical solecisms, and consequently not shocked by them when the few knowing ones are scandalized.

Many skilful advocates have pleaded for the "Automedon," have vaunted its glowing colors and justified its extravagances; others have described its birth and subsequent career. The heliotype accompanying this article will doubtless be far more definite and eloquent than any vague descriptive phrases. Nothing remains to be uttered save a sincere prayer that generous patrons may be found to assure its permanent abode in the Allston room. 'Twould be a pity to remove it, it looks so well there.

FREDERIC CROWNINSHIELD.

THE RIGHT TO THE ELGIN MARBLES.



THE evidence which was given by Mr. Newton in the treasure-trove case in the Thames Police Court appears to indicate that there are doubts about the title to property in the sculpture of the Parthenon, now in the British Museum. It is not impossible hereafter that a claim may arise for the restoration of the works, and that it may be made a subject of international adjudication. That England bought the sculpture from Lord Elgin for £35,000 is plain, but whether it would be possible to sati fy a council of lawyers about the rights of the vendor is another matter. His lordship's account of the acquisition would not, it is to be feared, be in accordance with the strictest notions of equity. His ownership was the subject of investigation by a Parliamentary committee, and in the end appears to have been taken on trust. Other nations have been enriched by artistic spoils, but England and Bavaria stand apart as purchasers of sculpture which was torn from the walls of temples. In order that a couple of galleries might be made more attractive, two buildings must forever lose the treasures which gave them character. It is not surprising that among Lord Elgin's contemporaries there were many who condemned his energy in bringing the marbles to England. Byron probably expressed what was a very general opinion in those days, when he said that a man "admires the plunder, but abhors the thief." The question we have now to consider is whether the removal of the statues was plunder, for if so, one's enjoyment of the Parthenon Room in the British Museum cannot be unalloyed. The history of the transaction must accordingly be given.

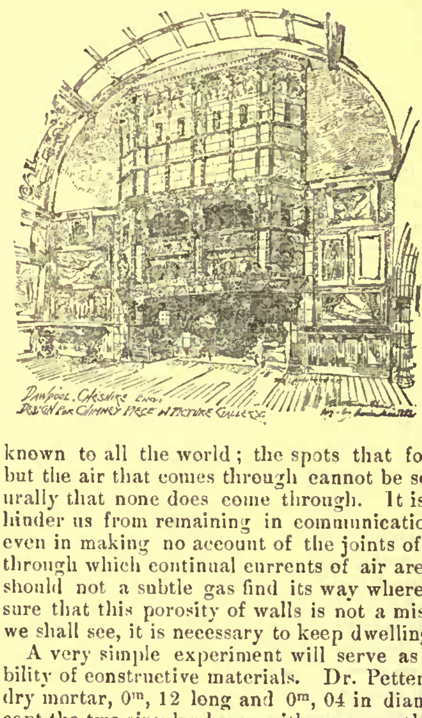
The Earl of Elgin was appointed ambassador to the Ottoman Porte in 1799. Before he left England his lordship appears to have entertained a belief that he could do something for the arts while absent. He consulted Thomas Harrison, the architect who designed the single-span bridge over the Dee, St. Nicholas's Tower, Liverpool, and Lord Elgin's house at Broomhall. Harrison had lived for a few years in Rome, and his opinion was that drawings, however accurate, could not take the place of casts as a means of artistic education. Lord Elgin thereupon endeavored to persuade the Government to appoint a staff of modellers, draughtsmen and architects to produce copies and drawings of Greek work, but the ministers were afraid of the expense. His lordship was too poor to undertake the cost of engaging English artists, but in Italy he secured the services of Tita Lusieri, who was described by Byron as a painter of the first eminence; Signor Balestra, an architect, and an assistant named Ittar, together with a Calmuck figure-draughtsman and a couple of modellers. Permission was obtained for the artists to establish themselves in Athens, and for three years they were engaged on casts and drawings, Lusieri being the superintendent. The firman was drawn up during the absence of the Grand Vizier from Constantinople. This document is addressed to the cadi, or chief judge, and the vaivode, or governor, of Athens. As it forms the title-deed to the sculpture, it will be well to give the most important passage: —

> He (Lord Elgin) hath also at this time expressly besought us that an official letter may be written from hence ordering that as long as the said painters shall be employed in going in and out of the said citadel of Athens, which is the place of their occupations, and in fixing scaffolding round the ancient Temple of the Idols (Parthenon), and in moulding the ornamental sculpture and visible figures thereon in plaster or gypsum, and in measuring the remains of other old ruined buildings there, and in excavating foundations when they find it necessary, in order to discover inscriptions which may have been covered in the rubbish, that no interruption may be given them, nor any obstacle thrown in their way by the disdar (or commander of the citadel) or any other person, that no one may meddle with the scaffolding or implements they may require in their works, and that when they wish to take away any pieces of stone with old inscriptions or figures thereon that no opposition may be made thereto.

It is evident that the pasha who drew up the firman did not contemplate any other work being done than the taking of casts of the sculpture. The "pieces of stone" must have meant something very different from the great frieze, the metopes, and the pedimental figures. Lord Elgin maintained that the firman was only expressed in general terms, because it was well understood that a permission issuing from the Porte for any of the distant provinces was little better than an authority to make a bargain with the local authorities. A similar permission was given to other explorers, but from want of means they were unable to operate on the judges and governors. How far the statements are accurate it is now impossible to determine. Lord Elgin admitted that his original plan was to bring away nothing but casts, and the meaning of the firman as an authority to model and measure becomes clear. Afterwards, on seeing the indifference of the Turks to the sculpture, statues being sometimes converted into mortar, his lordship's intentions were altered, and a very liberal interpretation was given to the word "removal" in the firman. It is remarkable that no official information was given by Lord Elgin to the Turkish government respecting the extent of his devastation. "The chance is," he said, "that I have done it five hundred times, but I cannot answer specifically when or how." A more extraordinary statement was never uttered by a diplomatist, unless it was when Lord Elgin said that he could not decide whether the permission was given to him in his capacity of ambassador or as a private collector. The terms of the bargain with the officials have never been known. Lord Elgin's agent said he was unable to conjecture the amount of the bribes, but he admitted the presentation to the vaivode of cut-glass lustres, firearms, and other articles of English manufacture.

From what we have said it will be seen that the entire transaction is surrounded by the indefiniteness which is always dangerous in a law case, and an ordinary tribunal would probably hesitate to accept the title on which England holds the sculpture. The English ambassador obtained privileges from the Grand Porte, which he chose to interpret as being a concession to Lord Elgin, the connoisseur. The Turkish officials at Athens were influenced by means of bribes in money and gimcrackery, and in consequence did not interfere. The high authorities in Constantinople, after the manner of an English circumlocution office, declined to know anything of the operations, as they had received no official information. It was easy for the Earl of Elgin, under those circumstances, to remove as much sculpture as he cared to possess. The real difficulties were those attending the voyage to England.

OUR CLOTHING AND OUR HOUSES.[1]



THE house also is like a vast and ample garment destined to regulate our connection with the surrounding medium, and to free us from its tyranny, but not to isolate us from it. It should not, or more likely — for it is too often forgotten,— it must not deprive us of air. Happily there is no voluntary prison so well corked that the outside air cannot find access to us without our knowing it.

The fact that water penetrates easily through a wall or ceiling is well known to all the world; the spots that form warn us sufficiently; but the air that comes through cannot be seen, and we imagine naturally that none does come through. It is an error; walls do not hinder us from remaining in communication with the exterior air, even in making no account of the joints of the windows and doors, through which continual currents of air are passing. Anyhow, why should not a subtle gas find its way where water could? We are sure that this porosity of walls is not a misfortune, far from it; as we shall see, it is necessary to keep dwellings from getting damp.

A very simple experiment will serve as evidence of the permeability of constructive materials. Dr. Pettenkofer takes a cylinder of dry mortar, 0m, 12 long and 0m, 04 in diameter, coated all over except the two circular bases, with wax; on the two bases are cemented two glass funnels, one of which is prolonged by a rubber tube, the other terminating in a very fine orifice. In blowing in the tube, sufficient air is forced through the cylinder, to blow out a candle placed at the other extremity. In this experiment the air that has passed through the cylinder is concentrated in the narrow canal of the funnel, and its rapidity is augmented by this.

The experiment can be varied in the following way: On a base, inaccessible to air, is constructed with bricks and mortar a segment of a wall, the anterior and posterior surface of which will be covered with two sheet-iron plates, each having a hole in it, with a tube inserted, the three other sides of the segment receive some impervious covering; if we blow into one of the tubes, a current of air will come out of the other. The same result is obtained with wood, and the different kinds of stones that will let air pass through them; some other kinds, like compact calcareous stone, are only very slightly permeable. It is true that in walls made with calcareous ashlar, water makes up a larger proportion than in brick walls ($\frac{1}{3}$ and $\frac{1}{4}$ respectively), and in this way the equilibrium is established. As a general rule, the more irregular the stones, the greater the amount of mortar, and the least regular are the least porous. When wet, all these materials become impervious to air. The experiment with the mortar cylinder will no longer succeed after the mortar has been moistened by aspiration in putting the free orifice of the funnel in water. We find also that it is much harder to force water through bricks and mortar, than air; with great difficulty we may be able to make a few drops appear at the free surface. It is then difficult to dislodge

[1] Portions of a paper by Louis W. Atlee, M. D., published in the *Journal of the Franklin Institute.*

water that has entered the pores of a brick: it will only come out by evaporation, and very slowly. It will impede the circulation of air in proportion as it fills the pores, and this unfavorable influence of humidity on the permeability of constructive materials becomes more apparent as the grain becomes closer or finer; a remark that has already been made in speaking of the various kinds of stuffs. Thus we see that damp walls allow air to pass through them with difficulty, and M. Märker found that a single day's rain sufficed to diminish, in a striking manner, the co-efficient of porosity.

In ordinary weather, and when they are very dry, walls transpire; they are incessantly traversed by feeble currents of air, that renew the air of closed rooms, and relieve it of the humidity with which it is charged. The atmosphere of a house is saturated with vapor from the respiration and transpiration of its inhabitants, by the water that is daily used in the household, without counting the dew that is deposited everywhere, when warm air from outside penetrates rooms that have remained cold. This humidity that is generated unceasingly, must be absorbed by the walls so that it may evaporate outside by the action of the sun and wind. It is for this reason that it is a good thing for building materials to be porous and permeable, and not an obstacle to the circulation of the air that should quicken the evaporation. This remark applies especially to northern countries, where the windows cannot be largely opened.

We must be distrustful of the thoughtless innovators who wish to use iron and zinc instead of the stone and wood of our fathers. The imperceptible transpiration of the walls, so important to carry off the dampness, would be suppressed.

The humidity that the walls receive from the external atmosphere in foggy and rainy weather, disappears generally quickly enough under the influence of the wind passing unceasingly over their surface. It is very different with the dampness inside, that is deposited on the walls of badly-aired rooms; if the walls are not porous, it is gotten rid of with great difficulty; even heating will not displace it, it will be evaporated by the heat only to be deposited again. This inconvenience is particularly perceptible in recently-built houses, whose mortar contains a large proportion of water, and in ground floors built on damp soil, that becomes impregnated with water by capillarity. This water closes the holes where the air ought to circulate, and the walls remains damp, notwithstanding the evaporation that takes place at the surface, and is very harmful to the inhabitants. Damp walls, like wet garments are cold, the water augmenting their conductibility; much heat is also absorbed by the evaporation. From this arises the succession of catarrhs and rheumatism that afflict the unfortunate tenants.

The quantity of water that a recently-constructed wall can contain is astonishing. Dr. Pettenkofer calculated for a house three stories high, five rooms, and a kitchen on each floor, say that it took 800,000 kilogrammes of brick to build such a house; the bricks alone would contain 40,000 kilogrammes; the mortar the same amount. We thus find that the masonry of a house of this size would contain 80,000 kilogrammes of water, not an easy thing to be driven out.

Many ingenious contrivances have been invented to dry the walls of newly-built houses quickly; the only ones worthy of serious attention are those based on the principles of heat combined with active aeration. The lower the temperature the more air will be necessary.

At 10° C., a cubic metre of air, that we must suppose already three-quarters saturated (containing 8 grammes of vapor), can take up only 2 grammes; to absorb the 80,000 kilogrammes of water contained in the masonry spoken of, it would take 40 millions cubic metres of air at 10° C. This volume of air, in a moderate wind, could be brought in contact with the exposed surfaces in twenty-four hours; but as it is evident the dampness will only be absorbed in proportion to the rapidity with which it appears at the surface.

Heat combined with a current of air could hasten the drying greatly. In raising the temperature from 10° to 20° C., we increase the evaporation five or ten times; first, because we augment the absorbing capacity of the air (100 centimetres of air, which at 10° C. can only take up 200 or 250 grammes of vapor, can now carry off nearly 1,000 grammes); and, secondly, in raising the temperature, we greatly favor the ventilation.

For a dwelling-house to be safe, its walls should not contain more than 4 or 5 per cent of free water.

The best way to determine whether the walls are dry enough or not, is first to ascertain the hygrometric degree of the air in the rooms before and after heating.

If the renewal of air is indispensable to insure against dampness, it is still more so to prevent the accumulation of impurities of all sorts that render the air unfit for respiration. All that is necessary to know is, by what signs tainted air is to be recognized, and how much air a man needs to breathe freely in a closed room.

Ordinary atmospheric air contains 21 parts of oxygen, and 79 parts of nitrogen, with 0.03 of carbonic acid; carbonic acid then is only found in the proportion of 3 to 10,000. Though the amount of carbonic acid produced by the inhabitants of a large city amounts to many millions of cubic metres daily, the proportion of carbonic acid gets very little above this, thanks to the movements of the atmosphere, and also to the hygienic influence of plants on the atmosphere that take up the carbonic acid freeing the oxygen, and absorbing the carbon. Let us see what takes place in a room occupied, such as a school-room. The air changing by the diminution of oxygen, by the pulmonary and cutaneous exhalations, if the ventilation is insufficient, a time will come when the air will be unfit to breathe. It is when the impurities with which the atmosphere is charged becomes perceptible by their odor, giving rise to the "*malaise*" characteristic of *closeness*. It is generally admitted that when the proportion of carbonic acid has reached 0.001, that this is brought about.

It has indeed been shown that the carbonic acid augments in proportion as the air become vitiated, but the *malaise* that is felt in a close room ought to be attributed to the perishable organic matters, that are contained in the pulmonary and cutaneous exhalations. Peclet says that the air coming out of the ventilators of a large hall, full of people, is stinking (*infecte*). The disagreeable odor so characteristic of a close room, is due, according to certain chemists, to a peculiar substance exhaled from the lungs; it has an alkaline reaction, and gives off ammonia.

What is really harmful are these miasms that smell. The carbonic acid, a relatively inoffensive gas, is only an indication of the progressive change in the air. From the experiments of MM. Regnault and Reizet we know that an animal can live in an atmosphere containing 0.07 of carbonic acid, the proportion of oxygen being maintained at 0.21. We have seen animals perish, when tightly shut up, notwithstanding that the carbonic acid was carried off and replaced by the due proportion of oxygen. Mantigazza has shown that when two birds are placed under two glass bells, and from one he absorbs chemically the carbonic acid, and from the other the organic matters, that the one in the latter resists much longer than the other. Dr. Pettenkofer was able to breathe several hours in an atmosphere containing 0.01 of carbonic acid without being in the least inconvenienced, but the carbonic acid was not produced by respiration, it was made by a chemical operation.

All this goes to prove that the few thousandths of carbonic acid contained in an atmosphere vitiated by respiration, are not capable of producing the effects caused by such an atmosphere. The oxygen diminishes in about the same proportion as the carbonic acid increases; but the loss of oxygen no longer explains these effects. We may well ask ourselves if a diminution of one per cent in the proportion of oxygen would be perceptible; would it not be compensated for by a more frequent respiration?

Carbonic acid has often been accused of effects caused by very feeble doses of carbon monoxide or carbon oxide, coming off from some incomplete combustion, or being reduced from carbonic acid. Carbonic oxide is a true poison; it destroys the vitality of the red blood globules. M. Leblanc found that a dog was asphyxiated in an atmosphere containing one-half per cent of carbonic oxide and three per cent of carbonic acid, whilst when the carbonic acid was alone used it only produced asphyxia, at 20 per cent (by volume). It is to carbonic oxide that the bad effect of cast-iron stoves is to be attributed, as they give it off when their external surface is heated red-hot. Whether the carbonic oxide is due to the permeability of the over-heated cast-iron, to the oxidation of the carbon of the cast-iron, or to the decomposition of the carbonic acid of the air, it has certainly been revealed by analysis, and has given rise to toxic effects, that have been somewhat exaggerated. Carbonic oxide is found in badly-prepared illuminating gas, and may become a cause of accidents if allowed to leak.

What is the volume of air a man needs to respire freely? This is a very complex question, about which hygienists have had much controversy. It is clear that the answer will depend on outside conditions, and still more on the limit of variation or tolerance, that is admitted for the composition of normal air. Let us commence with the simplest case, staying in a room hermetically sealed. In this case the volume of air is measured by the capacity of the inclosed space, "the cubic space" conceded to each inmate represents at the same time the air which he can dispose of. The air changing little by little, the proportion of carbonic acid will at last reach 0.001, the allowed amount. The larger the space allowed, the longer it will take to reach this dose. The volume of air in such a case must be in proportion to the length of time the room is occupied. This understood, in taking as a base, the proportion of one hundredth of carbonic acid by volume (one litre to the cubic metre), and admitting that an adult exhales 20 litres from his lungs every hour, we find that the volume of air to be supplied to each individual is 33 cubic metres. Thus — 33 cubic metres of air already containing 13 litres of acid (0.4 by cubic metres), in adding the 20 litres furnished by respiration we have a total of 33; the proportion limit 0.001, would thus be reached at the end of the hour. Therefore the cubic space to be allowed to a person shut up in a hermetically sealed place for one hour would be 33 cubic metres, 66 cubic metres for two, etc. More would be necessary if there were lights in the room, a candle alone using as much oxygen as a man; it is true that a candle does not set free so many hurtful products. If a higher proportion limit will be allowed, the volume of air could be much reduced. It must also be remembered that the change in the air takes place by degrees, and only reaches the limit at the end of the hour.

When a closed space (a hall), occupied by a given number of persons is subjected to a regulated ventilation, a fixed rule is established; the change in the air having arrived at a certain limit, no longer varies; the noxious gases are eliminated in proportion to their production. The cubic space has no other part to play than that of retarding the time when the fixed rule will be established. If it concerns a place that is to be occupied for a fixed time, like a dormitory, this consideration will have some importance, for things can then be so arranged that the proportion limit will not be reached before the end of the time of its being occupied. Another consideration is that a small space crowded would need so rapid a change as to cause a draught of air, which is always dangerous.

In calm weather it is not always sufficient to open the windows of places much crowded, such as the ward of a hospital. It is really necessary to have some artificial ventilation. The best ventilators are large open fireplaces, which in winter, when everything is shut, are lighted, and produce strong currents of air, not perceptible to the inmates, from the various cracks of the doors and windows.

PROFESSIONAL CHARGES A. I. A.

THE following revised schedule of charges and professional practice of architects was endorsed, as usual and proper, by the American Institute of Architects at its last Annual Convention.

GENERAL PROVISIONS.

For full professional services (including supervision) five per cent upon the cost of the work.

In case of the abandonment of the work, the charge for partial service is as follows: —

Preliminary studies,	1 per cent.
Preliminary studies, general drawings and specifications,	2½ per cent.
Preliminary studies, general drawings, specifications and details,	3½ per cent.

For works that cost less than $10,000, or for monumental and decorative work, and designs for furniture — a special rate in excess of the above.

For alterations and additions — an additional charge to be made for surveys and measurements.

An additional charge to be made for alterations or additions in contracts or plans, which will be valued in proportion to the additional time and services employed.

Necessary travelling expenses to be paid by the client.

Time spent by the architect in visiting for professional consultation, and in the accompanying travel, whether by day or night will be charged for, whether or not any commission, either for office work or supervising work, is given.

The architect's payments are successively due as his work is completed, in the order of the above classifications.

Until an actual estimate is received, the charges are based upon the proposed cost of the works, and the payments are received as installments of the entire fee, which is based upon the actual cost.

The architect bases his professional charge upon the entire cost, to the owner, of the building when completed, including all the fixtures necessary to render it fit for occupation, and is entitled to additional compensation for furniture or other articles designed or purchased by the architect.

If any material or work used in the construction of the building be already upon the ground, or come into possession of the owner without expense to him, the value of said material or work is to be added to the sum actually expended upon the building before the architect's commission is computed.

SUPERVISION OF WORKS.

The supervision or superintendence of an architect (as distinguished from the continuous personal superintendence which may be secured by the employment of a clerk-of-the-works) means such inspection by the architect, or his deputy, of a building or other work in process of erection, completion or alteration, as he finds necessary to ascertain whether it is being executed in conformity with his designs and specifications or directions, and to enable him to decide when the successive installments or payments provided for in the contract or agreement are due or payable. He is to determine in constructive emergencies, to order necessary changes, and to define the true intent and meaning of the drawings and specifications, and he has authority to stop the progress of the work and order its removal when not in accordance with them.

CLERK-OF-THE-WORKS.

On buildings where it is deemed necessary to employ a clerk-of-the-works, the remuneration of said clerk is to be paid by the owner or owners, in addition to any commissions or fees due the architect.

The selection or dismissal of the clerk of the works is to be subject to the approval of the architect.

EXTRA SERVICES.

Consultation fees for professional advice are to be paid in proportion to the importance of the questions involved, at the discretion of the architect.

None of the charges above enumerated cover professional or legal services connected with negotiations for site, disputed party-walls, right of light, measurement of work, or services incidental to arrangements consequent upon the failure of contractors during the performance of the work. When such services become necessary they shall be charged-for according to the time and trouble involved.

DRAWINGS AND SPECIFICATIONS.

Drawings and specifications, as instruments of service, are the property of the architect. By order,

THOMAS U. WALTER, LL.D., *President*,
GEORGE C. MASON, JR., *Secretary*.

NEW YORK, October 23, 1884.

A CASE IN POINT.

NEW YORK, December 11, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I should be glad to have your opinion upon the following charges for professional services?

Some four years ago, one-fourth scale drawings and specifications were made for an alteration of, and addition to an old house. No use of them was made at that time. This year the work was again taken in hand, an entire new set of drawings and specifications were made — by the owner's sanction — improving and adding to the original design.

Full services, *exclusive* of superintendence were rendered and large scale, and detail drawings were made for the interior of the principal rooms. The following bill was rendered: —

General drawings, etc.,	cost	$3,300.00	5%	$165.00
Fixed interior wood-work,	"	1,000.00	10%	100.00
Original drawings and specifications,	"	3,300.00	1%	33.00
Surveys and measurements,				15.00
				$313.00

Are these charges in excess of those sanctioned by the American Institute of Architects, and promulgated by them allowing a seven per cent charge for work costing less than $4,000.

I am, etc., faithfully yours, "ARCHITECT."

[THE charges are moderate. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

TREE-PLANTING IN NEBRASKA. — Four million five hundred thousand trees were planted in Nebraska the past year.

THE MEMBERSHIP OF FRENCH TRADE-UNIONS. — Of the 12,000 stone-cutters in France, only 600 belong to a trade-union; of 18,000 house painters, 200; of 3,000 gilders, 150; of 11,000 bakers, 450. Altogether there are in Paris 300,000 workmen, of whom only 50,000 belong to any kind of trade-union.

A NEW DRY-DOCK AT ST. JOHN'S, N. F. — The ceremony of opening the great Simpson dry-dock at St. John's was performed, December 10, by the Governor-General, when the British corvette "*Tenedos*" was successfully docked. The dock is one of the largest on this side of the Atlantic, and is 600 feet long, 132 feet in width, and with a draught of water of 25 feet. It will accommodate easily the largest ocean steamer afloat. Its site at River Head is in water as tranquil as a mill-pond, and its value to the North Atlantic traffic is incalculable. Its cost is $600,000.

A NEW CAMERA-LUCIDA. — A new camera-lucida has been invented by Dr. Schroder, possessing many advantages over the well-known contrivance of Dr. Wollaston. The pencil emerging from the eye-piece of the microscope is reflected twice, as in the old instrument, but the view of the paper and pencil is obtained by means of another prism placed under the first; the pencil from the microscope is totally reflected, and cannot pass through the film of air between the prisms, and the paper is seen directly between the two prisms, which offer no more obstruction to the view than a thick piece of plate-glass. The position of the image does not shift when the eye is moved, and the painful strain caused by the bisection of the pupil in the Wollaston instrument is entirely avoided. Drawings can be taken either with the body of the microscope at the usual inclination of 45°, or in a vertical position, both more comfortable in every respect than the old horizontal one, and preventing disturbance of the illuminating arrangement by having to shift everything when a drawing is required.—*Scientific American.*

COLD AIR FOR HOT CITIES. — The Americans are nothing if not inventive. Their inventiveness, even more than their gift of going ahead, is the attribute which differentiates them from all the nations of the earth. An American will never consent to do with his hands what he can do with a machine; and it has been truly said that a captain of industry, of the genuine American type, when he finds manual labor either too scarce or too costly, will never rest until he invents a machine to supersede hands. The last illustration of his practical ingenuity is a grand scheme for the supplying of New York with cold air as easily as it is supplied with gas and water. For a portion of the year New York is one of the hottest towns in the world, and it is somewhat remarkable that the new attempt was not made long ago. In London, during the longer portion of the year, the lack of warm air is more felt than the lack of cold; and there is not, perhaps, much room for the application of the New York invention. But the enterprising American or Briton who should supply cold air to the cities of Bombay, Calcutta, Madras, Delhi, Lahore, Ahmedabad, etc., where people simmer in the heat during the greater part of the year, would probably make his fortune in a marvelously short time. Cold air can almost as easily be "laid on" as coal-gas; and the American system would relieve Anglo-Indian households from untold miseries and worries. The shutters of damped grass, which are substituted for doors and windows in the hot weather, are not favorable to the purity of the air inside. The coolie forgets to water them. At the "thermantidote" whereby he pumps in the fresh air through the grass shutters his energy lags ever and anon. In the dead of night the drowsy coolie drops his punkah-rope, and his master, starting infuriated from his sleep, hurls first his imprecations, and next his boots, at the slumbering servant. All this trouble of punkahs and punkah coolies, and damped tatties, might be avoided by a continuous supply of cold air from the ice-factory, which nowadays exists at every considerable Indian "station." The matter should interest not India alone, but all tropical countries in which Europeans reside. —*London News.*

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Sketches of the Studios of Mr. H. H. Richardson Architect. Brookline: Mass:

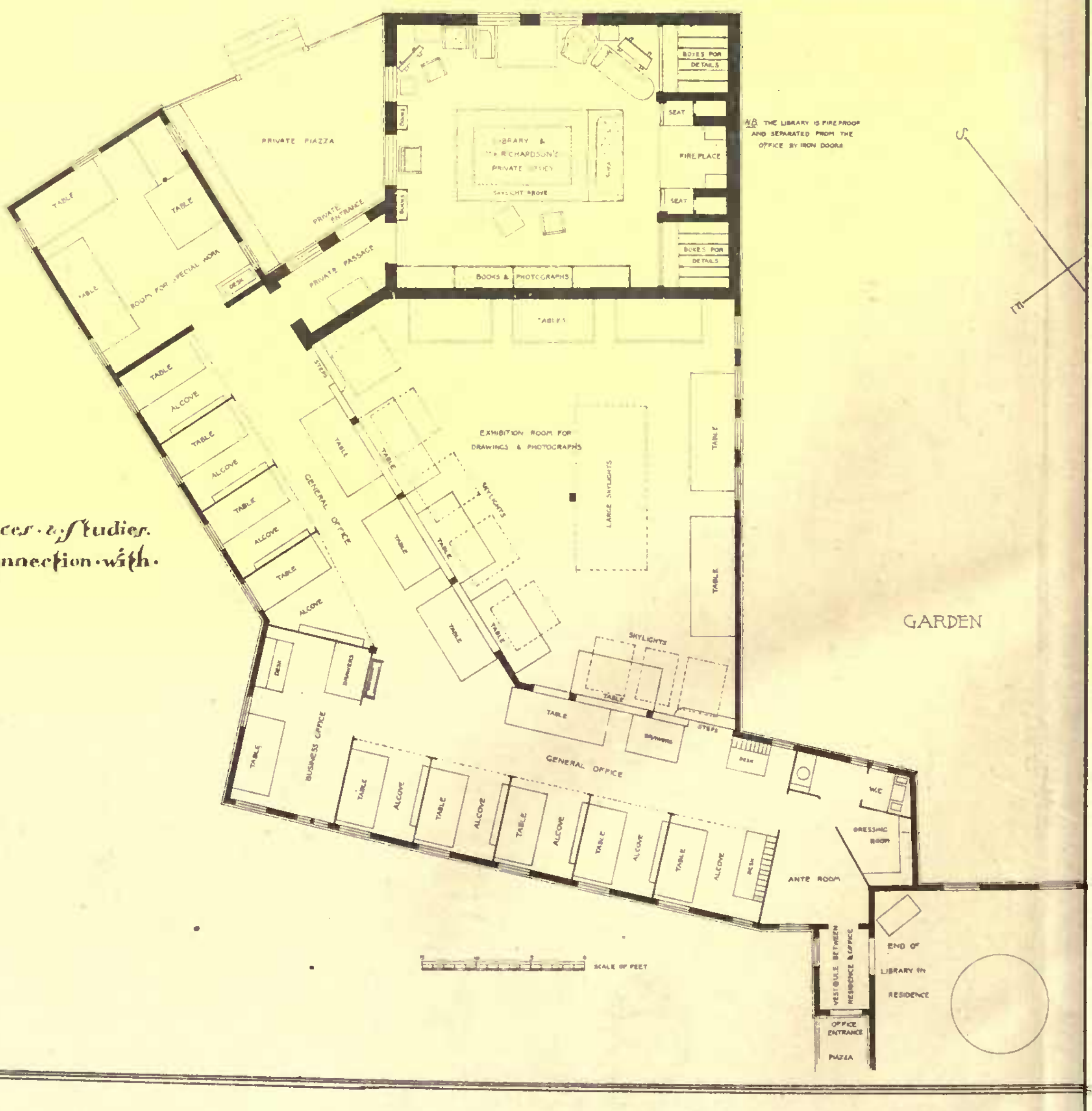
Ancient Wrot Iron Grille and Fire-dogs to Library

A Glimpse from the Road.

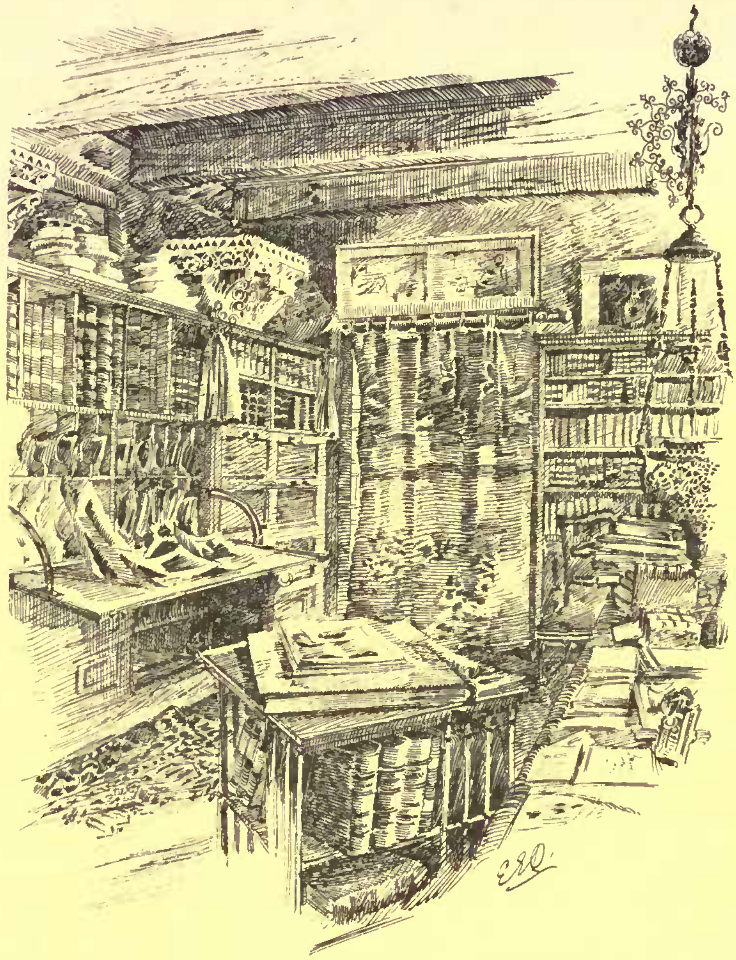
View

Plan

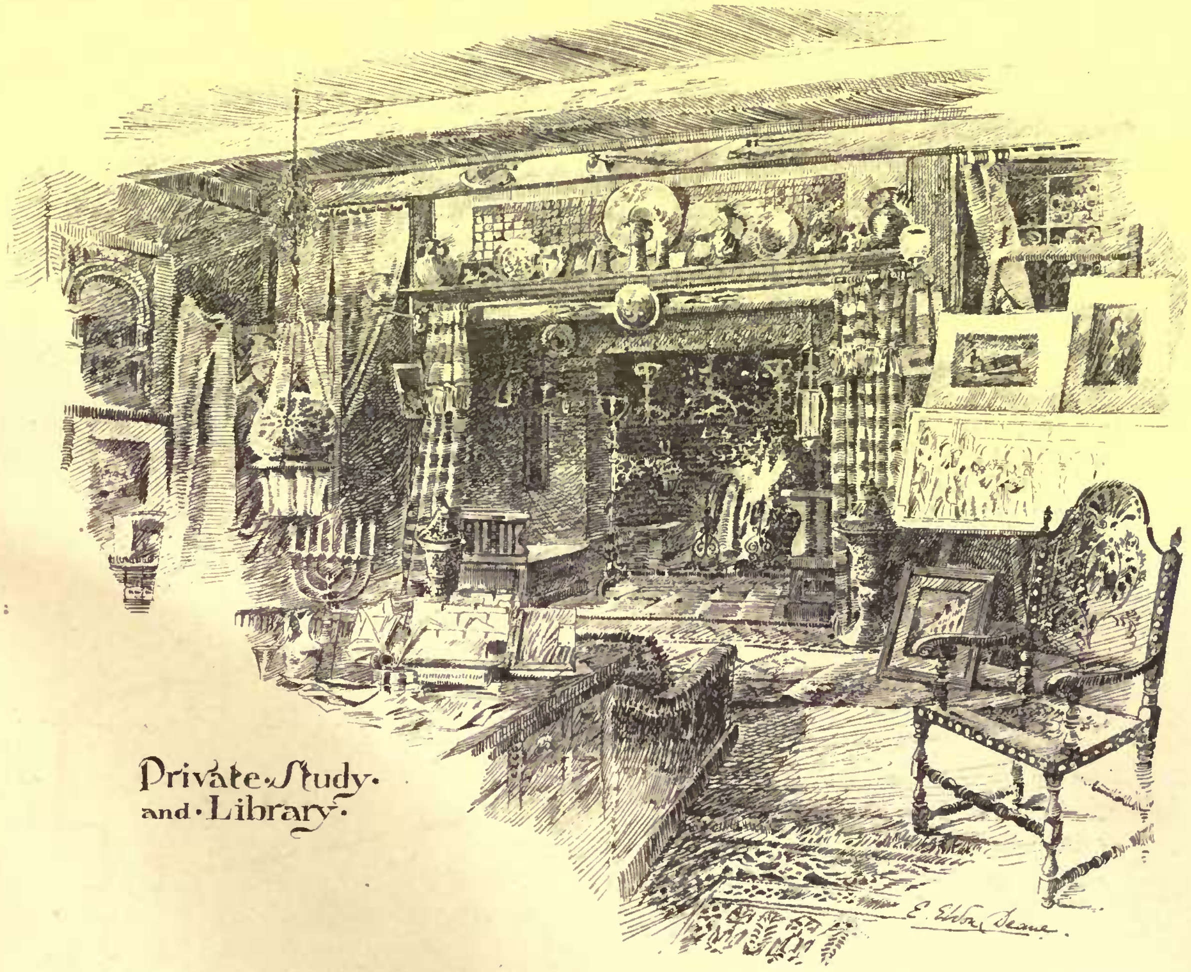
of Various Offices & Studies and shewing Connection with House.



· the · General · Drawing · Office ·



Private Study and Library · (looking · towards · door ·)



Private Study · and · Library ·

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