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CONTENTS.

EDITORIAL SUMMARY.
 PARKWAYS AND BOULEVARDS IN AMERICAN CITIES. — II.
 ROTCH TRAVELLING-SCHOLARSHIP REPORT.
 HAMBURG WAREHOUSES.
 PILE-RINGS AND METHOD OF PROTECTING PILE-HEADS IN
 DRIVING.
 NOTES AND CLIPPINGS.

ILLUSTRATIONS.

ENTRANCE TO THE BUILDING OF THE AMERICAN SOCIETY FOR
 THE PREVENTION OF CRUELTY TO ANIMALS, NEW YORK,
 N. Y.
 [Gelatine Print, issued with the International and Imperial Editions only.]
 WAREHOUSES AT THE PORT OF HAMBURG.
 SECTIONS AND DETAILS OF THE SAME.
 ST. PAUL'S EVANGELICAL LUTHERAN CHURCH, NEW YORK, N. Y.

DESIGN FOR THE PEOPLE'S BANK, BROOKLYN, N. Y.
 PLAN AND ELEVATION OF THE SAME.
 ENTRANCE GATEWAY TO THE BELVEDERE, VIENNA, AUSTRIA.
 NEW GALLERIES IN THE KREUZKIRCHE, DRESDEN, SAXONY.

Additional Illustrations in the International Edition

THE SCHONBORN MORTUARY CHAPEL ADJOINING THE CATHE-
 DRAL, WURZBURG, BAVARIA.
 [Gelatine Print.]
 THE GOETHE GYMNASIUM, FRANKFORT-ON-THE-MAIN, GER.
 PAVILION OF THE CITY OF VIENNA AT THE JUBILEE EXHIBI-
 TION, 1898, VIENNA, AUSTRIA.
 PROPOSED NEW TOWN-HALL AND MARKET, TAUNTON, ENG.
 DRAWING-ROOM: "THURSTONVILLE," BECKENHAM, ENG.
 NEW BUSINESS PREMISES, WEST CALDER, SCOTLAND.
 LONDON AND WESTMINSTER BANK, STRAND, LONDON, ENG.



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[For Classified List see Cover 3.]

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OCTOBER 22, 1898.

CONTENTS.

SUMMARY:—

New German System of Fireproofing.—Governmental Aid to Owners of private Forests.—Statistics of Zymotic Diseases in Michigan.—Death of W. W. Boyington, Architect.—The Paris Building-strikes.—The new French Coinage.—M. Oscar Roty and the Fraternité Artistique.—The next Exhibition of the Pennsylvania Academy of Fine-Arts.—Artificial Silk.	25
PARKWAYS AND BOULEVARDS IN AMERICAN CITIES.—II.	27
ROTH TRAVELLING-SCHOLARSHIP REPORT.	28
HAMBURG WAREHOUSES.	29
PILE-RINGS AND METHOD OF PROTECTING PILE-HEADS IN DRIVING.	31
ILLUSTRATIONS:—	
Entrance to the Building of the American Society for the Prevention of Cruelty to Animals, New York, N. Y.—Warehouses at the Port of Hamburg.—Sections and Details of the Same.—St. Paul's Evangelical Lutheran Church, New York, N. Y.—Design for the People's Bank, Brooklyn, N. Y.—Plan and Elevation of the Same.	
Entrance Gateway to the Belvedere, Vienna, Austria.—New Galleries in the Kreuzkirche, Dresden, Saxony.	
Additional: The Schönborn Mortuary Chapel attached to the Cathedral, Würzburg, Bavaria.—The Goethe Gymnasium, Frankfurt-on-the-Main, Germany.—Pavilion of the City of Vienna at the Jubilee Exhibition, 1898, Vienna, Austria.—Proposed New Town-hall and Market, Taunton, Eng.—Drawing-room: "Thurstonville," Beckenham, Eng.—New Business Premises, West Calder, Scotland.—London and Westminster Bank, Strand, London, Eng.	31
NOTES AND CLIPPINGS	32

A NEW system of fireproof floor and roof construction is finding favor in Germany, especially in Hanover, where it has become so common that it is known generally in Germany as the Hanoverian floor. The floor is framed with light iron beams, set about three feet apart, and either between or upon these beams is laid a course of hollow bricks, or tiles, about ten inches long, five inches wide, and four inches thick, formed with a tongue on one edge and a groove on the other. As soon as the beams are in place these tiles are laid over or between them, giving a smooth floor, upon which the men can stand to continue the work. The tiling is very strong, as has been proved by many tests, and is nearly waterproof, so that, until the roof is on, suitable holes must be left in the floor to carry off rain-water. Where the blocks are set between beams of five inches' depth or less the under side can be plastered, and the top finished with tile flooring; where they are put on top of the beams a separate ceiling is necessary. The blocks weigh about four pounds each, or less than twelve pounds per square foot of floor; no centring of any kind is needed for laying them, and very little cutting is required, so that the work is cheaply and quickly done, the total cost being little more than that of a roof or floor of timber, while the block construction is almost infinitely more durable, is fireproof, and is free from shrinkage, twisting and decay. While we, in this country, may justly claim to have carried fireproof construction to a perfection elsewhere unknown, our science has been displayed in great warehouses and office-buildings, and we need simple methods, applicable to dwelling-houses of moderate cost. In these forms of fireproof construction the Germans and French, who conceive the first floor of a house, over the cellar, as a thing necessarily of masonry, whatever may be the case with the other floors, are far in advance of us; and in the period upon which we are now entering, in which fireproof construction for city dwelling-houses is to become the rule, instead of the rare exception, we shall have much to learn from the German and Austrian builders.

THE Forestry Division of the United States Department of Agriculture is as earnest in trying to do good with the information that it collects as it is zealous and intelligent in collecting it. In a circular, No. 21, about to be issued by the Department, giving practical suggestions to owners of forest lands for preserving and utilizing them, the important announcement is made that the Forestry Division is ready to aid, so far as its appropriation will permit, any corporate or private owners of forest lands in the development of their property, preparing, on receipt of a description of the tract in question, giving its area, situation and character, working plans for planting and maintenance, together with detailed instructions. All this is done gratuitously, the only condition being that the

owner of the lands shall report the results of his operations, so that, from these reports, useful suggestions may be gathered for the benefit of owners of other forest lands in a similar situation. In addition to this admirable work of the General Government, many of the States have now either Forest Commissions, established by the public authority, or Forestry Associations consisting of corporations of private individuals, devoted to the work of assisting, by advice or in other ways, in the utilization of lands worthless for agriculture, by the proper management of the forests now existing on them, or by replanting them, where the original forest growth has been destroyed. Every American citizen must wish success to this new movement, and those who can assist in it will deserve well of their country by doing so. The sneering remark made not long ago on the subject by a newspaper, which gave the area of the forests still existing about Archangel, in Northern Russia, demonstrates forcibly the necessity for immediate and vigorous action in this country. It is hardly necessary to say that timber at Archangel might as well be growing in the moon, so far as its probable usefulness to inhabitants of our Mississippi Valley is concerned, and we may take it for granted that, except on the immediate seacoast, American citizens must depend, for lumber and firewood, on American forests. The end of these, as they are at present managed, is not far off, and the only hope of the country lies in taking steps at once to replace them.

THE State Board of Health of Michigan has long been famous for the energy with which it has promoted the application of scientific methods to the improvement of the sanitary conditions of the citizens of the State. Many of our readers will remember how a serious epidemic of scarlet fever in Detroit was checked by burning several tons of sulphur in the sewers; and proceedings of this kind have been quite characteristic of the policy of the Board as the chief advisory body of the Commonwealth in sanitary matters. Whether they have all been perfectly judicious is, possibly, uncertain, and the wisdom of the sulphur disinfection of the sewers has been questioned; but results furnish the best test of a policy, and, as is shown by a recent collation of the vital statistics of the State for the past twenty-five years, the average yearly mortality from scarlet fever has been reduced by seventy-five per cent; that from diphtheria in about the same ratio; the deaths from whooping-cough and measles have been reduced one-half; typhoid fever and tuberculosis have become less fatal, and malarial diseases have almost disappeared. There is no doubt that the zymotic diseases are far better understood and more efficiently treated by physicians now than they were a quarter of a century ago; but with all due allowance for this, a great deal of credit still remains for the Board of Health.

THE telegraph brings the news of the death of Mr. W. W. Boyington, of Chicago, one of the most noted of the older generation of architects. After the great Chicago fire, Mr. Boyington, who, as one of the pioneers of the city, had a very large acquaintance, was busily employed, and designed many large buildings, both in Chicago and other cities. His last important work was the Illinois State Building at the Exposition of 1893.

THE strikes in the building trades in Paris, where eighty thousand men are said to have left their work, stopping operations on the buildings for the Exposition of 1900, and other important structures, are happily over, and matters seem to have settled back into their ordinary condition. Complaint, as usual, is made of dissatisfaction on the part of some of the workmen, but the affair has had from the first very much the look of a political manoeuvre. Of course, work on the Exposition buildings, as well as on the new railway-stations at the Champ de Mars, the Alexander Bridge, and the other structures to be used in connection with the Exposition, cannot be delayed without risk of very great injury to the undertaking, and French agitators are just as quick as our walking-delegates to see an opportunity for distressing innocent people, and are, if possible, more unscrupulous in taking advantage of it. In the present instance, the French public, having been somewhat excited and alarmed by the revelation of the iniquities of high military officials, might be presumed to be in a fit condition to be still further excited, in the hope that some precipitate action would be taken, which might be turned to the advantage of

the plotters. It has been evident from the first that a systematic attempt was being made to goad the Parisians into some sort of disorder in connection with the Dreyfus matter, by means of a continual succession of flaming extras of the newspapers, aided by frantic deliverances on the part of politicians and editors; but the French seem to have sobered greatly of late years, and the oratory which would once have led to a demonstration behind barricades found, this summer, little response. It was natural enough that, under these circumstances, the leaders of the trades-unions should be instructed to use their power to cause real distress, in the hope of assisting an agitation which was evidently failing, and the French people are to be congratulated that even this cruel scheme has come to nothing, apparently through the good sense of the workmen themselves.

IT would be worth while for amateurs of the smaller fine-arts to get some banker or money-broker to procure for them specimens of the new French coinage. The coins are not yet in general circulation in France, but are sold in the shops in Paris as curiosities, at a trifling premium, and there would be no difficulty in obtaining, at an outlay of twenty-five or fifty cents, a very beautiful piece of work, which would have now the advantage of being fresh from the mint, an advantage of considerable importance, as some of the details of the coins are so delicate as to be obscured or confused by even slight scratches. The design of the new coins is the work of M. Oscar Roty, a member of the Institute, and one of the most distinguished medal-engravers in Europe. The artist has introduced several peculiarities of great interest. In the first place, what we may call the background of each face of the coins, instead of being flat, is hollow or "dished." In this way greater relief can be given to the device on the coin, without making it project beyond the rim, which protects it from wear; and M. Roty has taken advantage of this innovation to adorn the principal face of his coin with a very beautiful full-length figure, in a relief resembling that of the antique coins, rather than the flat, cut-paper modelling of most modern coinage. This figure advances with charming grace and nobility of movement across a field decorated only with some faint sun-rays, the artist's object evidently being to avoid placing anything obtrusive in the immediate neighborhood of the principal motive. The other side of the coin shows a leafy branch, treated in a natural style, and placed quite out of centre, almost after the Japanese fashion. On each side is an inscription, in letters of the simplest possible form, and of rounded section, so that, while perfectly legible, they afford a marked contrast to the neat, flat, sign-painter lettering characteristic of all other modern coinage. In fact, so simple and rustic is the appearance of the lettering that nearly all persons who see a Roty coin for the first time criticise it rather contemptuously as "a rough piece of work," without noticing the exquisite beauty and delicacy of the modelling of the principal figure, or reflecting that the rounded surfaces, and unadorned outlines, of the letters form a part of the composition, which they improve, while the neat, fussy lettering of ordinary coins would do much to injure it. So far, apparently, the two-franc piece is the largest coin yet issued in the new form, and this, of course, shows the design best; but pieces of one franc and fifty centimes are also to be had.

M. OSCAR ROTY, the designer of the new coinage of France, is not only an artist of the highest rank, but is noted for his benevolent energy. He was himself a poor boy, but has raised himself by his industry and talent from the ignorance and squalor of Montmartre to membership in the Institute of France, the most distinguished position that the world has to offer as a reward for intellectual attainment; and now he is endeavoring to help other poor boys in ways of which he knows the value. With this end, he, in connection with some brother artists of similar disposition, among whom was M. Paul Nénot, the architect of the Sorbonne, who is himself a member of the Institute, and one of the most brilliant and distinguished architects in France, founded, five years ago, the "Fraternité Artistique," the object of which should be to provide for the education, between the ages of two and eighteen, of the sons of artists, whom the death of their parents, or other unavoidable calamity, might deprive of support. Some provision has already been made for the orphan daughters of artists, by the "Orphelinat des Arts," established some time ago, and conducted by Mme. Marie Laurent, but their brothers have hitherto had to shift for themselves. Now, however, thanks to

the efforts of M. Roty and his associates, a beginning has been made toward taking care of them, and the first beneficiary of the undertaking, the young son of an architect recently deceased, has already been placed in a good school, the Société Centrale assisting by a special subscription. Of course, funds are needed for carrying on the work, but the corporation has been properly organized, and many subscriptions have been received, among them being a large number from architects. The Fraternité hopes to obtain money enough to purchase a house of its own, in which its protégés can be brought up together, its aim being, as its *Annuaire* says, to keep the children in a sort of hospitable mansion, where the memory of their parents will be carefully preserved, rather than to supply simply their material wants. This idea, which is also that of Mme. Laurent's "Orphelinat" for girls, is quite characteristic of French delicacy of feeling, and it is to be hoped that the "Fraternité" will be able to carry it out. Meanwhile, it is hardly necessary to say that further subscriptions are very much needed. Two forms of participation in the work are provided. By one, ten francs is subscribed annually; and by the other a gift of one thousand francs or more is made outright, the giver ranking as a "benefactor" or "donor," while the annual subscribers are simply members of the Fraternité. We suppose that American architects, in these dull times, do not generally have much surplus income left at the end of the year, after taking care of their own children; but there may be some who would like to have their names connected with so excellent a charity, at a cost of two dollars a year, and the American Institute of Architects is perhaps rich enough to permit itself the pleasure of a graceful act of professional courtesy, in placing itself on the list of benefactors. Subscriptions may be sent to M. Oscar Roty, at the Palais de l'Institut, Paris, or to M. Aug. Patey, Hôtel des Monnaies.

ARTISTS should not forget the coming exhibition of the Pennsylvania Academy of the Fine-Arts, which opens January 16, 1899, closing February 25th. The income of the Temple Trust Fund, which now produces about eighteen hundred dollars annually, is available for the purchase of meritorious works, and for providing medals, and the Academy medal may be awarded for work of conspicuous excellence. The Walter Lippincott prize, of three hundred dollars, will be awarded for the best figure-painting in oil by an American citizen, and the Mary Smith prize, of one hundred dollars, will be awarded for the best work in oil or water-color by a resident woman artist. As we have already mentioned, the Architectural Department of the Exhibition will be under the charge of the T-Square Club. Entry-blanks may be obtained from the Secretary, at the Academy of the Fine-Arts, Philadelphia, and must be returned, properly filled out, on or before Thursday, December 8, 1898.

THE artificial silk made from collodion is slowly finding its way into commerce, and is said to be particularly adapted for furniture brocades and hangings, where a brilliant lustre, with a low price, is desirable. Until recently, the cost of the artificial silk has been nearly as great as that of the natural product, but the manufacture has been simplified in operating on a larger scale, and it is now considerably cheaper. The Chardonnet process, which is the one used in practice, consists in converting cotton into pyroxyline, or gun-cotton, by treatment with nitro-sulphuric acid, dissolving it in alcohol and ether, filtering it, and then forming it into fibres by subjecting it to a pressure of about seven hundred pounds to the square inch, in a steel cylinder, from which it issues through glass tubes, drawn down to a calibre at the point of about one three-hundredth of an inch. The fibres thus produced are cylindrical, strong and lustrous, and are immediately wound on bobbins, spun, and made up into skeins. In this state the silk is dried, and subjected to treatment with an alkaline sulphide, which removes the nitrogen compounds, leaving it practically incombustible. It is then ready for bleaching and dyeing. Great care must be taken in all stages of the process, and the manufacture of the glass drawing-tubes requires trained workmen; but these difficulties are soon overcome in a large establishment. At present, one factory is in operation at Besançon, in France, another is working profitably at Spretenbach, in Switzerland, and a third is in process of equipment at Wolston, in England. At present, the total production is about three hundred and thirty pounds per day, and the silk finds a ready sale at two dollars a pound, or less. It is very light, the finest fibres measuring more than sixty miles in length to the pound.

PARKWAYS AND BOULEVARDS IN AMERICAN CITIES. — II.¹

THE parkway and boulevard systems of Boston offer the most complete and comprehensive examples of meeting the problems of metropolitan development on broad lines of beauty and public convenience yet offered by any great American city. They provide pleasant routes to and from the various parks and from one park to another, form agreeable approaches to the city in various directions, facilitate quick transit by electric railways, and furnish great trunk routes for vehicular transit that will gain enormously increased importance with the approaching era of the motor-carriage. These thoroughfares may be divided into two main classes: those that were laid out primarily with reference to their use for pleasure purposes, and those whose main object is the accommodation of general traffic, but which have been given a parkway character, and thereby an enhanced utility both in their facilitation of rapid transit and in their subsidiary use for pleasure purposes.

The great Boston and Brookline Parkway is a unique example of the picturesque type of parkway and is one of the masterpieces of that preëminent creative genius, Frederick Law Olmsted. A large portion of this parkway forms the boundary between Boston and Brookline and was jointly laid out by the two municipalities. In connecting the heart of the town with Franklin Park its delightfully varied route of six miles traverses three other important pleasure-grounds — Leverett Park, Jamaica Park and the Arnold Arboretum — besides furnishing a continuous panorama of park-like scenery, often of an ideal character. The landscape features of this parkway were suggested by the topographical circumstances of the region traversed, in the gradual transition from the banks of a tidal estuary and formal urban conditions to the purely rural scenery of Franklin Park. Beginning at the Public Garden, the magnificent Commonwealth Avenue, with its width of 240 feet between the building-lines, constitutes the urban end of this pleasure-way. Thence the Parkway is divided into the several sections, called Charlesgate, Fenway, Riverway, Jamaica way and Arborway, first passing through the placid salt-marsh scenery of the Fens, with its meandering creek and bosky banks; next coursing an idyllic river valley, with scenery strikingly English-like in its rural charm — the river a small and quiet stream. Then follows a broader valley, with graceful pastoral slopes, fine trees in groups and in groves, and a chain of ponds varying in size from mere pools to an island-studded lake. In immediate succession comes the delightful water-park formed by Jamaica Pond and its beautiful shores. Farther on, but a half-mile's distance, is the magnificent tract where, in the Arnold Arboretum, a great scientific department of Harvard University is combined with a noble woodland pleasure-ground, with far-reaching hilltop prospects and a remainder of the primeval forest of the old Bay Colony in the shape of a magnificent hanging wood of hemlock. Here all the trees that will flourish in this part of the world grow luxuriantly and naturally under ideal conditions, and yet as orderly in their progressive sequence as the specimens in the cases of the most scientific of museums — this being a museum of living trees and shrubs. A half mile more and the Parkway reaches the great pleasure-domain of Franklin Park.

When Dr. Oliver Wendell Holmes wrote "*The Autocrat of the Breakfast-Table*," the "Long Path," of which he told so charmingly, running across the Common from the Joy Street entrance on Beacon Street to the corner of Tremont and Boylston Streets, was deemed a considerable stretch of walk to be contained within a pleasure-ground. His pair of lovers who strolled beneath its arching elms must be elderly people now, doubtless with a troop of grandchildren — splendid youths and maidens of to-day. They, too, must stroll as lovers now through the pleasantest ways their feet can find. And, starting on the old Common where their grandparents walked in fond attachment, they have before them a new Long Path, where for six miles they may walk one continuous pleasure-way, through lovely and ever-changing scenes; at will indefinitely varied by the many connecting paths, branching here and there, and the maze of walks that invite them in Franklin Park. In the new Long Path of his beloved Boston Dr. Holmes would find to-day a more intimate comparison with the path of life that his lovers chose to walk together than was offered by the straight-away elm-arched *allée* of the Common.

This great parkway includes three miles of water-way continuously navigable for canoes, launches, and other small craft, besides Jamaica Pond. Between Jamaica Park and the Arnold Arboretum, and between the Arboretum and Franklin Park, the section called Arborway assumes a formal character; in one part, to accommodate abutting residents, there are two narrow traffic-roads on each side, separated by planted spaces from the broad central pleasure-drive.

Traversing Franklin Park, the same parkway route continues as Columbia Road and Dorchesterway to the shore at Dorchester Bay, one of the most beautiful sections of Boston Bay. Columbia Road is a formal parkway, with a central turfed space and planted strip reserved for electric cars, separating a wide pleasure-road on one side and a narrow traffic-road on the other. Dorchesterway has a single broad road devoted to pleasure travel, bordered by planted spaces, with turf and trees. Along the shore the parkway continues as Strandway to Marine Park, and thence across to, and around, Castle Island. The island section of the drive has not yet been

carried out. All this makes a continuous line of pleasure-ways from the Public Garden to Castle Island, more than thirteen miles, besides many miles of connecting park-drives.

Such is the main line of the Boston parkway system. But there are other very important elements. The Metropolitan Park Commission, established to provide the collective municipalities of Greater Boston with a park system of magnificent proportions, has in hand the creation of a series of parkways on a yet more extensive scale. In this work it has, where necessary, the coöperation of the Boston and other municipal park boards. There are three great wilderness park-reservations in charge of the Metropolitan Park Commission — the Blue Hills, Stony Brook Woods, and the Middlesex Fells — and the plan provides for connecting them with the urban centres of population by pleasant parkway routes, and also for utilizing, so far as practicable, the banks of the three rivers, the Charles, the Mystic and the Neponset, for lines of parkway that will also serve the hygienic purposes of protecting the streams from pollution.

One of these parkway routes diverges from the great Boston Parkway at the Arnold Arboretum and is called the West Roxbury Parkway. It is mainly of the picturesque type, running irregularly — adapting itself to the hilly contours of the country — to the Stony Brook Woods, whence it is planned to continue it to the Blue Hills.

A very important line of parkway is Fellsway, with its diverging sections, Fellsway East and Fellsway West, from Broadway Park in Somerville to two entrances of the Middlesex Fells, in Malden and Medford, respectively. This parkway, mainly formal in character and partly picturesque, forms a great trunk thoroughfare for a large part of the north metropolitan region, furnishing the only agreeable approach to the metropolitan centre and also a quick-transit route by electric cars over the central planted space.

A corresponding line on the south is the Blue Hills Parkway. In connection with the boulevard called Blue Hill Avenue it makes almost an air line from Franklin Park to the Blue Hills — a parkway of more than six miles. It thus provides, in continuation of the Boston and Brookline Parkway, an uninterrupted pleasure-route from the heart of the city to the Blue Hills, something like fourteen miles; also, in continuation of Columbia Road, a similar pleasure-route from the shore at South Boston. In character it is similar to Fellsway, — mainly of the formal type, changing to the picturesque at about a mile and a half from the Blue Hills, where it follows the valley of Pine Tree Brook. It likewise provides a quick-transit route by electric cars to the Blue Hills. The construction of this parkway between the Neponset River and the Blue Hills has not yet been undertaken.

A superb metropolitan parkway is that of the Charles River — the first instance in this country where the reclamation of an important stream throughout the better part of its course has been undertaken. The motive for this work is both recreative and sanitary. The river and its shores offer the most valuable and the most economical pleasure-ground sites for the metropolitan population, while their use for these purposes prevents the pollution of the waters, the occupancy of the banks by nuisance-breeding industries, and the consequent depreciation of property values throughout the river valley.

This great improvement is now well under way; the greater portion in the hands of the Metropolitan Commission, and other important parts in those of the Boston, Cambridge, and Newton Park Boards. In landscape character it recalls the picturesque Boston and Brookline Parkway, with similar features carried out on a much larger scale. First, there is a great basin with formal walled banks and bordering esplanades, suggesting the eventual development of a magnificent metropolitan "Court of Honor," with monumental bridges and stately architecture. Next there are wide salt-marsh levels coursed by the meandering estuary — the scenery celebrated by the poet-dwellers on the neighboring Cambridge uplands, Longfellow and Lowell — which the design changes to a fresh-water stream amidst a verdant meadow landscape. Farther above, the already fresh-water reaches of the stream are characterized by a great variety of rural scenery — open, park-like meadows, wooded bluffs, wild gorges, waterfalls, lake-like expanses where the metropolitan boating scenes present spectacles comparable to those of the Thames. The plan of improvement provides a continuous line of park roads from the midst of Greater Boston, and connecting with the municipal system of parkways, for eleven miles along the river in a general westerly direction, sometimes on one bank, sometimes on both, for a distance of about eleven miles, to Waltham and Newton. The improvement has a less elaborate character for the remaining section of the river's course through the Metropolitan District, to Dedham, a distance of something like thirteen miles. The intention here is to convert the river into a water parkway, with special reference to the use of the stream for aquatic recreations, preserving and enhancing the landscape character of the banks by public ownership, combined with restrictions upon the lands remaining in private possession — restrictions that prevent tree-cutting, mutilations of the scenery, and undesirable usage of the banks.

A second great river improvement is that of the Mystic. Here the Mystic Valley Parkway has been constructed between Medford and Winchester along the shore of the beautiful Mystic Lakes and the Abbajona River. The impression made by this parkway, immediately upon its opening to public use, was that of an extraordinarily complete succession of park-like scenery; wide water views with high and hilly backgrounds, grandly developed trees standing singly and in groups, with the satisfying pastoral landscape that is

¹ Continued from No. 1189, page 12.

made possible by the existence here of large country-seats since the early Colonial days. Studies for the continuation of this Mystic Valley Parkway call for its connection with Middlesex Fells, its extension farther down the river, and a connecting line across to the Charles River and a union with the Boston municipal system by way of Fresh Pond in Cambridge.

The improvement of the Neponset River valley comes next in order. The Neponset is a beautiful stream, with a distinct character of its own. A portion of the river-banks has been acquired, and the studies made call for some form of parkway route along the river from Hyde Park through Milton and Boston to Dorchester Bay and the Quincy shore, where several miles of the sea-front are intended for a waterside drive. The exigencies of the case do not call for the realization of the Neponset improvement at so early a day as that of the other two rivers, and the matter may rest for some years with the acquisition of the necessary lands.

Besides the parkways pure and simple, Boston has a system of great avenues that have been planned with reference to both ordinary traffic and pleasure purposes. The reconstruction of Beacon Street from its junction with Commonwealth Avenue to the Chestnut Hill Reservoir furnished the pioneer example in this class. The street was changed from an ordinary highway to a magnificent avenue of the boulevard type, with two roads, one narrow, for local use, and the other broad, together with a saddle-path of soft gravel, joining a similar path in the Boston and Brookline Parkway. Between the two roads is a planted space, shaded by trees and with electric-railway tracks running through the turf. This was a novel idea, which has been extensively adopted in other parts of the country. The road-bed of well-kept turf is not only agreeable to the eye but adds to the comfort of electric-car transit by deadening noise and preventing dust, while permitting greatly accelerated speed.

Subsequently, the continuation of Commonwealth Avenue to the Chestnut Hill Reservoir was given a similar character, barring the saddle-path. Commonwealth Avenue has been extended from the Reservoir, on the same plan, through the City of Newton to the Charles River, forming the great central avenue of that municipality. From the Public Garden to the river Commonwealth Avenue has a length of about eleven miles.

Huntington Avenue, from Copley Square nearly to Brookline, has also been reconstructed upon a similar plan. This avenue originally had broad planted spaces, with turf, between the sidewalks and the road, but these proved next to impracticable in an urban thoroughfare largely devoted to traffic and destined to business occupancy to a great extent. The planted area was therefore changed to the centre of the avenue, with car-tracks laid in the turf, greatly to the advantage of an important transit route. This avenue is mostly paved with asphalt. The extension of this boulevard improvement to the Chestnut Hill Reservoir, along the line of Boylston Street in Brookline, is proposed, making the third great avenue of the kind coming together at the Reservoir.

To the same system of boulevards belong Columbia Road and Blue Hill Avenue, already considered in connection with the more strictly parkway routes. Metropolitan Boston has thus a remarkable series of great pleasure-ways radiating on all sides from the more densely populated centre. Some of the most important of these ways are adapted to ordinary traffic uses and also facilitate local transit by electric-car routes to a very considerable material extent. In this system should also be included the marginal pleasure-ways, by the seaside at Revere Beach and the Quincy shore, and likewise the transverse route presented by Massachusetts Avenue in its course across Boston from Dorchester Five Corners to the Charles River.

It should also be noted that Newton has adopted an admirable policy in utilizing, so far as practicable, the courses of the minor streams within its limits by taking advantage of the lines of natural surface-drainage thus presented. The banks of the watercourses are treated in a picturesque manner with trees, shrubbery and turf, and on either side roads are laid out. The abutting lands are thereby made desirable for first-class residential purposes and the municipality secures the necessary lines of surface-drainage at low construction cost. Two tributaries of the Charles River—Cheese-cake Brook and Laundry Brook—have thus been improved; the latter with the cooperation of the adjacent municipality of Watertown.

The total length of pleasure-ways comprised in the parkway and boulevard systems of Greater Boston, either existing, under construction, or determined upon, is something more than ninety-three miles. This includes the entire course of Charles River through the Metropolitan District from Dedham down, something like half of which has been taken with special reference to its service as a water-parkway. The estimate, however, is based on extent of routes and not on that of roads; including neither the length of double roads in the parkways and boulevards, nor the connecting-roads through public parks. Neither does it include the total length of roads in the picturesque parkways of the Charles River and the Boston and Brookline system. The grand total would be increased to considerably more than a hundred miles by including various lines that are contemplated for the continuation and completion of existing and determined routes.

SYLVESTER BAXTER.

[To be continued.]

ROTCH TRAVELLING-SCHOLARSHIP REPORT.¹

IN writing a report of two years' of as varied work as my last two, I feel the difficulty of giving any adequate idea of the various influences that went to make up the result as a whole—to discriminate the various causes that together produced the effect, or, indeed, of describing the effect in an intelligible way, the more especially as I feel that I do not yet fully comprehend the result myself.

I left home with pretty-well-defined ideas as to the end I wanted to attain and the correct method to pursue in order to arrive at it. The longer I stayed in Europe the less value seemed to attach to any of my preconceived ideas and the more fully I was impressed with the fact that every man must work out his own salvation and the methods of work best suited to his own particular needs.

I landed early in July at Glasgow and went from there, by way of Edinburgh and the eastern cathedral towns, to London. One of my most rigid beliefs on leaving home was that there was nothing good in the Gothic style, and the discovery that I was wrong came quickly and came as a shock. This discovery probably did more to humble my pride and helped me more to a receptive mental attitude than any other one thing; but the process continued throughout the whole of the two years.

After ten days in London I started for Paris by way of Lewes, Dieppe, Amiens, Beauvais and Gisors. In the midst of works in a style that was fascinating and new to me, it was a pleasant and profitable two weeks. My original plan was to spend six weeks or two months in England, but partly because I was anxious to get my first impressions in Italy and partly because I found travelling in England very expensive, I changed my plan, and after spending a week in Paris started for Italy by way of Lucerne. My first stop in Italy was at Como, where I spent several days and made several studies. Then to Monza, where I was unable to discover anything of especial interest to me; next to Milan, where I stayed about two weeks, several days of which were spent at the Certosa di Pavia studying the buildings, and in the museum. I found that, coming fresh to Italy, it was difficult if not impossible to judge of the relative importance of work. If I had realized how favorably the work at the Certosa di Pavia compared with that in the rest of Italy I should have felt the desirability of staying there a much longer time. However, in five days I was able to absorb enough of the spirit of the work to derive a distinct benefit from it.

From Milan I went to Genoa direct, but found but little of interest there; then on to Pisa, Lucca, Pistoja and Florence. In Florence, for the first time I began to feel the necessity of studying carefully the work in the galleries—to appreciate the fact that all the different and yet similar manifestations of the Italian Renaissance are so closely correlated that it is impossible to study them quite separately.

Of course by far the greater part of my time and strength was devoted to directly architectural studies, but from that time on the history and development of Italian painting, sculpture and the "allied arts" came in for an increasing share of my attention. I spent about three weeks in Florence at this time and then went to Siena for ten days.

The work to be done in the various towns of Italy is so well understood and has been done so many times that it seems hardly necessary to infringe on the province of the guide-book in trying to give a list of the monuments that seemed to offer valuable material for close study, and as I suppose no two men ever did exactly the same work or found the same buildings of quite equal importance to them, such a list would only serve to provoke comment and excite wonder at particular things that were either included or omitted; so, in the main, it seems wiser to mention only such monuments as seemed to be particularly valuable to me. The tower of the Palazzo del Popolo, at Siena, seems to me one of the most remarkable monuments in Italy. The means employed are so simple and the effect is so fine that, among other things, I thought it worth while to study it rather carefully and later submitted a drawing of it as an *envoi*. Of course there is a field for some careful study of the Siennese school of painting, where the artistic development was so curiously arrested.

From Siena I went to Montepulciano and Orvieto on the way to Rome. After weighing the pros and cons as carefully as possible I decided to join the Roman School—a step which I afterwards regretted. My sole motive for identifying myself with the "School" was to have the use of a drawing-table and a comfortable draughting-room; but I afterwards felt that belonging to an institution which exists principally on paper and in the imaginations of some gentlemen several miles away was a hindrance rather than a help, and that I should have accomplished more if I had been thrown entirely on my own resources.

I was unfortunate in that my health was not good while I was in Rome, but it may be that under different conditions I should have accomplished no more.

My Roman *envois* were the Portico of the Palazzo Massimo and the fragment of a cornice from the Baths of Agrippa, both of which I found very interesting. The measuring and study of the former, in particular, I found extremely interesting. Although it has been measured and drawn many times, the doing it showed me many unexpected irregularities and helped me to get the point-of-view of the

¹Final report made by Mr. L. H. Boynton, thirteenth holder of the Rotch Travelling-scholarship, to the Boston Society of Architects which, for the Trustees, directs the travel and studies of the several Scholars.

architect, so that I felt that I could follow his mental processes in designing it. I also found that making full-size working-drawings of Roman detail was very interesting work. The translating of the actual work into terms of working-drawings will prove, I hope, of great value to me in realizing the meaning of full-size detail.

In April I went to Naples and from there to Sicily. I had of course planned to go to Greece, but the war with Turkey came at that time and I felt that, with the likelihood of disturbances and the possibility of being blockaded by the "Powers," it would be very unwise to carry out my plan. I was bitterly disappointed, as Greece was the country I was most anxious to visit. Sicily I found very interesting and the temples at Girgenti helped to give me some distant idea of the work in Greece. After this, the mosaics at Monreale and in Palermo are of great interest and in many ways are doubtless unique. Returning from Palermo to Naples, I spent several days in the museum there and in particular made rubbings of some of the best examples of the Roman lettering. From Naples I made a trip to Pompeii and one to Paestum. The latter place is very disappointing, after Girgenti. The temples, while they are wonderfully preserved, do not in any other way compare with those in Sicily. Leaving Naples I stopped for half a day in Caserta and from there went to Benevento, where I measured the triumphal arch, of which I afterwards made a set of drawings for an *envoi*.

This Arch of Trajan at Benevento is singularly like the Arch of Titus at Rome. It is of about the same period and is in an almost perfect state of preservation. From there I went straight to Rome, where I remained until about the middle of May. I had expected to stay in Rome for some time longer, but I found the climate so debilitating that it seemed wise to go to a higher and better air where it would be possible for me to accomplish more work, so I went, by way of Viterbo, Spoleto, Foligno and Assisi, to Perugia, where I had had some drawing-boards sent, and in the month I stayed there I was able to get through a large amount of work. In this region I found some very interesting material in the reliquaries and marble altarpieces of about the period of Mino da Fiesole and I was able to measure and draw, then and later in Florence, quite a number of them. They represent a, to me, very interesting phase of the artistic development of the period. From Perugia I went to Florence, stopping a day at Cortona and getting there a most delightful and characteristic final impression of the Umbrian valley. I stayed another three weeks in Florence, measuring, drawing, and visiting the galleries, and then went north to Pistoja, Bologna, Ravenna, Ferrara and then to Venice. I have not yet lost the feeling of keen delight of the first ten days in Venice. My plan at first was to stay there only for that length of time, but there seemed such a wealth of material there that I found six weeks none too long, and left at the end of that time with real regret. Among other work, I made careful studies and measurements of Santa Maria della Salute, which seems to me the culmination of that later Renaissance of Northern Italy, which seems so cold and so lacking in feeling in most of the earlier examples and which so soon degenerates into Baroque, but which, in a thoroughly pagan way, has such a decided charm in this example. My next stop was at Padua, and from there to Castelfranco and Vicenza. I had hoped to make an *envoi* of the Villa Rotunda near the latter place, but I was unable to overcome the dense stupidity of the custodian or even to make her understand what I wanted to do, so I was forced to abandon the project and go on to Verona. I stayed there for ten days and measured the Palazzo del Consiglio and made a study of the color-scheme. It is a wonderfully interesting monument and well repays careful study. A great part of its charm lies in the color, which, incredibly rich in its present faded state, probably loses nothing from the effects of time.

In all I spent about fourteen months in Italy, and of that time six months were spent in Rome, one month in Perugia, six weeks, in all, in Florence and six weeks in Venice.

This leaves four months of actual travel. As to methods of work, in general my practice was to make measured surveys and full notes of such work as seemed to me desirable to know about accurately, when I could get at it, and to draw it out at once or as soon afterward as possible. I purposely did not measure and draw work simply because it existed: I had to feel it to be satisfactory. In fact I think it is likely to be dangerous and misleading to put mediocre work on record. I attempted to avoid archaeology as distinguished from history and gave my attention to the visible artistic manifestation as distinguished from the mechanical constructive. When I did not think accurate information necessary, or where it could not be had, I usually relied on photographs rather than on sketches, excepting where I particularly wanted to fix a motive or an idea in my mind.

As I have already said, I tried to study the painting and sculpture of the different regions and periods, so as to get as far as possible the basis for a comprehensive understanding of the relations of the parts to the whole in the Italian Renaissance.

From Verona I went to Munich, by way of Trieste and Innsbruck, and then went by way of Strasburg, Nancy and Rheims to Paris.

It seems especially difficult to give an adequate idea of the work I did in Paris. Of course, the chief work was done in an *atelier* and was quite in the regular line. I tried to study planning especially, as the French understand it, and was at first disappointed to find how different their point-of-view is from the American one and how almost incomprehensible to an American. However, in the end, I felt more than ever sure that, with all the obvious surface absurdities, the system of instruction is on a right basis and on sound principles.

Their fresh methods and new ways of attacking a problem were to me particularly inspiring.

Besides this work in the *atelier* I had three *envois* to draw while I was in Paris, besides some other work that I had measured in Italy. The *envois* were the Palazzo del Consiglio at Verona and, by request of the Committee, two examples of the Romanesque and Gothic work in the Cluny Museum. There were also the galleries and museums, besides a limited amount of sight-seeing. I went to Chartres, Orleans and Blois from Paris.

After eight months full of delightful work of various kinds I left, by way of Rouen and Winchester, for London, from which latter place I took steamer for home.

As to the benefit I derived, I think it very probable that I do not realize it at all fully as yet and that it is too soon for me to estimate the result; but, beyond any mere facts I have learned, it seems to me to have had a very broadening influence and to have helped me to a larger vocabulary of ideas and motives, if I may be allowed to use the expression.

The drawings which I sent home represent only a part of the work I did abroad, and of course it is not possible to make any "showing" for a large proportion of the study that I did. The proper disposition and distribution of my time was one of the most difficult problems for me to settle: whether to do more or less drawing; how much time it was wise to spend in work not strictly architectural; and how much sight-seeing to include, were questions that troubled me a great deal.

However, I hope to show more fully in the future, in the work I am permitted to do, the results of my study and the benefits I have derived from two years which were very full of interest, work and enjoyment.

HAMBURG WAREHOUSES.¹

IT would now be well to examine what kind of buildings we find in a city like Hamburg, which has long been associated with serious fires, and where the new warehouse district, which was erected with the "Free Harbor" improvements during the last decade, by no means shows a particularly meritorious record of small fire-losses.

The great fire at Hamburg is comparatively recent when we think of our great fire of 1666, for it only occurred some fifty years back, and the serious nature of that catastrophe is still full well appreciated by the public authorities. The new Hamburg warehouses were, if I may say so, erected under the directions of an office where the atmosphere was still impregnated by reminiscences of a great fire, and where questions of fire-risk were wont to have serious consideration. These Hamburg warehouses were also erected for owners and occupiers who were wont to regard the inconvenience of fire far more seriously than is the case with our warehousemen or merchants. There was also the influence of the municipal insurance office, in which most of the bricks and mortar of Hamburg are insured; and there was, further, the influence of an insurance ring of private offices, where the managers were not only alive to the advantages of better construction, and assisted better construction with rebates in the premiums, but where the ring was also so powerful as to be able to enforce its requirements very effectually. Moreover, we should not forget that the end of the "eighties" and the early "nineties" had already given us a far larger number of suitable materials or methods of construction which could be applied at a reasonable cost with a view of minimizing fire-risk than were forthcoming in the early "seventies," when so much of the building on the Cripple-gate area had been done.

If we examine what has resulted from all these circumstances, so favorable to the better protection of the new warehouse district, we cannot but be astonished at what the actual fire-loss has been, and in what curious way elementary principles of fire-protection, well known at the time, were apparently either overlooked or purposely avoided.

Let us look at a section, Figure 66 on our two-page plate this week, taken through the warehouse district. This section well explains the general arrangement of the new works at Hamburg. Here we find that the two principal blocks of warehouses (each having, besides a basement, some six floors of storage accommodation) are practically enormous frames of unprotected ironwork, ingeniously constructed in the lightest possible manner, yet in every way liable to almost immediate collapse on the outbreak of a small fire. If we take this section and remember that the block through which this section is cut extends over 300 yards both ways, making a total length of some 600 yards of warehouse property, separated only by party-walls, some 60 feet to 70 feet apart, with only at times intermediate light partitions, one is indeed surprised at the risk that has been incurred, and must even congratulate Hamburg that no combination of unfortunate circumstances has caused any one of the serious fires that have occurred in the district in question to spread along the row of warehouses. Had it not been for the very efficient fire-brigade, with its strong equipment of fire-floats, further, the high-pressure water-service and the ample water-supply from the canals, the record would have been a very different one. If placed, say, in such a district as Cripple-gate, under similar conditions, these same warehouses must have been destroyed quite in the same manner as those which were razed to the ground in November last. And yet the Hamburg warehouses were erected with all due consideration of the hazard to which they are subject, and the requirements

¹ One of a series of papers on "Fire Protection," by Edwin Q. Sachs, published in *Engineering*.

of the merchants, the authorities, and the insurance offices. Does this not seem anomalous?

The section, Figure 66, of the canal and warehouses speaks for itself as to the fulfilment of modern requirements and the careful observance of modern methods in the general arrangement of the warehouses. The whole of this warehouse district is a model in many respects, and speaks well for the care which was given to the various details. Even architecturally, this warehouse district is of considerable merit, and surely it is rare to find warehouses of which one can say the same elsewhere. And yet, as far as fire-protection is concerned, there has been a blunder, and any one who will turn back to the sixth article of this series will immediately see in what direction the blunder has been made. Unsuitable forms of iron construction have been used, as far as the fireman is concerned, for all this ironwork has not been protected in any manner whatsoever. No doubt, as I have said before, the German engineers acted with the best intentions. They had in view the principle that in warehouses where such heavy loads are carried it is of the utmost importance that the ironwork can be easily examined, and preferably that is always in view. There is no doubt that the hidden rust might cause a collapse, but there is just as little doubt that it requires but little heat to cause a collapse if a fire originates where light lattice ironwork stands open as it does in these Hamburg warehouses.

These principles of construction, *i. e.*, those of light lattice ironwork, were adopted practically in the whole of the warehouses built at the time by the great Warehouse Company, which had leased the ground from the Hamburg authorities, and carried out the work under the directions of its officers. Practically the same methods were employed in the various private warehouses built at the time. To obtain some idea of the extent to which this method was adopted, I would only note that so nothing like 35,000 square metres of ground were covered with warehouse buildings in this district, giving a superficial storage area of over 200,000 square metres. The section, Figure 66, which I have shown explains the methods of construction adopted, but Figures 74 and 75, showing to a larger scale sections through one of the warehouses, and Figures 76 to 78, giving sections of flooring, explain more plainly the method in which the girder and the lattice work stanchions were introduced.

The area of the warehouse district is somewhat irregular, and this naturally prevented the identical repetition of any one warehouse design, but the principles observed are the same. This uniformity in principle is also observable in plan; thus the staircases, though mostly inclosed in brick walls, are uniformly so placed as, on the one hand, to be of little service from the fireman's point-of-view, and, on the other, to allow the fire to get through from one block to another, should by any mischance the protective doors be open, or the doors themselves give way. No consideration has been given to the fact that the fireman should be able to attack a warehouse fire from two points, and that on no account can one staircase be allowed to suffice for two important blocks, such as is the case in most of the Hamburg warehouses. We have cases at Hamburg, where one staircase has on the one side a warehouse of 40 metres' frontage, or over 130 feet, and on the other a warehouse with 30 metres' frontage, or over 100 feet. The division between these two warehouses is supposed to be by a party-wall, but the staircase, with its flights only about 3 feet wide, almost invites a fire breaking out in one warehouse to jump across, thus allowing of a spread to the neighbor. A combined risk of something close on to 250 feet frontage, with a depth, say, perhaps of 75 feet, is a very considerable one, and one which would also lead to the destruction of further adjoining property should, by any mischance, the Hamburg Fire-brigade be seriously engaged elsewhere, or have to contend against a severe gale.

But, as I have said, so far the Hamburg Fire-brigade has always been able to attend promptly in good force with its large number of fire-floats, besides its ordinary equipment of steam fire engines; and it has, further, had the advantage of a high-pressure water-supply. In other words, what with the position of these warehouses and the means at the disposal of the fire-brigade, the risk is considerably lessened. But to repeat, given the same buildings in the metropolis, we could expect no more from them than we could of the warehouses in the Cripple-gate area. The buildings in the Cripple-gate area, as far as their construction went, if placed in long lines, separated by real party-walls, and arranged on similar lines as the Hamburg warehouses, might have, perhaps, burned more rapidly; but their collapse would certainly not have been of a worse description than the collapse to be expected from the light and unprotected ironwork of the Hamburg buildings under consideration.

Now, if I condemn the Hamburg warehouses as originally built with a "free port," I must not fail to say that there are but few public authorities who have been so painstaking in attempting improvements after the blunder was discovered as those of the old Hanse city. After the bad experience with the light ironwork supports, a number of tests were organized under the direction of the Board of Works, with the view of ascertaining the relative power of resistance of various materials and various forms of construction. It will be remembered that I referred to some of the results of these tests as defined in a report of the Hamburg authorities, when speaking of unprotected iron in the eighth article. This series of tests was particularly creditable to a public authority which, having associated itself with a special form of construction, and having continued to advocate it after the blunder had become evident, very open-mindedly

put the matter in the hands of a Commission on which both the advocates and enemies of unprotected iron were represented, not forgetting the eminent engineer-in-chief of Hamburg on the one hand, and the chief officer of the fire-brigade on the other.

But having also come to certain results with the aid of these tests, the public authorities have facilitated the application of the results by not only allowing, but favoring, the application of heavy woodwork in new warehouses to be erected in the district under consideration; and we thus now obtain, as the most modern type of warehouse to be found in Hamburg, the wood warehouse of old with certain modifications.

Thinking that the latest example of a wood warehouse of this description would be of considerable interest, I give, with the kind permission of the architect, Herr Gustav Shrader, engravings (Figs. 67 to 73) [See Illustrations] of a building which was only completed last year for the Export and Warehouse Company on the Steinwäerder. The plan of this warehouse almost approaches perfection, as regards the general proportion and the distribution of space between party-walls. But, perhaps, its most notable feature is the arrangement of the staircases which, while yet showing the application of the old principle of one staircase to every two warehouses, as a matter of fact, gives us two staircases to each pair of warehouses, and arranges these staircases in such a manner as to minimize the risk of fire spreading from one block to the other.

If I am not wrongly informed, the arrangement of the staircases, as here shown, is due to a suggestion of the chief officer of the Hamburg Fire-brigade; and while the improvement over the ordinary staircase by the arrangement of a lobby and twice-double doors is practical, but not particularly ingenious, the contrivance of the circular staircase for the special use of firemen is certainly a very clever piece of planning. We here obtain a circular staircase which suffices in every way for the purposes of the fire-brigade, and which yet occupies a minimum of space, and, on the other hand, in no way adds to the risk of spread. This circular staircase has its approach from the outside, as far as every floor is concerned, balconies being provided. Each block and each floor has its door on to this balcony, while the winding staircase similarly has a door, as far away as possible from these two openings. While the main staircase faces the thoroughfare, the circular staircase is on the water-side of the warehouse, and it is just this staircase, which had so far always been omitted, which will afford particular facilities for the fireman when wishing to attack a fire in any one block from a second point. Before leaving the plan, I think special attention should be called to the dimensions, more particularly as we are here dealing with wood supports, and the question of bearing is of importance.

With regard to the floors in this latest example of Hamburg warehouses, I would only notice that, as finances did not permit of the more elaborate forms of fire-resisting flooring being introduced, the architects had to be satisfied with one main division to every three floors, and we thus find that while the ground-floor is separated from the first floor by an ordinary floor of joists with double boarding, rebated, and grooved, the same kind of floor also separating the first story from the second story, further protection is afforded in the next division where an iron and concrete floor has been introduced with bearers above, allowing for an air-space, and a double flooring on the top of this. Again, I cannot but draw attention to the dimensions which are given, as these are all-important, and will either tend to prove or disprove that heavy timber construction may be arranged to fulfil the requirements of a modern warehouse without incurring a greater expenditure on heavy wood-scantlings, or an extra expenditure in the surrounding walls owing to extra thickness of the floors. The principles of carpentry practised in Hamburg in work of this description are also instructive; and we should not forget that we are dealing with the warehouse that, besides having a cellar, has six floors, similar to the original example of a warehouse built for the "free port" in its early days.

The contrast is most curious, especially if one warehouse be visited after the other, and the difference has been noted between the fine trellis-work of the older warehouse and the clumsy woodwork of the newer example. A point of no small importance should also be noted as regards the roof. The new warehouse has a very flat roof, compared with the older one, and this is a further facility for the fire-brigade, whose work often becomes precarious, not to say impossible, where the slope varies from 30 degrees to 45 degrees.

From the expert's point-of-view, it is only regrettable that no fire has yet occurred in this warehouse in order to be able to practically prove the power of resistance as compared with the older example; for this test will be watched with great interest, and would perhaps lead to our returning entirely to heavy wood stanchions where the small value of ground either allows us to take up space with numerous supports, or where the business that is carried on does not prevent subdivision by rows of uprights, standing some ten feet apart. As I have said, the staircase contrivance on the water-side is particularly ingenious, and the idea of only protecting every third floor with improved forms of flooring should be remembered where money is scarce. But, taken as a whole, we here have an experiment with the wood support of old, and it is the reintroduction of wood which makes this latest instance of Hamburg warehouse work so important.

There is certainly no reason, to say the least, why the new Hamburg warehouse should not afford some better protection than the old one, and even a small improvement should be acceptable to the Hanse city.

PILE-RINGS AND METHOD OF PROTECTING PILE-HEADS IN DRIVING.

A committee of the Association of Railway Superintendents of Bridges and Buildings makes the following report on Pile-Rings and Method of Protecting Pile-Heads in Driving:—

"First.—We find that the best way to protect the pile-head is to use a 1" x 3" ring, made out of the best iron that can be obtained at the place where used. We recommend, where a railroad company have a steam-hammer in their shops, that they make their pile-rings out of hammered-iron from old car-axles. The cost of a 1" x 3" — 14" diameter ring is \$1.75, while the same size ring made out of best bar-iron costs \$2.00. A pile-ring made out of hammered-iron will last to drive 75 oak piles and at least 300 cedar piles. The rings made out of best bar-iron usually last to drive 50 oak piles and 200 cedar piles; in fact, one of your committee had 50 pile-rings made out of old car-axles four years ago, and since that time has driven 250 oak piles and 6,000 cedar piles without any renewal of pile-rings. A pile-driver should carry on the tool-car 60 pile-rings, 10 pile-rings 15", 30 — 14", 10 — 13½", and 10 — 13" in diameter.

"The 14" diameter are the ones most used, 14" being the width of caps used by most roads. It is not necessary to have the pile-head larger in diameter than the cap is wide.

"Second.—In fitting the pile-ring, the pile should be neatly sawed off square; the pile should be neatly chamfered down at least 5" from the end, so the ring will just catch on and let the pile-hammer do the rest. This is a little hard on rings, but in this way you are sure to get a good fit of the ring and the pile-head is best protected.

"The face of the pile-hammer should be concaved to the depth of 1½" in the centre, and run out to nothing 2" from outside of the hammer; this will drive the fibre of the wood down slightly over the edge of the ring and make a neat fit of the hammer, and if the piles are kept exactly under the hammer there is very little danger in fracturing the pile. The best weight of a pile-hammer is 3,300 pounds. The height of the blow should not exceed 12' in driving cedar piles, or 20' in driving oak piles. It will be found that short, quick blows will drive the pile as quickly as long blows, and are less liable to injure the pile. The pile should be neatly prepared before driving it; the knots should be neatly trimmed off, and the pile sharpened to a 4" square point for hard driving, the point to be made as near straight with the pile as possible. Piles should never be over-driven. When a pile does not go over 1" at a fall of 10' with a 3,300-pound hammer, the blow should be shortened to 6', and the pile carefully driven until it stops going or does not go over ¾" at a blow. The driving of piles for railway traffic, and for all kinds of structures, requires a great amount of judgment to do good work. The use of the iron cap for driving piles in trestles that are in use is not very practicable, as you cannot drive the piles up so close to the stringer with them as you can without them. It is too much extra work to move the stringers so as to use the iron caps and follower, but for driving piles for foundations and dock work, or any place where there is no obstruction, we think Wm. T. Casgrain's patent cap and follower an excellent device. It is especially adapted in driving foundation-piles, as that class of piles are generally short — not over 25' in length, and with the patent cap they will not need any toggles to keep them right, and they are good protection to pile-heads, as the piles in foundations should be driven home until they stop and the hammer bounces on them. In driving piles through shell-rock or soapstone or hard-pan, where piles require shoeing, the best way is to use old arch-bar iron, welding four pieces together and drawing the end to a point and flaring the four pieces out to fit the four sides of the pile. Have some holes punched in the strap to fasten the points on the pile with boat spikes; this kind of a point will go through hard substances where the round cast-iron point will not work. These kinds of points have been used by some of your committee to drive through concrete around piers to great advantage, and any one having occasion to drive piles through hard substances too hard for piles should not neglect to shoe them with points made out of old flat iron. A little practice will soon teach one how to make them."



[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

ENTRANCE TO THE BUILDING OF THE AMERICAN SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS, NEW YORK, N. Y. MESSRS. RENWICK, ASPINWALL & OWEN, ARCHITECTS, NEW YORK, N. Y.

[Gelatin Print, issued with the International and Imperial Editions only.]

WAREHOUSES AT THE PORT OF HAMBURG.

FOR description of this plate, copied from *Engineering*, see article elsewhere in this issue.

SECTIONS AND DETAILS OF THE SAME.

ST. PAUL'S EVANGELICAL LUTHERAN CHURCH, EAST 156TH ST., NEW YORK, N. Y. MESSRS. DODGE & MORRISON, ARCHITECTS.

DESIGN FOR THE PEOPLE'S BANK, BROOKLYN, N. Y. MESSRS. J. G. GLOVER AND H. C. CARREL, ASSOCIATED ARCHITECTS, BROOKLYN, N. Y.

PLAN AND ELEVATION OF THE SAME.

[The following named illustrations may be found by reference to our advertising pages.]

ENTRANCE GATEWAY TO THE BELVEDERE, VIENNA, AUSTRIA.

This plate is copied from *Architektonische Rundschau*.

NEW GALLERIES IN THE KREUZKIRCHE, DRESDEN, SAXONY.

This plate is copied from *Deutsche Bauzeitung*.

[Additional Illustrations in the International Edition.]

THE SCHÖNBORN MORTUARY CHAPEL ATTACHED TO THE CATHEDRAL, WÜRZBURG, BAVARIA. BALTHASAR NEUMANN, ARCHITECT.

AFTER long-continued negotiations with the Chapter of the Würzburg Cathedral, Prince-Bishop Johann Philipp Franz von Schönborn obtained permission to build a mortuary chapel for himself and his house as an annex to the Cathedral. Balthasar Neumann, the most famous architect of his generation in Southern Germany, drew the plans for it and conducted their execution. On June 4, 1721, the corner-stone of the building was laid, but as the Prince died in 1724, the work of construction was interrupted and not resumed until 1729, when a brother of the founder, Friedrich Carl von Schönborn, ascended the Episcopal See. The chapel was completed, in its essentials, in 1733, but its consecration was delayed until the year 1736. In its totality, as well as in its details, Neumann's design must be pronounced a masterpiece. The plan is rectangular with rounded corners, the entrance being placed in a recess projecting from the centre of the long east façade. Upon a high pedestal rise pilasters, respectively engaged coupled columns with Corinthian capitals, each showing a death's-head between the corner-volutes. The round-arched windows have under their sills panels with sculptured ornament expressive of mortality, while above the windows, resting on arched cornices, are seen winged cherubs in playful attitudes. Surmounting the columns which flank the doorway skeletons in draped robes, the emblems of death, are seen, perching on scrolled cornices.

Of quite a different character are the sculptures above the main cornice. Upon the apex of the central pediment angels are holding up the cross, the symbol of Faith, while right and left, on the raking sides are placed two female figures: Hope and Charity. The oval windows of the attic are framed with mirthful Rococo-ornament, vases with sprouting tops surmount the attic over each pilaster, and the dome, with finely-proportioned lantern, crowns the whole.

It is obvious that the artist employed the symbols described to remind mankind of death and decay of all things human (in the sculptures of the lower story), while pointing out to them the possibilities of a higher life and the hope of a glorious resurrection (in the sculptures of the upper story), a symbolism, which furnishes only another proof, if one were needed, that the much-maligned masters of the Rococo period did not work blindly, but that, to the contrary, their work was often fraught with exalted ideas and deep meaning.

THE GOETHE GYMNASIUM, FRANKFORT-ON-THE-MAIN, GERMANY. HERR FROBENIUS, ARCHITECT.

This plate is copied from *Zeitschrift für Bauwesen*.

PAVILION OF THE CITY OF VIENNA AT THE JUBILEE EXHIBITION, 1898, VIENNA, AUSTRIA.

This plate is copied from *Osterr. Monatschrift für den öffentl. Baudienst*.

PROPOSED NEW TOWN-HALL AND MARKET, TAUNTON, ENG. MESSRS. TAPPER & CROUCH, ARCHITECTS.

This plate is copied from the *British Architect*.

DRAWING-ROOM: "THURSTONVILLE," BECKENHAM, ENG. MR. FRANCIS HOOPER, ARCHITECT.

NEW BUSINESS PREMISES, WEST CALDER, SCOTLAND. MR. J. GRAHAM FAIRLEY, ARCHITECT.

LONDON AND WESTMINSTER BANK, STRAND, LONDON, ENG. MR. F. W. HUNT, ARCHITECT.

NOTES AND CLIPPINGS

THE EIGHT-HOUR DAY IN ENGLAND.—The old controversy as to the expediency or otherwise of the eight-hour day is revived by the account just published of the results of this system at the Pallion Works of Messrs. Short Brothers. Advocates of the change assert that a workman coming in cold, sleepy, and hungry at 6 A. M. in general only works in a very half-hearted way till the breakfast hour. Sharp supervision by the foreman is needed to keep him up to the mark, and in our own experience we have known men retire morning after morning to the sweet seclusion of a low-pressure cylinder for a second nap. Further, there is always a loss of time in anticipation of and following every break, so that it is advantageous to reduce the number of these to a minimum. Lost time is also common with the usual arrangement of working hours, though its amount varies much in different towns, and in some instances it is trifling. Messrs. Short, however, state that with the old system at Pallion usually from 15 to 20 per cent of the time-workers lost the first quarter, whilst the men on piece seldom turned up till 8.30. In fact, with the eight-hour day, which they first adopted seven years ago, the actual time worked per man per annum is more than with the old system, and the production of the works has been correspondingly improved. Opponents of the eight-hour day, while admitting that a workman is not at his best till after breakfast, draw attention to the fact that machines are not thus affected by hunger and sleep. Machinery is, of course, becoming continuously more important, and is displacing much handwork. A reduction of the hours worked by a machine per week is, therefore, a serious matter, as the earning power is correspondingly diminished, while the interest on its cost price, and similar charges, remain the same. Moreover, in America, where the men work with great intensity, the ten-hour day is in vogue, which suffices to prove that it is not impossible for a well-fed and vigorous mechanic to work these long hours at top pressure. It has, however, to be remembered that the American workman gets his breakfast before he starts, and has only one break in the day's work. Moreover, every device is adopted to ease his labors. Machines are designed with a view to his convenience, automatic appliances are adopted wherever possible to reduce his work, so far as the conditions allow, to one of guidance rather than of muscular effort, and, further, there is no objection to providing him with a seat where the latter will not hamper him in his work. Locomotive drivers are a case in point. In short, good factory management should aim at reducing to a minimum all causes of fatigue not contributing directly to effective production. This fact has, we believe, been more fully recognized in the States than here, and one consequence of this has been the abolition there of early morning work with tired and hungry men. Messrs. Short's experience would seem to entirely justify the opponents of this practice, while it also shows that the agitators who claimed an eight-hour day for the purpose of decreasing the number of unemployed were mistaken as to effects of the change proposed, at least in shops where the men are as independent of discipline as shipbuilders are.—*Engineering.*

BY-PRODUCTS OF THE FOREST.—Trees yield many things besides timber. Turpentine, for example, is the raw sap of the pitch-pine. "The turpentine merchant," says a writer of forestry, "in whose wake miles of dead trees, presenting a pitiable sight, are to be found." It is the turpentine orchards of the Mississippi that he describes. The forest suffers in life as well as in death in the service of man. The cinchona is robbed of its bark for the sake of the quinine which it contains. Resins, rubbers, barks, fibres, tans, dyes, lacquers, seeds, and fruits—the list has no end. Many of these are due to modern enterprise; it is curious to note, however, that wood-tar is prepared just as it was in the fourth century before Christ. A bank is chosen and a hole dug, into which the wood is placed covered with turf. A hole is lighted underneath and the tar slowly drips into the barrels placed to receive it. Tar, distilled in its turn furnishes wood-vinegar, creosote, and pitch. Vanillin, an artificial substitute for vanilla, is made from the sap of the Scotch pine, while a kind of rubber has been obtained from the common birch. Charcoal factories yield other products than charcoal, notably wood-naphtha; in some the smoke given off is used as fuel. On the Continent the hobbine, which we burn to waste over here, is used in the manufacture of textile fabrics. There are fortunes to be made in the by-paths of industry. Some industrious statistician has calculated that in the United States 100,000 cords of maple are used annually in the manufacture of shoe-pegs, and 390,000 cubic feet of pine in making matches. Wood has had an important influence on the paper-making industry. Young saplings, which before were not worth cutting down for fuel, can now be converted into pasteboard. A tree was cut down in Galveston at 10 o'clock in the morning and converted first into pulp and then into paper by 6 o'clock in the evening. At 6 o'clock the next morning it was being distributed as a daily paper.—*Invention.*

DISCOVERY OF A CRANNOG.—The remains of a dwelling built on piles has been found on the shores of the River Clyde, and is an undoubted crannog. This crannog is fairly extensive, with a circumference of 184 feet. The piles are of oak, and show under the mud the distinct marks of such cuttings as a stone axe would make. The cross-beams are of fir, birch and hazel. In the refuse mound the pastoral character of the dwellers was shown, for there were the bones of cattle and sheep. Many fire-stones were found and a whetstone. One important discovery was made, which was a canoe, thirty-seven feet long, and cut from a single oak-tree. The crannog is of decided archaeological importance, because of its locality, and, with the flint and bone tools, it must belong to the Neolithic age. Heretofore metal objects have been found in crannogs, so these on the Clyde must be the oldest yet discovered.—*Exchange.*

THE TOMB OF Ghiberti.—Signor Francheschini, the Italian historian, has just found in the old cemetery of the Church of Santa Croce, in Florence, the tomb of Ghiberti, the celebrated sculptor and architect: He was the designer of the famous doors of the Baptistery at Florence of which Michael Angelo said that they were "worthy of Paradise."—*Boston Transcript.*

WOMEN SCULPTORS.—Seven women labored on the colossal statues of the World's Fair buildings and grounds, and at the head of these stood Miss Julia Bracken, who was in practical charge of the women sculptors and who herself modelled several famous statues. The large figure of "Illinois Welcoming the Nations" was the work of her hands, as were also the flying figures which adorned the corners of the Woman's Building and the "Victory" of the Manufactures Building. Since the Fair Miss Bracken has devoted her time chiefly to bust work, the most successful being the bust of Sir Moses Montefiore, the Hebrew philanthropist. This talented sculptor occupies a studio in Chicago. Mrs. Low W. Moore, another of the "working seven," had her bust of John R. Bunsley accepted by the National Sculpture Society of New York. It was such a strong piece of work that the judges refused to believe it had been fashioned by the dainty hand of a woman.—*N. Y. Tribune.*

END OF AN ANCIENT LONDON CHURCH.—Owing to the recent changes, Holy Trinity, Minorities, has ceased to be a parish, and will be united to St. Botolph's. It may be well to remember that the church which will thus undergo transformation into a mere parish-room has a long and distinguished history. Originally the chapel of the Abbey of St. Clare, which was founded in 1293 by Blanche d'Artois, Queen of Navarre, the church was known by its present name as far back as 1563, some twenty-five years after Lady Elizabeth Savage had surrendered the abbey to Henry VIII. Among its plate are a pair of flagons, presented by "Honest Will Legge," the cavalier who was given the abbey-buildings for his loyalty and lies buried in the church. In that same seventeenth century the place enjoyed the same reputation for "easy marriages" as did the Fleet later on, but from 956 weddings in one year the total fell rapidly to only six in 1865, and now that warehouses have encroached on all the surrounding ground, the permanent population is so small that church and parish alike have ceased to have material reason for existence. And in these days no one pays much attention to sentiment.—*London Church Gazette.*

MOVING A FORMOSAN CITY.—W. E. Curtis, the Washington correspondent of the *Chicago Record*, writes of a scheme of the Japanese Government, ordering the destruction of the city of Teckcham, Formosa, and removal of all its inhabitants to a new location. The city is situated on the northwest coast of the island, and has been frequently subject to pestilence. In 1896 and 1897 plagues visited Teckcham with enormous fatality. This fact being called to the attention of the Government, an investigation was ordered by sanitary experts, who reported that the city was built upon a swamp, whereupon an order was issued to the governor to select a new location as convenient to the old as possible, where the natural conditions were healthful. A new city was laid out, and each property-holder in the old one was assigned a site that corresponded in area with that he occupied at Teckcham, and was given twelve months to remove his buildings and belongings. Sewers, railroads and sidewalks, public buildings, water-works, and all other public improvements were laid out by the Government in the new city without expense to the people, but they were required to pay the cost of the removal of their own property. Most of the houses and other buildings in Teckcham are built of very light wooden material.—*N. Y. Times.*

THE VATICAN.—The assemblage of buildings called by the name of "The Vatican," and which extends in an oblong irregular mass north of St. Peter's as far as the town walls, consists mainly of (1) the Papal palace, (2) the court and garden of Belvedere, (3) the Library, (4) the Museum. The Papal palace contains, among other remarkable objects, the Sistine and Pauline chapels, painted by Michel Angelo. The Sistine Chapel contains the painting of the "Last Judgment"; the four "stanze," or apartments, painted by Raphael; and the "logge," or open galleries, painted by Raphael's pupils under his direction. There are numerous other apartments, with paintings and other objects worthy of notice, which are described in the guide-books. The principal staircase, made by Bernini, is a splendid work of art. The Vatican is said to contain altogether eight great staircases, more than twenty courts, twelve great halls, and several thousand apartments large and small. A corridor, about 1,000 feet long, joins the Papal palace to the building called "Belvedere," which serves as a museum. About half-way up this corridor is the entrance to the Vatican library, which was built by the architect Fontana, under Sixtus V. Pope Nicholas V was the founder of the Vatican library, which has been increased by many popes. The libraries of the Duke of Urbino, of the Elector Palatine, of Christina of Sweden, of the family Ottoboni, and others, have been added to it. It contains 80,000 printed volumes and 24,000 MSS., of which 5,000 are in Greek, 16,000 in Latin and 3,000 in the Oriental languages. Partial catalogues of this great store of learning have been published by Assemani, Marini, Mai and other librarians. The museum or collection of works of art, mostly of ancient sculpture, was begun by Clement XIII and Clement XIV, and greatly increased by Pius VI, who was a man of taste, and who gave it the name of "Museo Pio-Clementino." It was illustrated by Gio. Battista Visconti and his son, Ennio I. Visconti, in 7 vols. folio, with plates, Rome 1782. Pius VII, during his troubled pontificate, began a new collection, to which has been given the name of "Museo Chiaramonti." The two together, which are distributed along the court, garden and palace of Belvedere, constitute the richest museum in Europe. Another and more extensive garden belonging to the Pope is annexed to the Vatican palace, and extends along the brow of the hill.—*The Architect.*

WAREHOUSES AT THE P

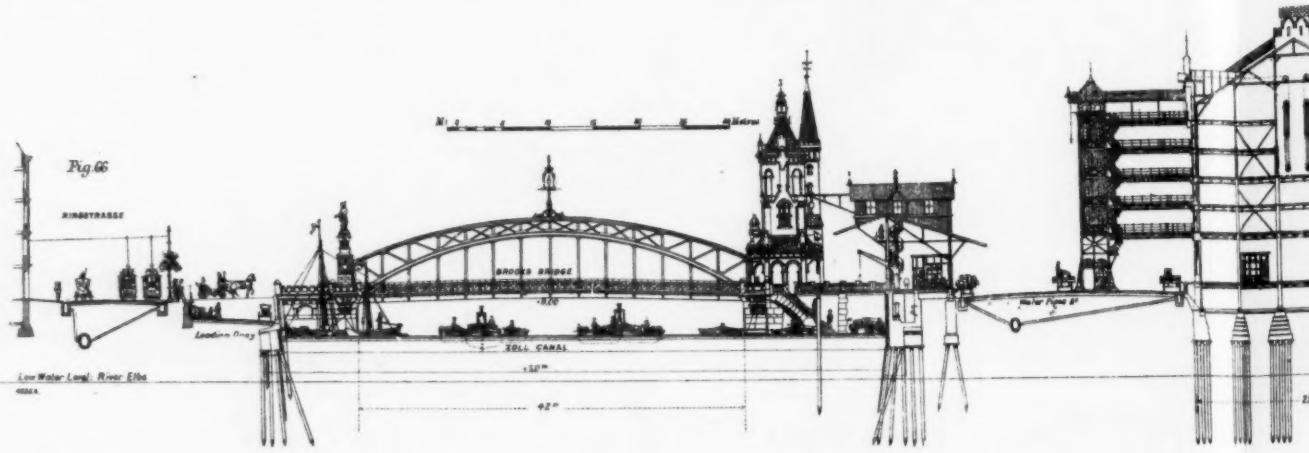
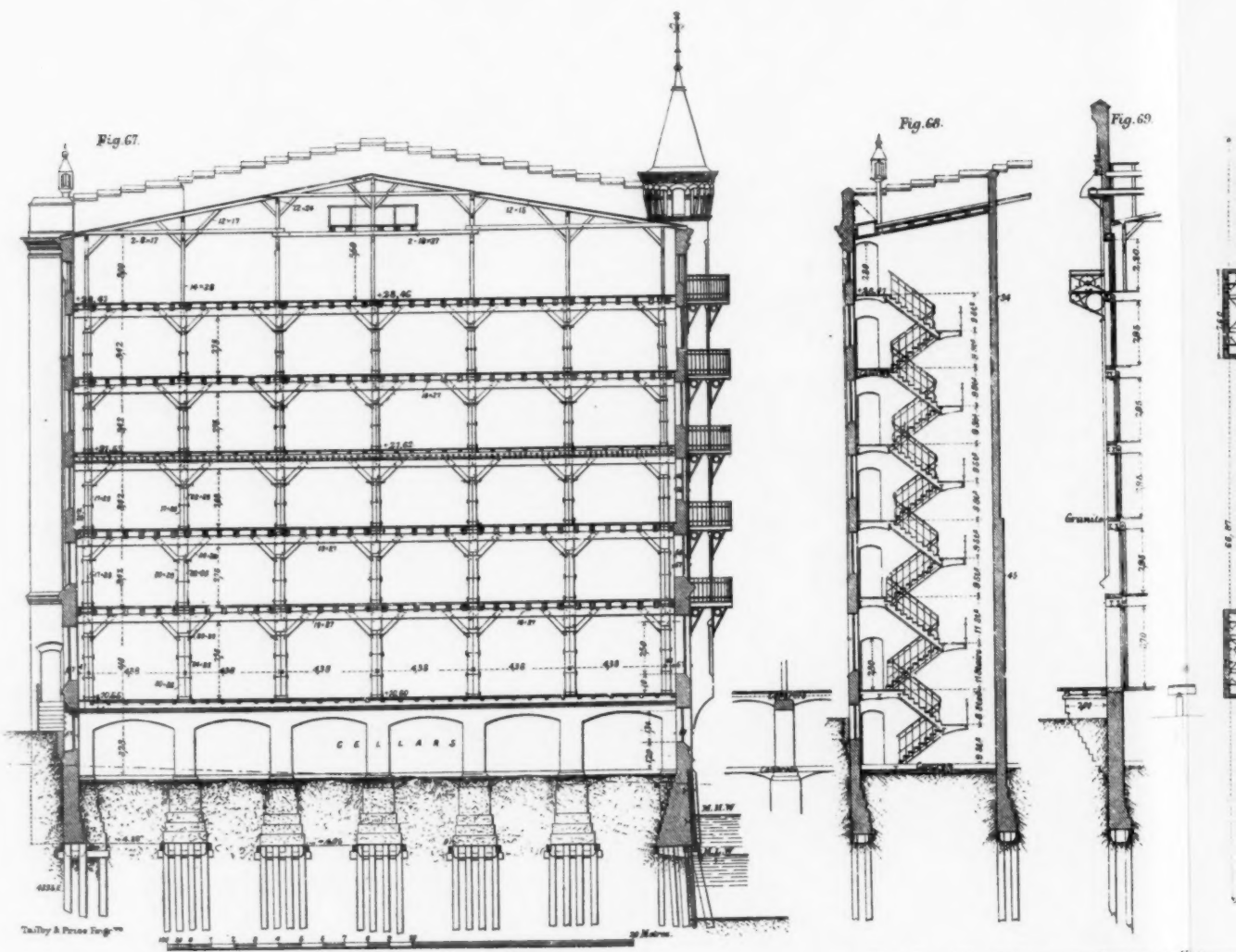
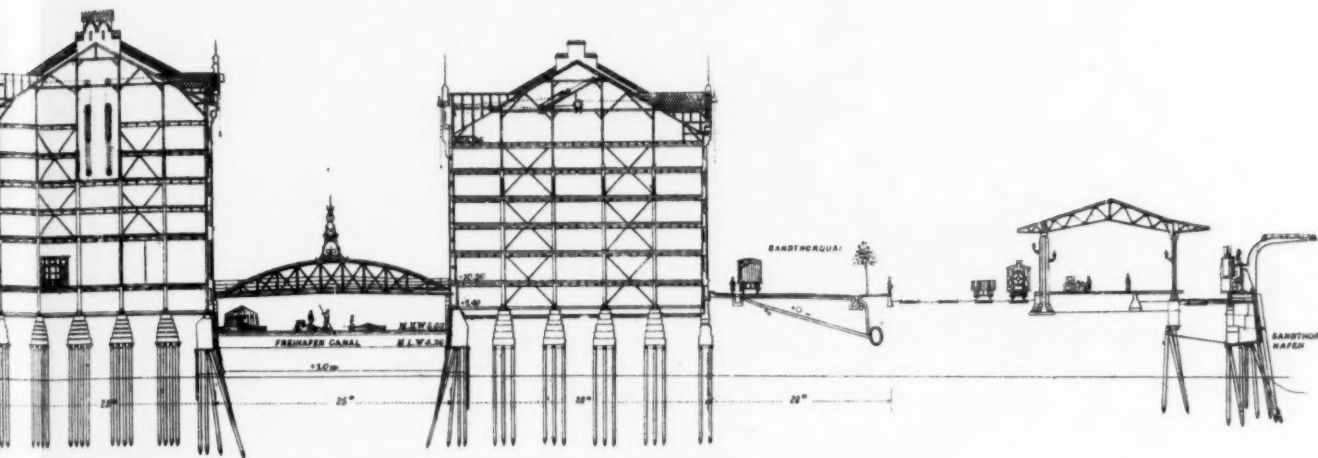


FIG. 66. SECTION OF HAMBURG WAREHOUSE



FIGS. 67 TO 72. SECTIONS AND DETAILS OF HAMBURG

THE PORT OF HAMBURG.



HAMBURG WAREHOUSES AS CONSTRUCTED IN 1887.

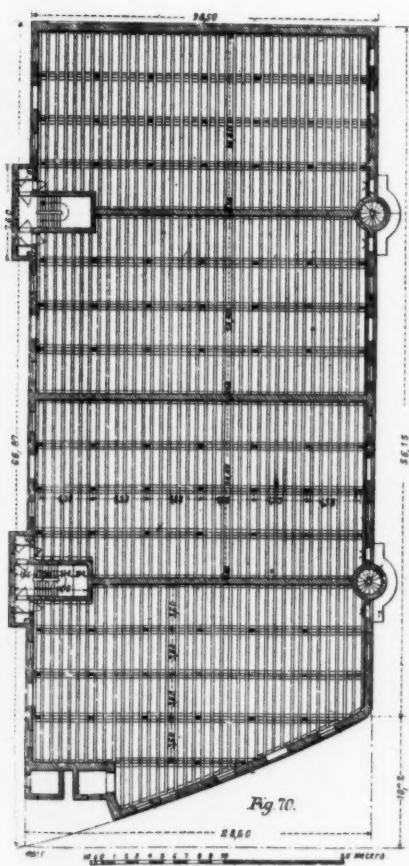


Fig. 70.

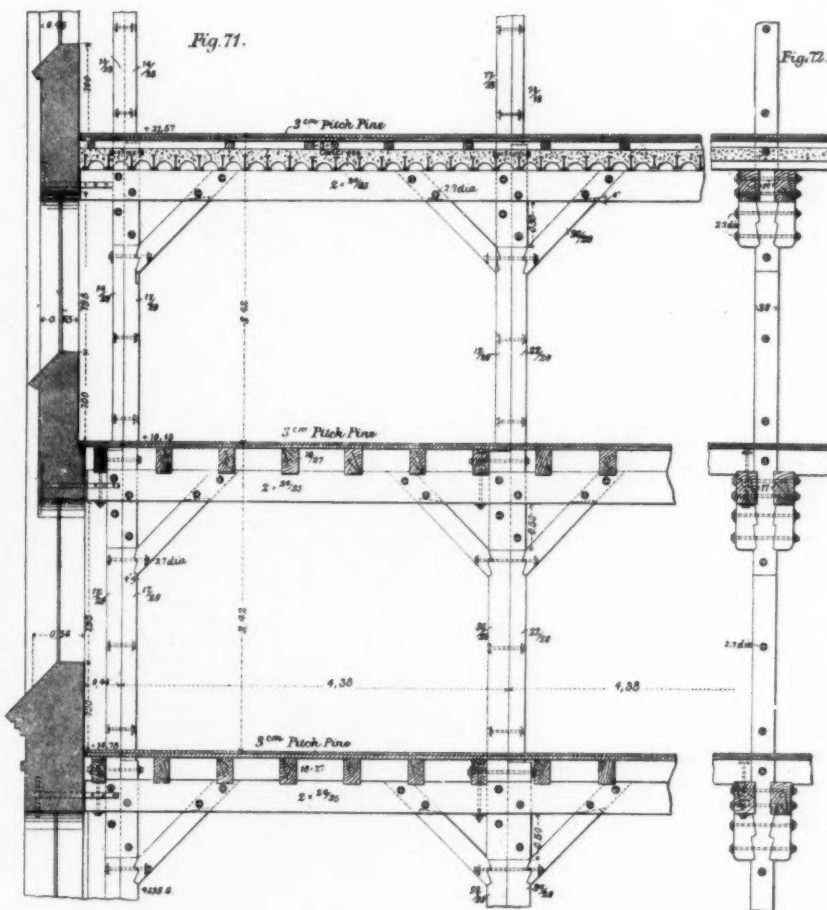


Fig. 71.

Fig. 72.

HAMBURG WAREHOUSES AS CONSTRUCTED IN 1897.

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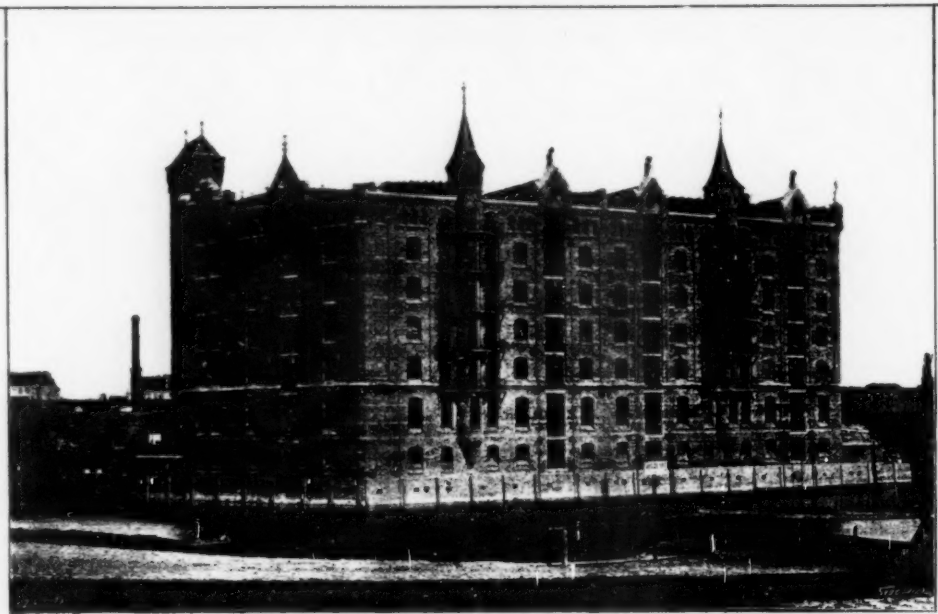
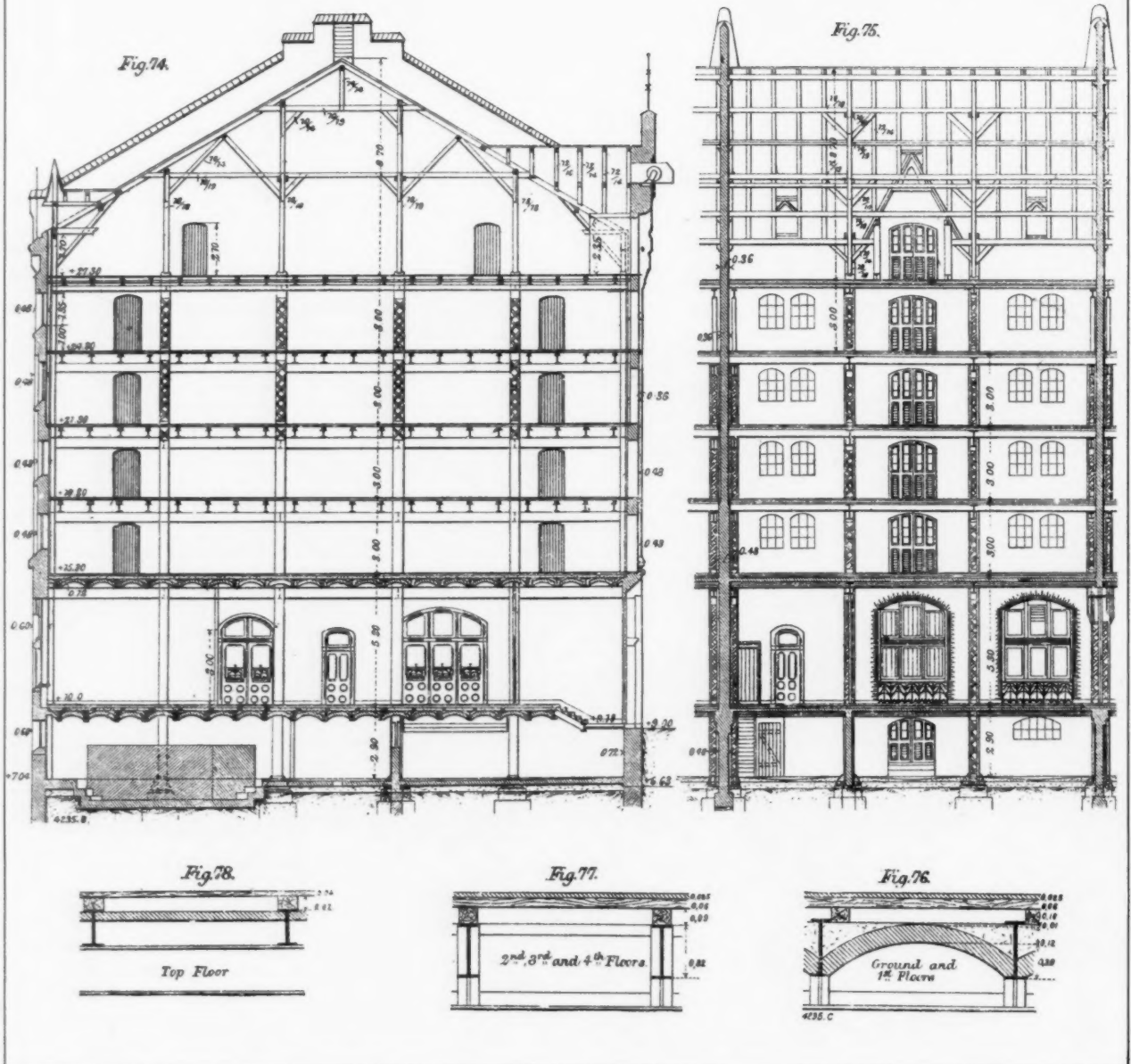


FIG. 73.

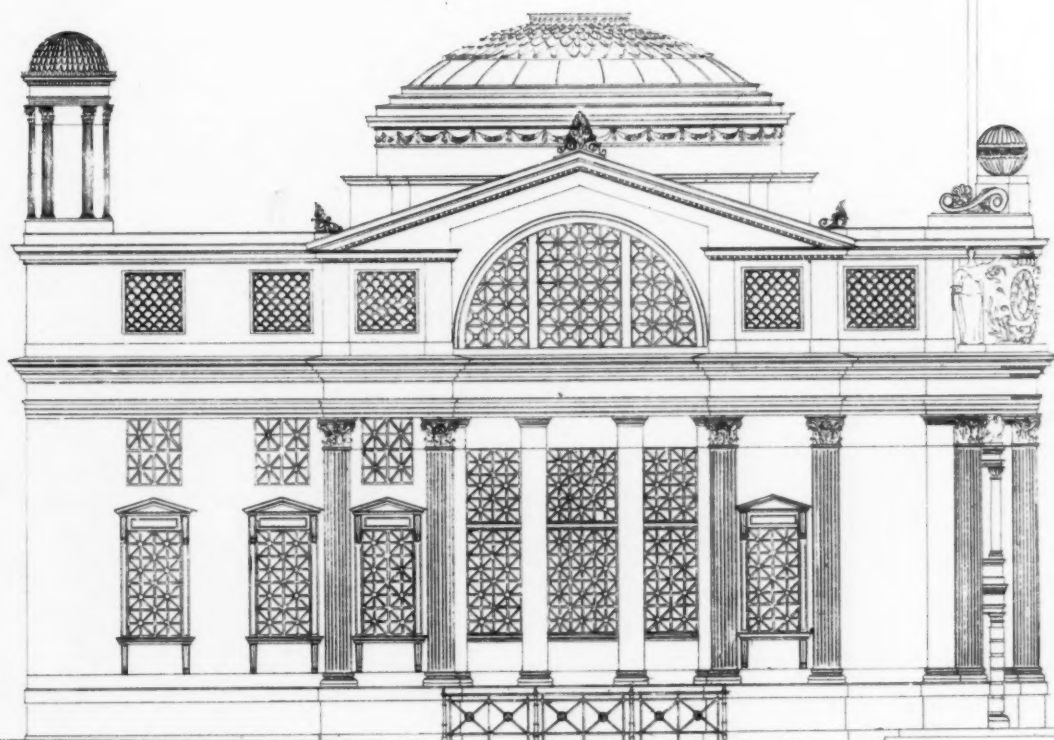
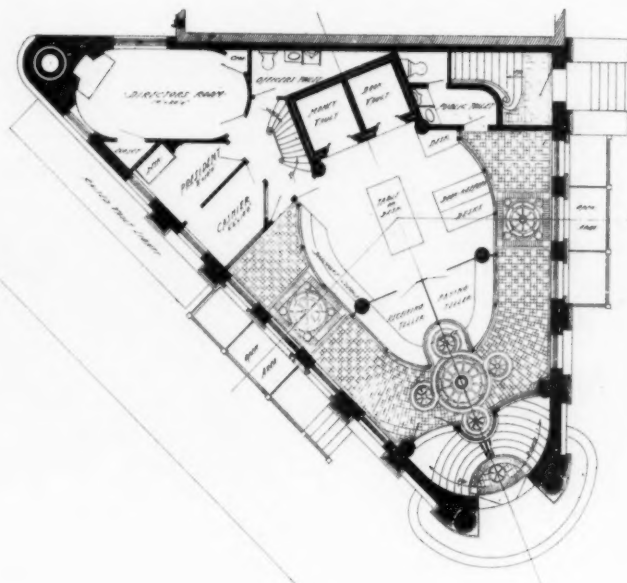


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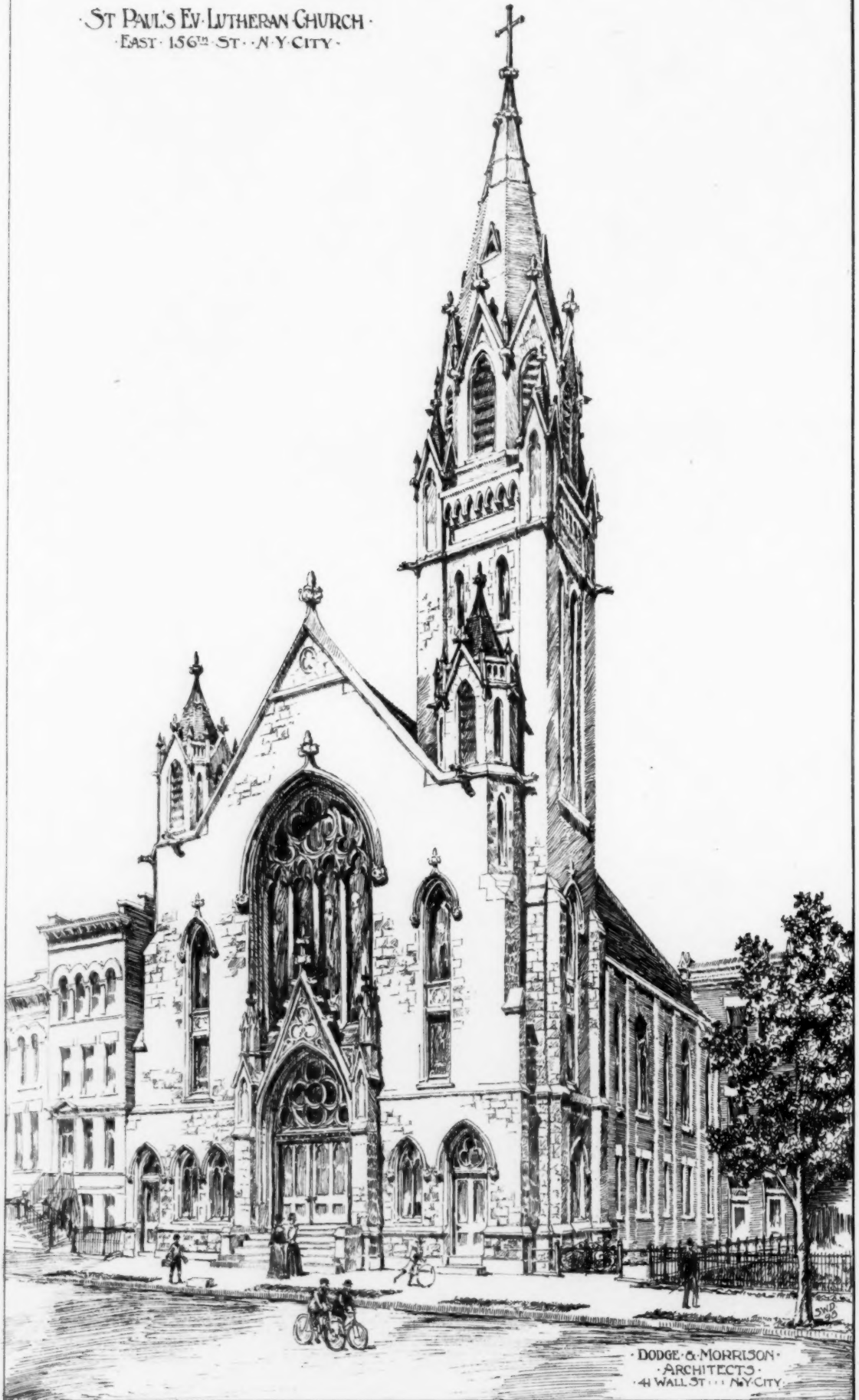
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DESIGN FOR PEOPLES BANK
BROADWAY AND GREENE AVE.
BROOKLYN, N.Y.

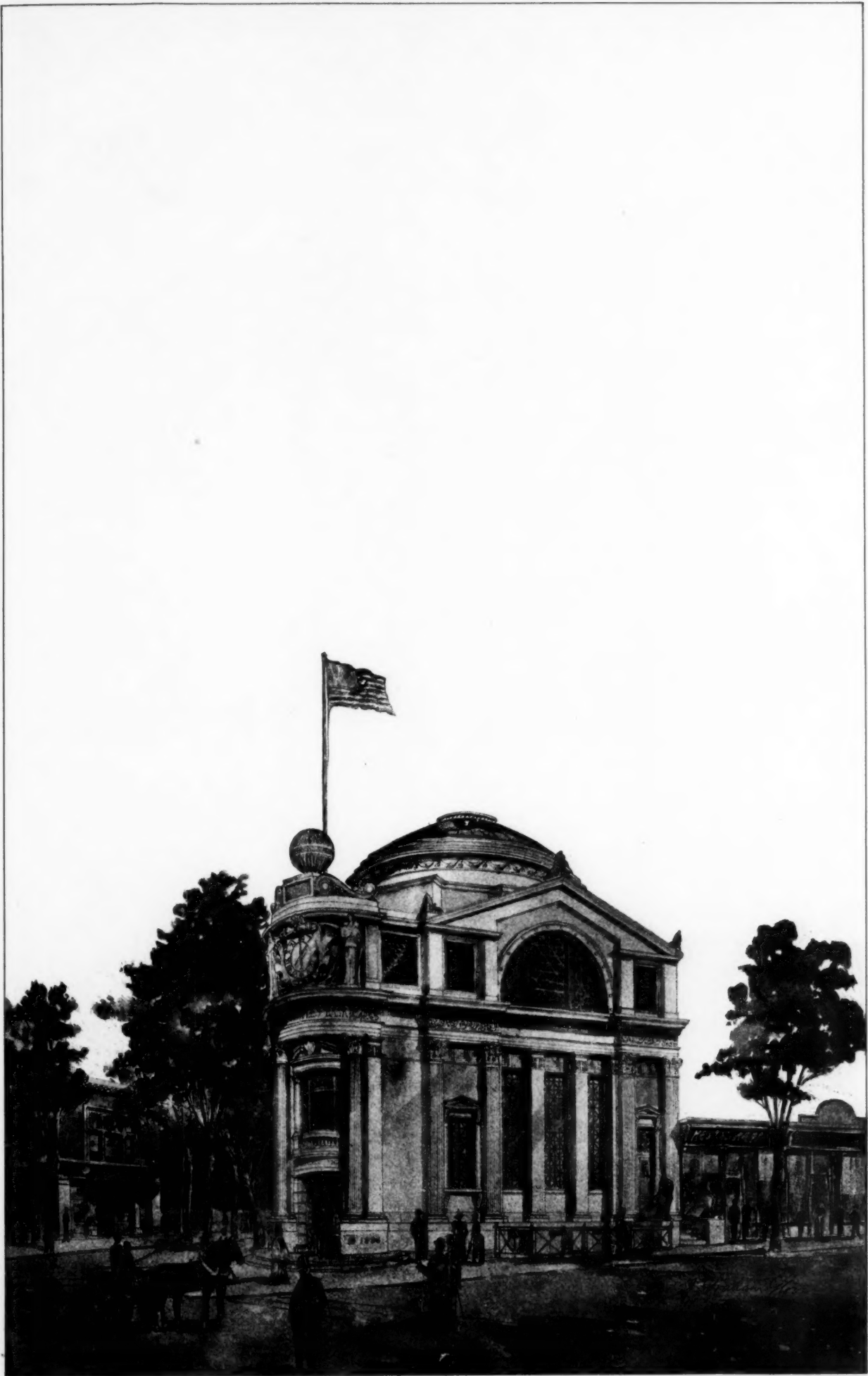
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