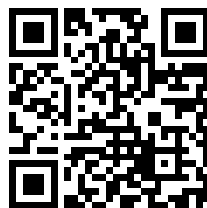
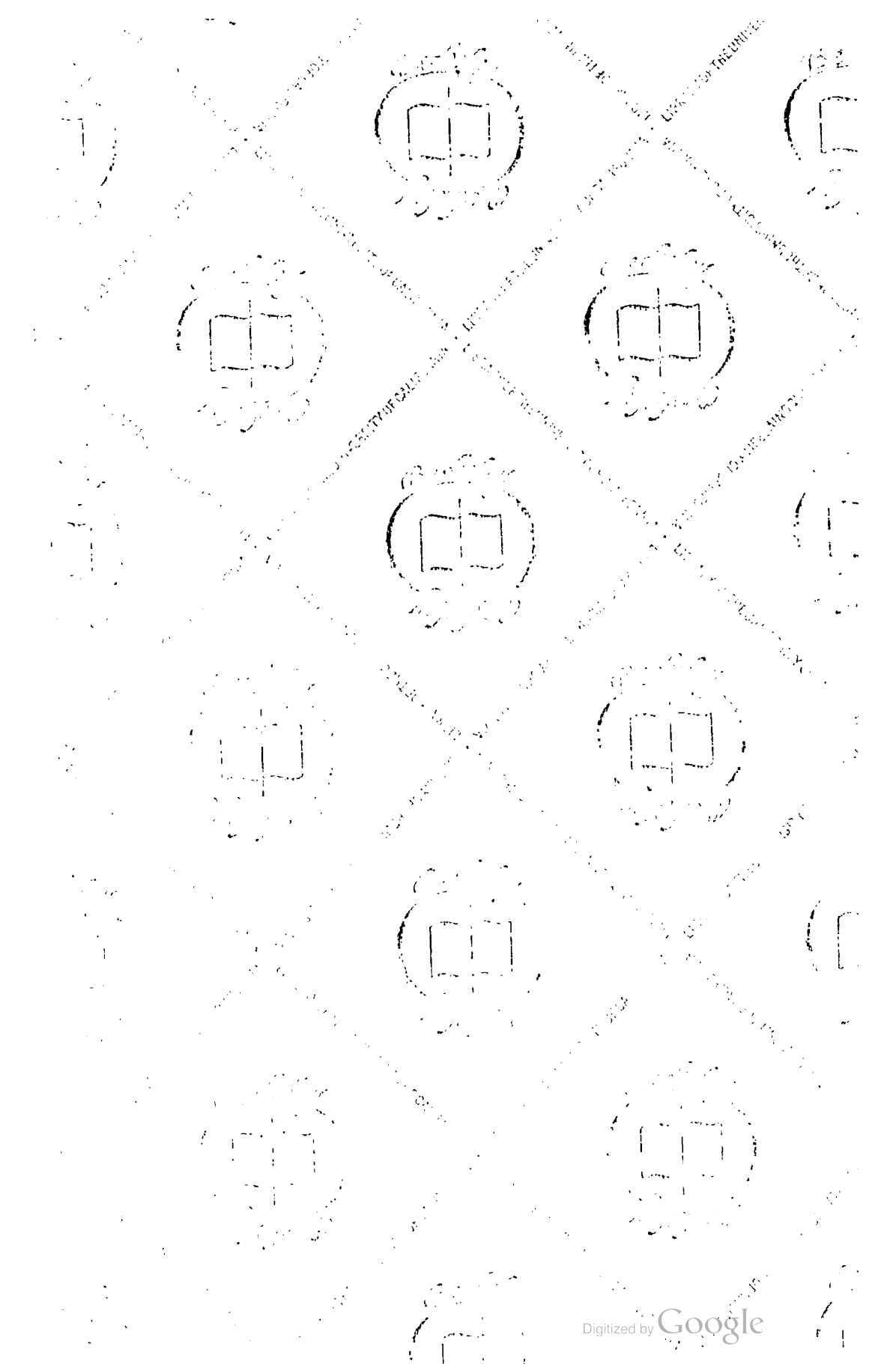

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NOVEMBER
1906

VOL.
VII

THE
**ARCHITECT
AND ENGINEER**
OF CALIFORNIA

NO.
1

NOVEMBER FEATURES

Competitive Plans for the Bank of
Italy

The Garden and the Bungalow

Municipal Encouragement of
Better Buildings

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Building

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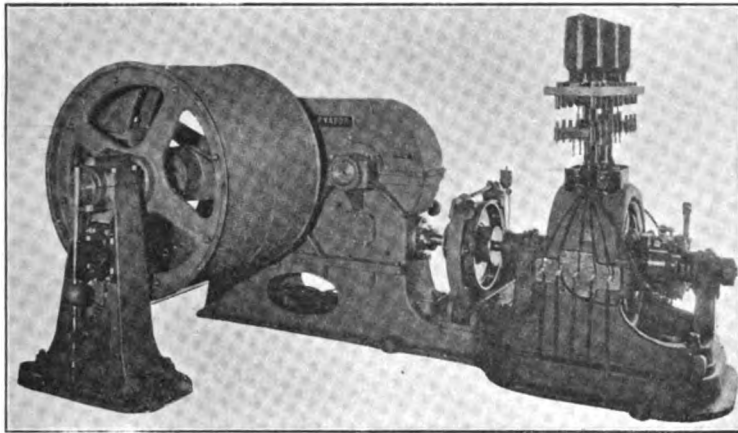
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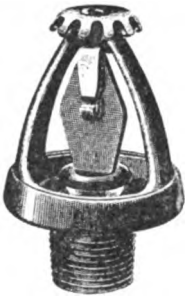


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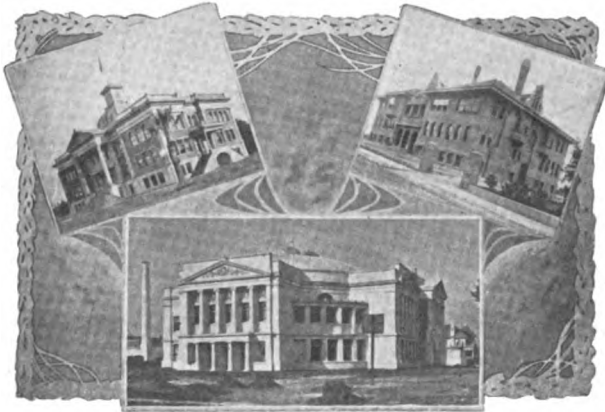
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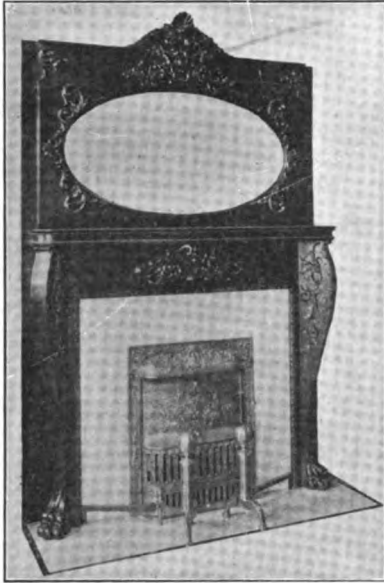
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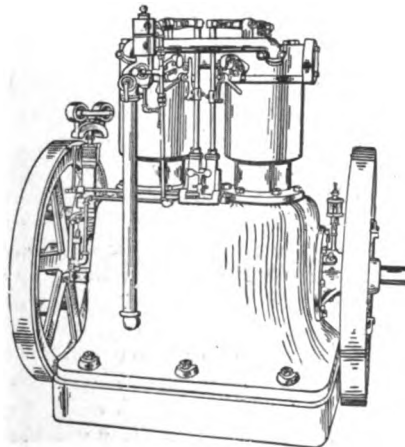
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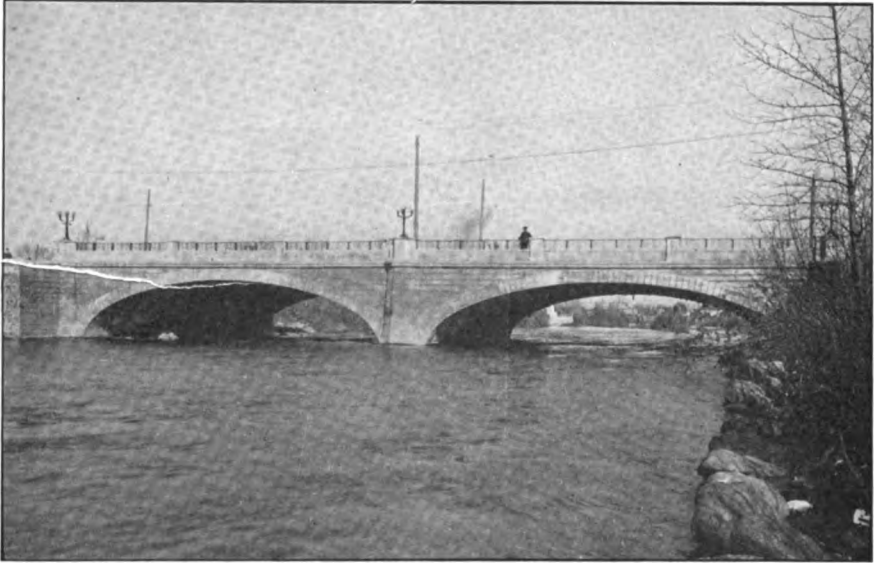
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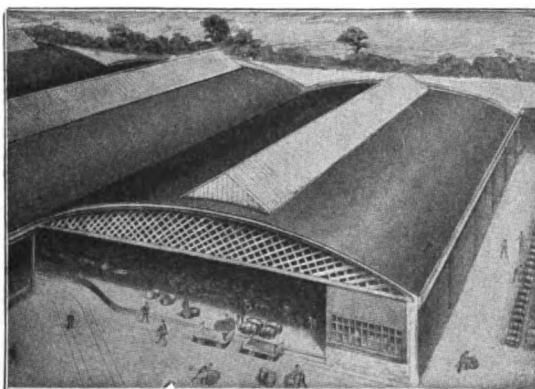
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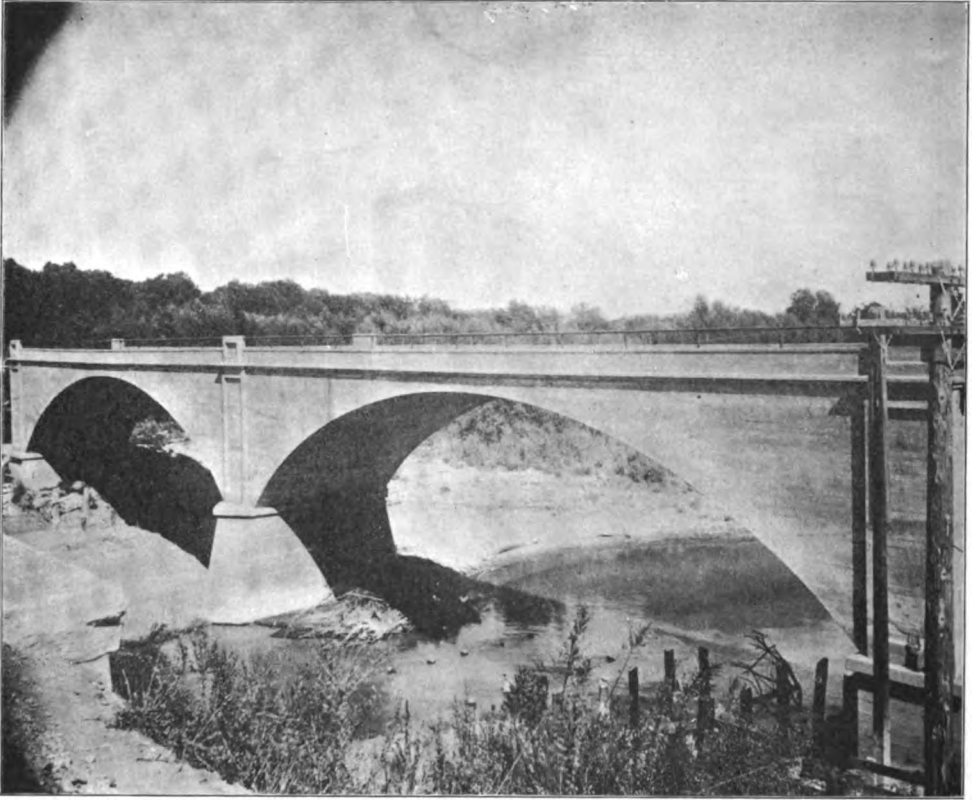
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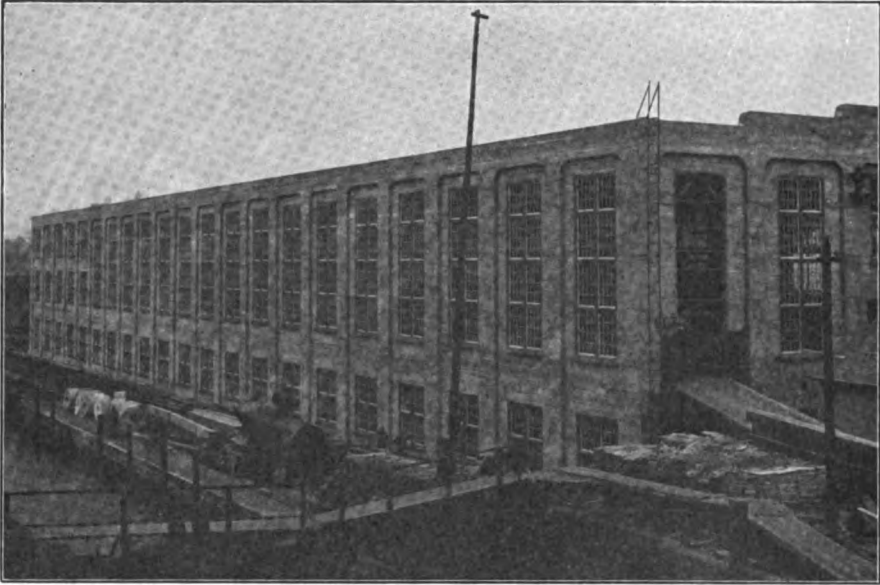
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F. A. KOETITZ,
Vice-President and Engineer.

F. M. BUTLER,
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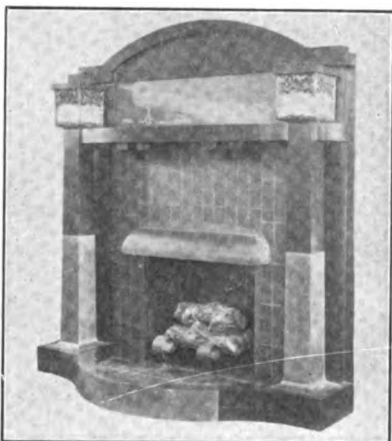
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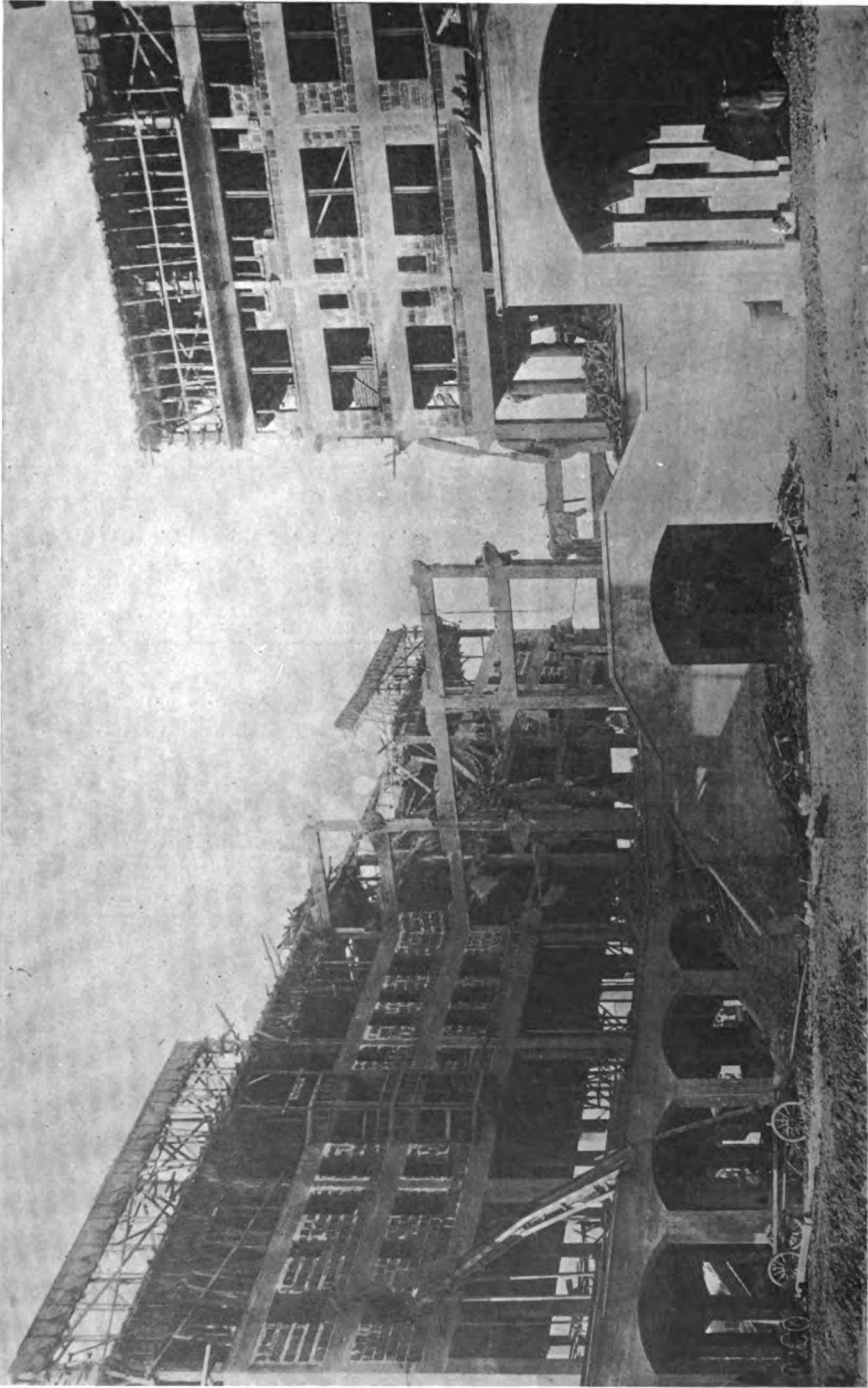
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General view of the Bixby Hotel, Long Beach, after the collapse of a portion of the Building on November 29th. On the right the lack of supports under the fifth story can be seen. On the left a good idea can be had of the tremendous load this form of floor construction can carry after the concrete is matured little damage being done to the first floor.

THE Architect and Engineer Of California

VOL. VII.

NOVEMBER, 1906.

No. 1.

The Garden and the Bungalow

By WILLIAM KNOWLES, Architect



William Knowles. Architect

THE bungalow is a particular type of cottage architecture, that became popular about the time the English first occupied

India: It was developed, as all styles are developed, by meeting the necessities of the situation. The hot climate demanded a roof that would give plenty of shade, and also allow the air that was stirring to freely circulate through the rooms.

California climate is particularly adapted to the low, spacious, airy house. Here we may spend most of our days in our gardens, so that the garden and the house have become closely allied. There seems to be no distinction made between indoors and out, as most Californians live a free, unconventional life.

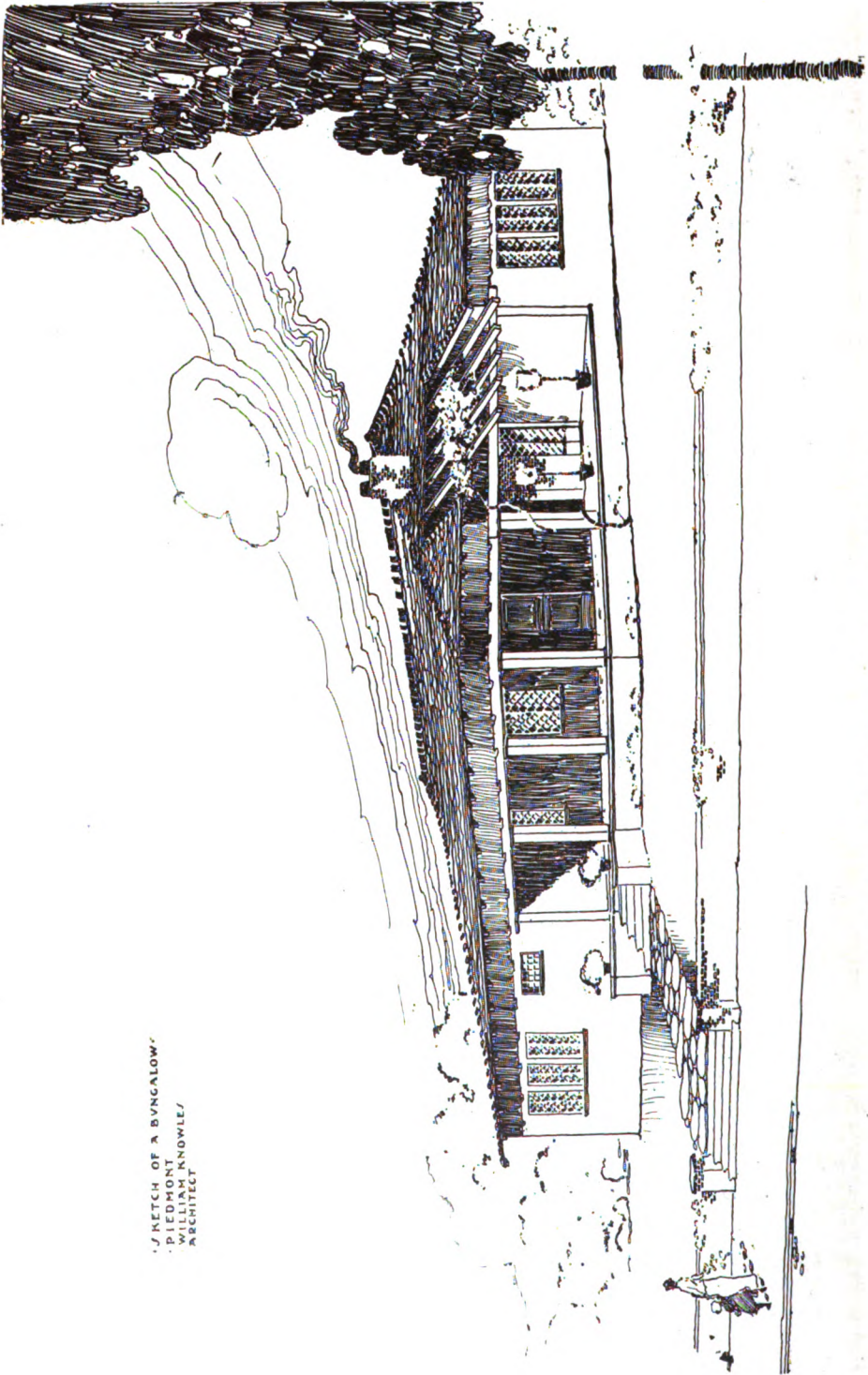
In the bungalow that generally pleases you will find that it has the effect of being low.

The vertical lines are eliminated as much as possible, while all the horizontal lines are emphasized. These long, low lines never fail to give one the idea of rest, comfort, and a life free from strife. Our valleys suggested these things to the Mission fathers, who naturally gave expression to their feelings when they built their Missions.

Then the secret of building a successful bungalow is to keep it low. It matters little whether you have cedar shingles, plaster or rough boards for your outside finish, the first effort should be for good proportions; the detail and finish will follow easily.

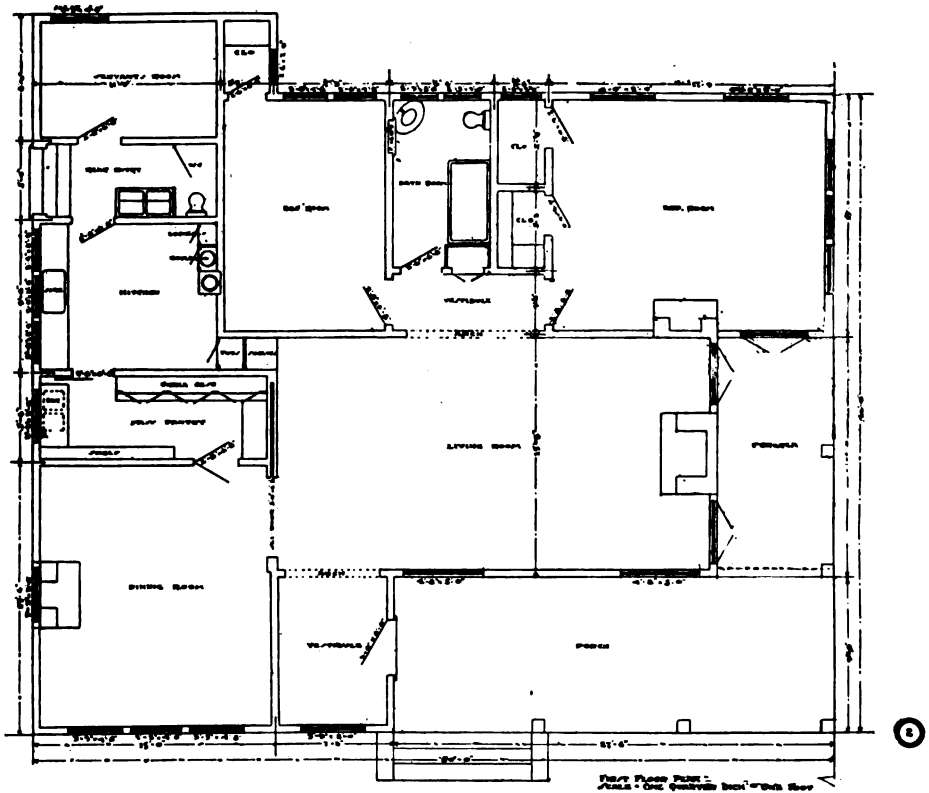
You cannot spend too much time in studying over the plain surfaces or elevations of your little home. Strive to make its charm in its simplicity, rather than depend upon the jig-saw or plaster bracket for its beauty.

The porch is the feature of the plan shown with this article. It extends along the front and south side, and allows one to walk either from the living room



SKETCH OF A BUNGALOW.
PIEDMONT BUNGALOWS,
WILLIAM KNOWLES,
ARCHITECT.

Sketch of a Piedmont Bungalow. William Knowles, Architect



First Floor Plan of a Piedmont Bungalow
William Knowles, Architect

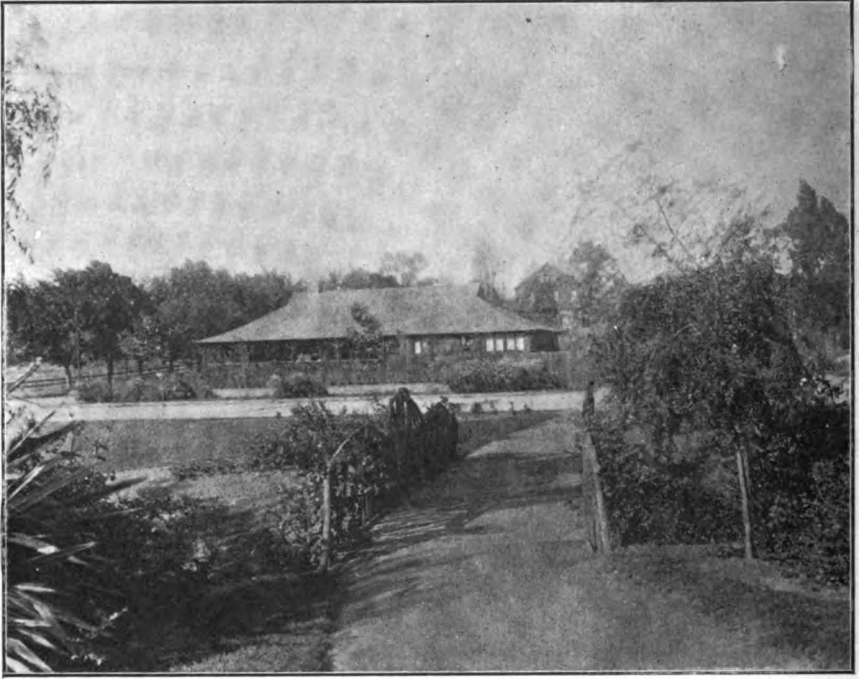
or main bed room through French windows to the open air. The roof over the south portion of the porch consists of nothing but rough rafters, which will be covered with vines in the summer time, and will allow all the sun there is to flood the living room during the winter.

Instead of entering directly into the living room, a small vestibule is provided. Its purpose is to preserve the privacy of the home and protect it against the storms.

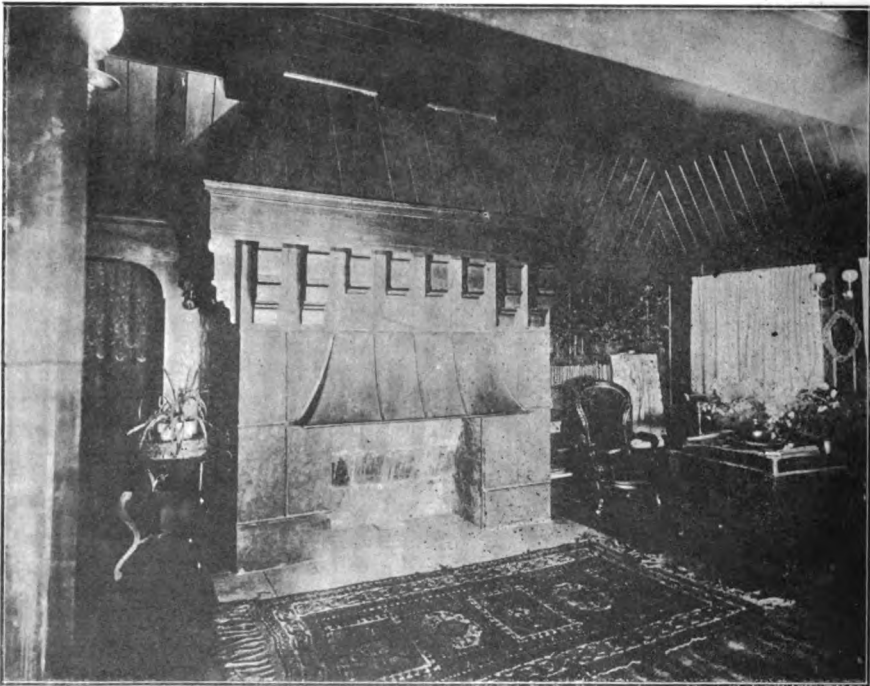
The large, generous living room, with the dining room opening from it, gives ample room for the entertainment of guests. The quiet welcoming fireplace that smokes cheerfully with its friends, tends to make you feel quite at home. The bedrooms are removed from the living part of the house by a small lobby. This lobby also serves to screen the bath, which is conveniently placed between the two bedrooms, and easily accessible from the main part of the house.

The kitchen and pantries are well supplied with accommodations for dishes, pots, pans, and bins. Beside the large bins for flour, there is provided four small bins for salt, meal and sugar. The rear entry is between the servant's room and the kitchen, and will also be used as a laundry.

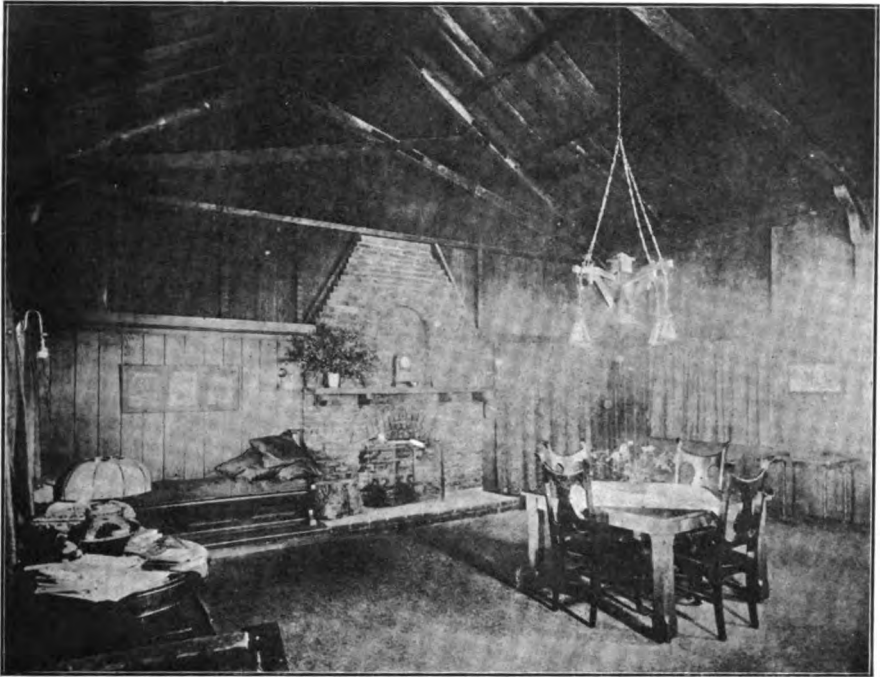
All the outside finish is of rough lumber. The sides are of twelve-inch redwood boards, lapped about ten inches to the weather. The outside will be stained a dark sepia, with a white sash and a tile red roof.



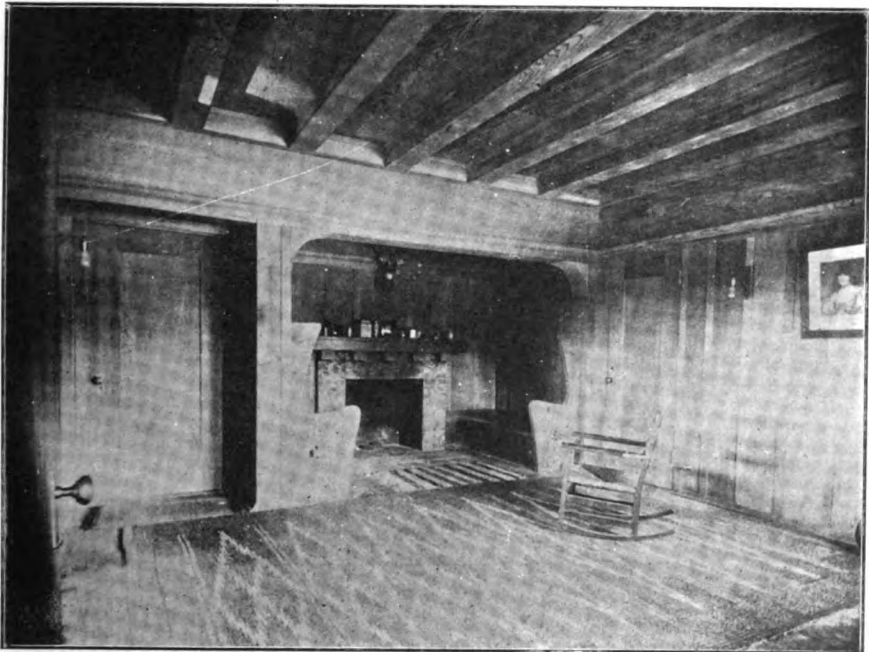
Bungalow of Mr. Bernard Ransom. William Knowles, Architect



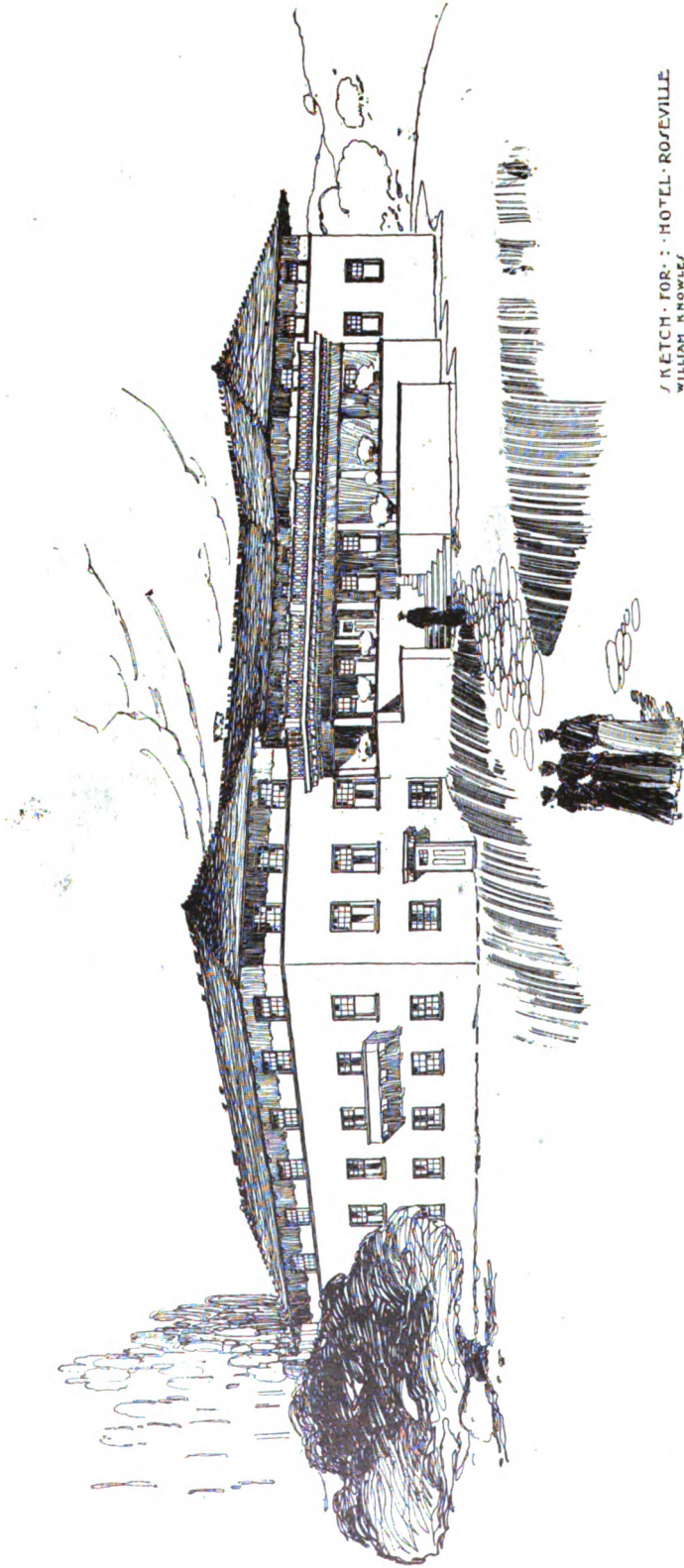
Living Room in Bungalow of Mr. Bernard Ransom. William Knowles, Architect



Dining Room in Bungalow of Mr. Bernard Ransom. William Knowles Architect

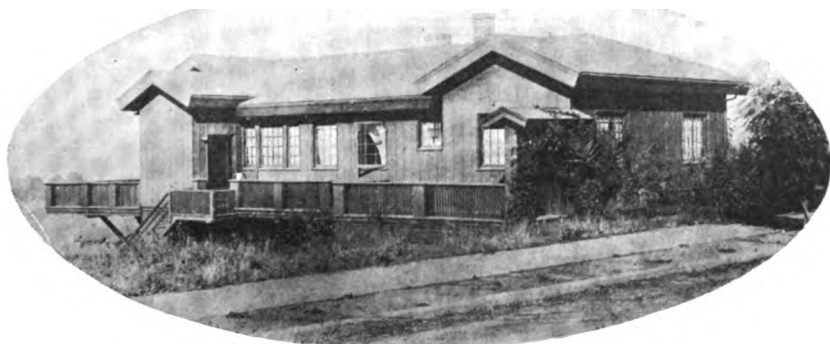


Living Room in Bungalow of Mr. James Ballentine. William Knowles. Architect



SKETCH FOR HOTEL ROSEVILLE
WILLIAM KNOWLES
ARCHITECT

Sketch for Hotel Roseville, William Knowles, Architect



*Bungalow of Mr. James Ballentine
William Knowles, Architect*

There will be little or no wood finish in the interiors, the desired effects will be obtained by carefully selected papers. The picture mold will mitre over the heads of doors and windows, forming a very effective and inexpensive cap.

The bedrooms, bath and kitchen will be done in white enamel. The bath and kitchen wainscot will be of metile, marked off in small squares. These small bungalows grow in interest as the garden and vines obtain a more luxurious growth. The effect of age, with its quiet low tone, can not be had without the help of nature. Each year finds the garden and bungalow more closely drawn together.

* * *

A California Railroad Depot

The Southern Pacific Railroad Company is preparing to build a new depot at Berkeley, which will be especially designed to harmonize with the college architecture in that city. The building, of French Renaissance, consists of two main sections connected by an arcade. It is 190 feet in extreme length and 41 feet wide. An arcade 11 feet wide extends along the entire west front and both ends of the building. It will be constructed of red pressed brick, with light buff terra cotta trimmings and copper roof and cornice. The arcade is in the Doric order, made of reinforced concrete covered with terra cotta. The entablature and pediment carry out the same color scheme. The north wing of the building contains a smoking room, baggage room, etc. The south wing contains the waiting room, retiring room and ticket office. The interior of the waiting room, which is 45 x 25 feet with a 23-foot ceiling, is to be finished in light buff brick with terra cotta trimmings and to have an elaborate terra cotta fireplace with an ornate hammered copper hood at one end. The walls of the waiting room will be finished in paneled designs by a famous sculptor, executed in terra cotta by California manufacturers. The wood finish throughout will be of Eastern oak; special designs in electric light fixtures will be introduced. Between the two wings of the building will be a grass plot surrounded by an ornamental fence, cement walks, etc. The surrounding grounds will also be laid off with lawns and cement walks.

The Municipal Encouragement of Better Building

By F. W. FITZPATRICK

SAN FRANCISCO has been sorely tried, cruelly wounded, indeed, but her people have given the world splendid evidence of American grit and stamina. During the trying days they behaved splendidly, and since then have we had many an occasion to congratulate them upon their magnificent recuperative powers and the unity and virility of their efforts and success in re-establishing order out of chaos and the foundation of a still greater city. We hear some lament anent the flimsiness of the temporary buildings that have been permitted to go up, but we realize the craving one must feel for shelter, the urgency of the case, and would not blame your people if they insisted upon erecting merely tents instead of the wood and galvanized iron shacks that are being built by the thousand. It would have been an insufferable hardship to have insisted upon better construction. But the authorities should have made some restriction, so that there would be swathes of open spaces around more or less limited areas—in other words, four or five blocks of temporary buildings should have been permitted, then an open space all about, and then more temporary blocks. As it is, if fire once secured headway again, it would mean the total destruction, not only of these cheap buildings, but of costly stocks. Fire occurring in several places at once, thus cutting up the efforts of the brigade, would be exceedingly hard to manage, and San Franciscans, of all people, must be impressed with the possibility of almost any imaginable accident.

But the question of fire in these temporary buildings is not the one I wished to write about in these brief notes, important though it be. Nor will we say much about the certainty that many of those "temporary" buildings will become more or less permanent fixtures, a source of anxiety and danger, a menace to the entire city, and the cause of very considerable additional expense being incurred in making surrounding permanent buildings more fire-proof than they would have to be were it not for this menace. The matter I have in mind at the present moment is the splendid opportunity San Francisco has to encourage her citizens and help them to build their permanent buildings well.

The State or municipal government has been exceedingly punctilious about enforcing the laws that define the duties of the individual toward itself, but it has somewhat tardily recognized its obligations toward the individual. The awakening has been with a sort of start, and we have gone to the extreme that some people have fairly turned purple in calling us rampantly "paternalistic." We have enacted laws relating to health, wise sanitary measures, others looking to the comfort, the liberty of the individual; we even legislate now to the end that nothing but pleasant sights shall be seen by the individual at least in our streets. We eliminate deformed and repulsive beggars, projecting signs, cattle, noisy vendors, etc. The State steps in and, to a degree at least, prevents one or a combination of men from fleecing or extorting from the individual. It educates his children, carries away the refuse from his house; it cares for the sick, the very poor, the aged. But its tendencies, an hereditary trait handed down from medieval times, are still to take hold of things as a sort of last resort—efforts towards cure seem to be more natural to it than anything in the creative way, or prevention of

troubles. In so many things the State does literally the amputation that, alas, is all too frequently necessary, and spends vast sums in that amputating while insignificant expenditures would have been all that was necessary to have prevented the evils that made the amputation necessary. Talk of consistency! We spend millions in prisons, hospitals, poor-houses, and such institutions, while we are niggardly indeed with our school funds, health boards, and other preventive agencies, that, if properly and more liberally handled, would reduce by half or more the expenses incurred for the cure.

So with fire, the municipality spends millions in alleged fire protection, but when you suggest the expenditure of five cents for municipal fire-prevention, why, the authorities look at you askance and feel certain that an attempt is going to be made to rob the till. One thing could be done, however, a splendid preventive measure, that would not cost the municipality one cent and that would, in time, cut off a very large percentage of the expenditure now incurred for fire cure. One of the city's most sacred rights is the imposition of taxes, a lien against property that takes precedence of all else, a sacred and inalienable right, but, in heaven's name, is there any reason why that right should not be intelligently exercised?

As things are now, if a man, besides being business-like and appreciative of his own welfare and the security of his property, is public-spirited enough to build well and refrains from making his property a source of danger to that of his neighbor, a source of anxiety and expense to his city, and puts into that building in the way of fire-proof construction and general betterment a much larger sum than what indifferent existing laws we do have compel him to, why, the assessor comes along and says that the total value of that building is so much, including the cost of those aforesaid betterments, and, therefore, the man's taxes must be so much—a fixed per cent that is the same all around—so that the man is not only taxed upon the value that he may be expected to get out of his property, but is taxed upon the additional amount he has already taxed himself *pro bono publico*, and, unnecessarily, from some viewpoints—a compounded affair; inequitable, unjust!

That man has built well enough that there is but little danger of his property being much damaged by fire or of its being the cause of damage to adjacent property. That building of his will not give any work to the fire department. Indeed, he could get along without that department. Salaries and cost of apparatus, etc., constitute a very heavy item of city expenditure—a goodly share of our taxes go to the defraying of that expense.

The other man, a sort of *Buddenseick*, builds a tenement. He and his architect labor with the building department to secure exemptions; they "skin" the building everywhere they possibly can. The safety of the property is not the question. The one thing is to get the very greatest return possible in rents. Those rents will be high enough so that he can afford to pay the pretty stiff rating the insurance companies mulct him; if the building burns down, why, they will pay him for it; if any lives are lost, why, that is none of his business. The city wishes to protect life, however, and, perhaps, additional ladders and other provisions are made so as to safeguard that very building; the fire department watches it very carefully; it is one they are sure to be called to, sooner or later. The assessor comes along. The property is worth so much, and it is manifest, even to him, that it was built very cheaply; the total

investment is small, howbeit that the danger is great, and Mr. Man is assessed on his cheap to him, but expensive building to his city, at just exactly the same rate as the other man.

What justice is there in that?

How much better, more just and equitable, and what an encouragement it would be to good building if taxes were on a sliding scale, arranged according to classes of building—class A, class B, and so on. The minimum rate assessed against the very best buildings, those well-built and in which every precaution is taken to prevent fire, and the very maximum tax levied against old fire-traps and buildings that are a menace to all about them and on account of which nine-tenths of all our great expense for fire-protection has to be incurred.

It would not only encourage better building, but it would be a very great incentive to the general improvement of property and the elimination of old rookeries in cities.

The insurance companies could do as much for us as this proposed system of taxation. They could make their rates on poorly built buildings prohibitive, so that a man would have to build well. But they have not the public weal at heart. We cannot expect them to do anything public-spirited. Insurance companies are managed for private gain. Insurance is essentially a gamble, and there will be no remedial rates established as long as there is any possibility of the companies winning out in that gamble. Besides, when a great disaster occurs, as at San Francisco, why, they can repudiate the claims against them, or fight them, or "settle" them. Or they can go out of business, or they can raise the rates slightly all over the country, and it is such a vast country that they can soon refund themselves for such a colossal loss as even that of San Francisco.

No, we need expect but very little from the insurance companies. The cure lies in the direction of the reform of municipal taxes. That reform would not be very difficult, and it would soon be brought about if people would only wake up to their own privileges, and rights, and advantages, and insist upon them. The municipality exists for and by them; why have they not sense enough to do that governing—their own governing right?

We have harped on this reform in taxes for years. How hopeless it almost seems to secure anything of that kind and how one has to literally fight himself to not repeat what a great capitalist once said about the dear people! It is only by persistent and never-ending hammering that we *have* secured any reforms in the past, and, trying as it is, we will keep on that hammering in this matter, too, until something is accomplished. Our people have not been responsive, as I say, but that the suggestion is a practicable one is proven by the fact that Paris, quick at realizing the possibilities of any suggestion, whether from its own people or from abroad, has adopted this idea and has it in successful operation. More than that, it has gone a step farther, and is encouraging the beautifying of its buildings, as well as their proper construction. It actually awards prizes to the architects of its most beautiful private buildings and remits a certain percentage of taxes to the owners of those buildings for having "taken steps to assist in making of it the most beautiful city in the world."

I suppose if we should suggest such a system of prizes, as well as remitted taxes, there would be those who should fairly shriek "paternalism!"

On the following ten pages will be found
The Competitive Plans for

THE BANK OF ITALY

SAN FRANCISCO



As presented by Architects

Frank T. Shea

Ralph Warner Hart

Sutton & Weeks

L. Mastropasqua

Charles Paff & Co.

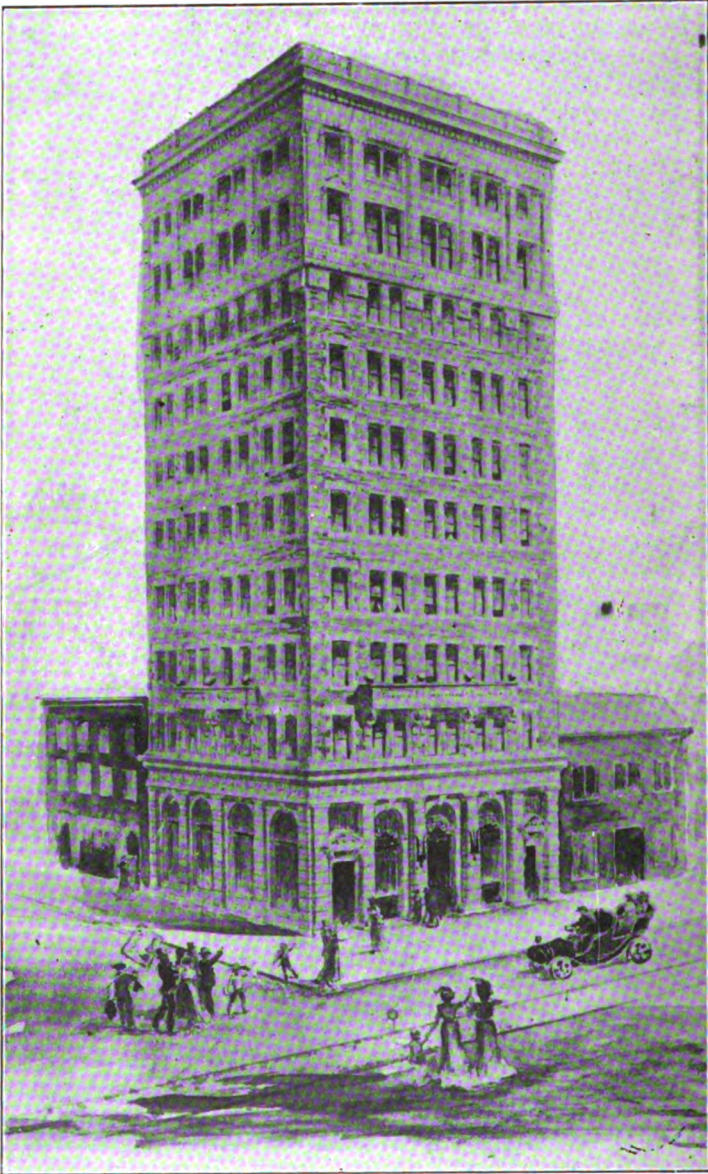
Stone & Smith

Loring P. Rixford

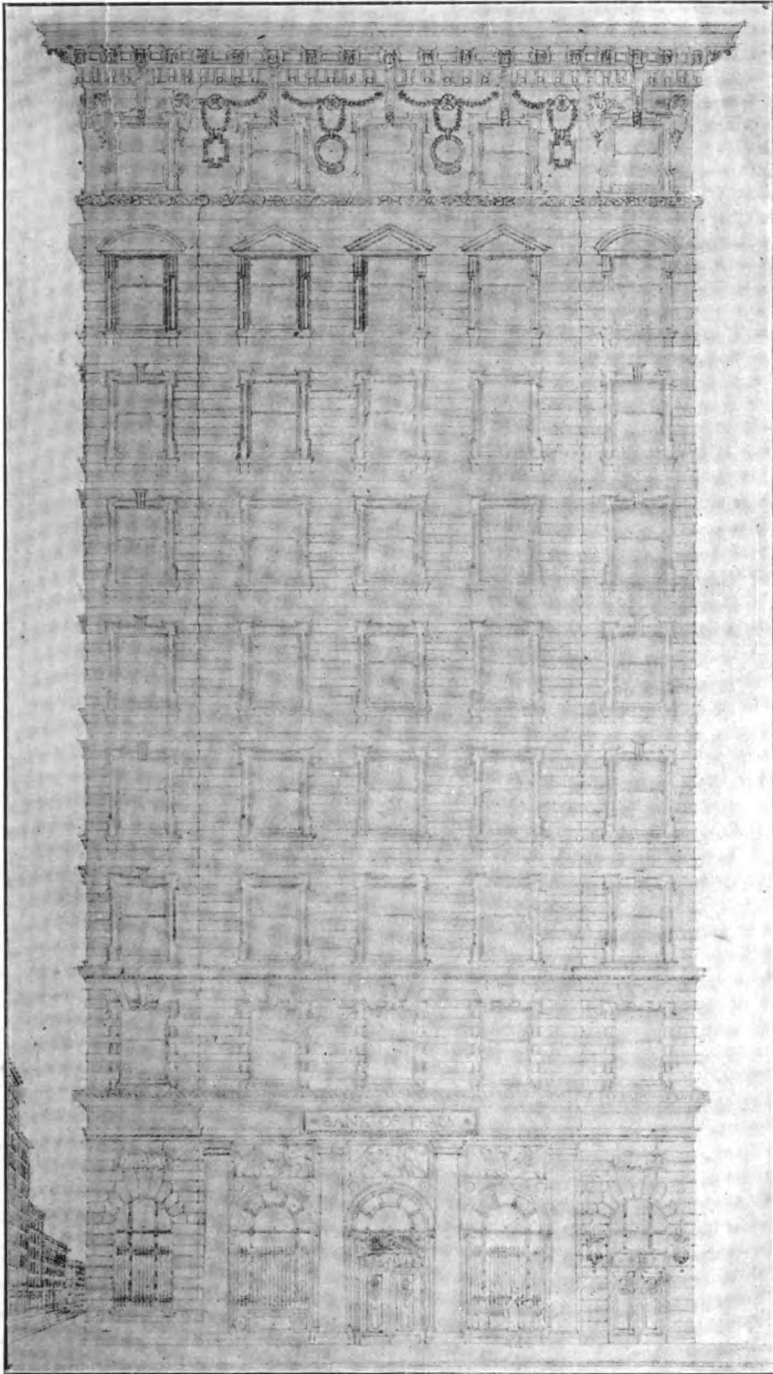
William Mooser & A. M. Milwain

CONDITIONS:

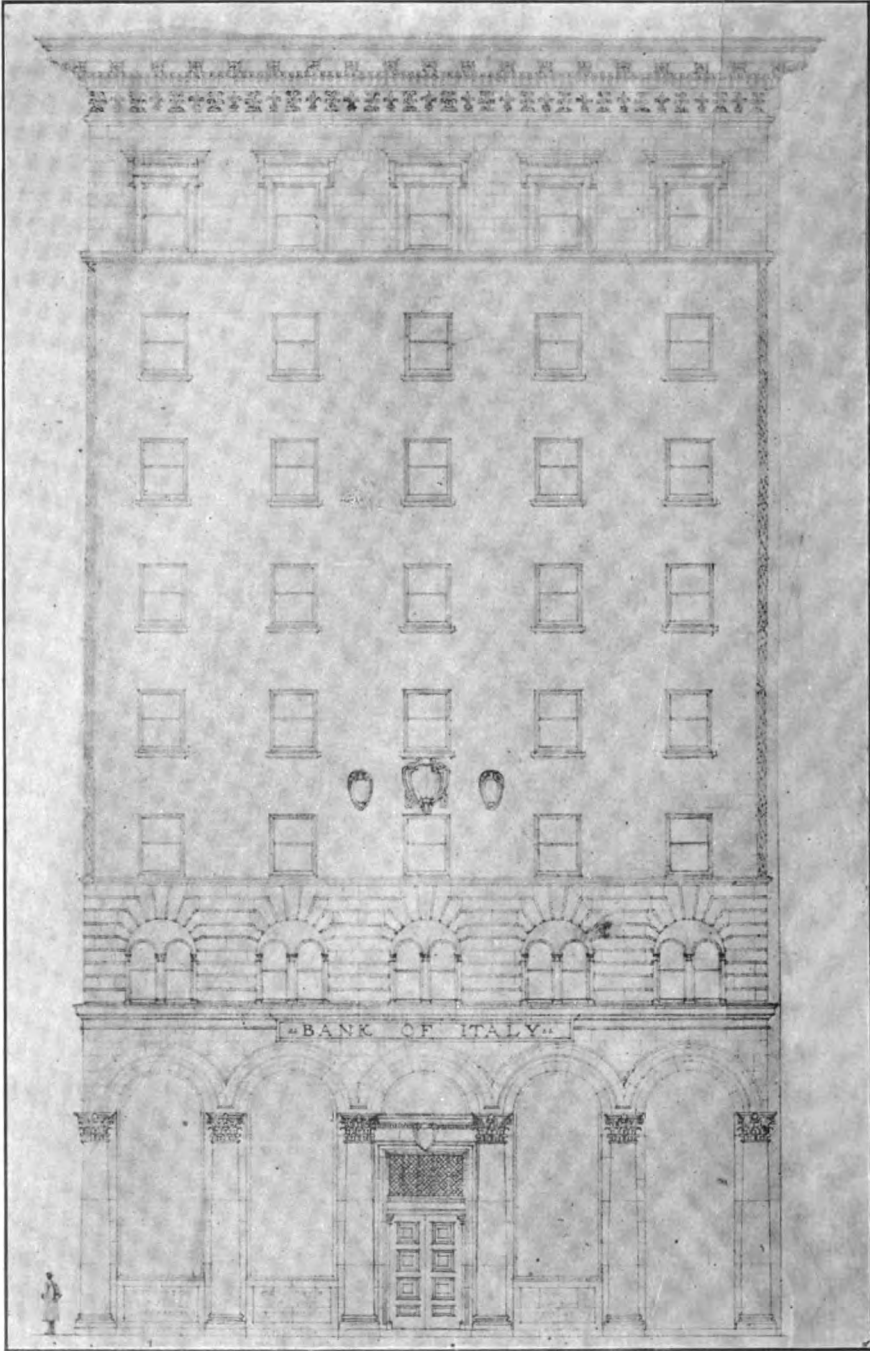
Building to be from eight to ten stories
high; Class A Construction
and to cost \$120,000



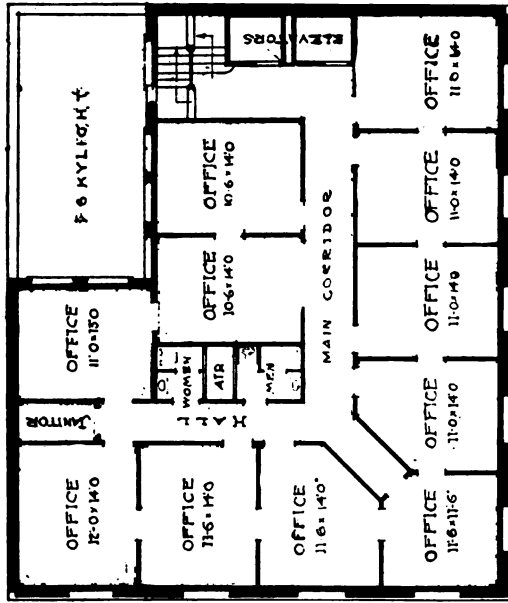
*Successful Design of the Bank of Italy Building, San Francisco
Frank T. Shea, Architect*



Ralph Warren Hart. Architect

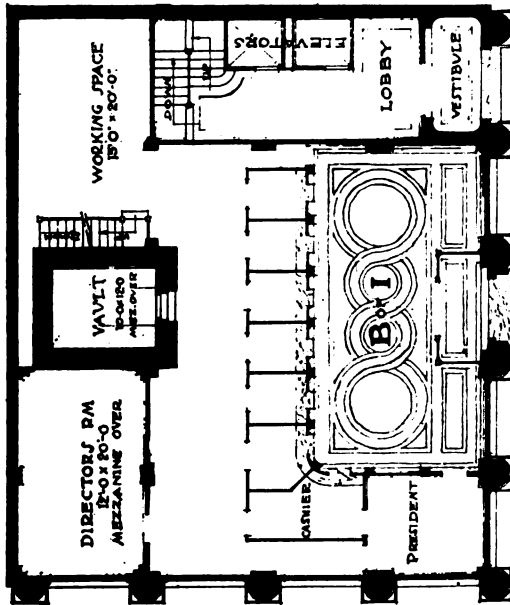


*Front Elevation. Bank of Italy
Sutton & Weeks. Architects*



TYPICAL FLOOR PLAN

THIS PLAN CAN BE USED WITH EITHER THE CORNER ENTRANCE OR MONTGOMERY STREET ENTRANCE.

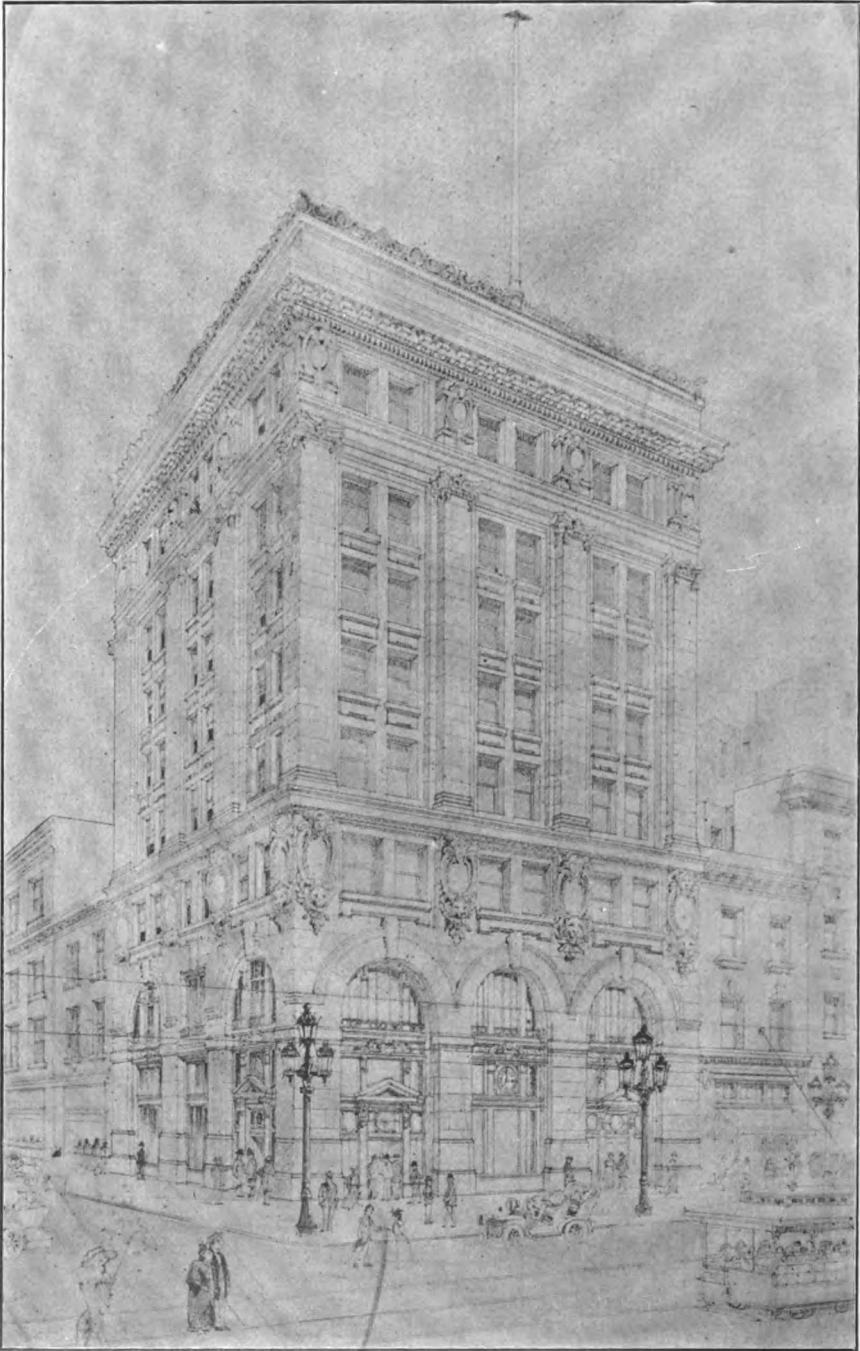


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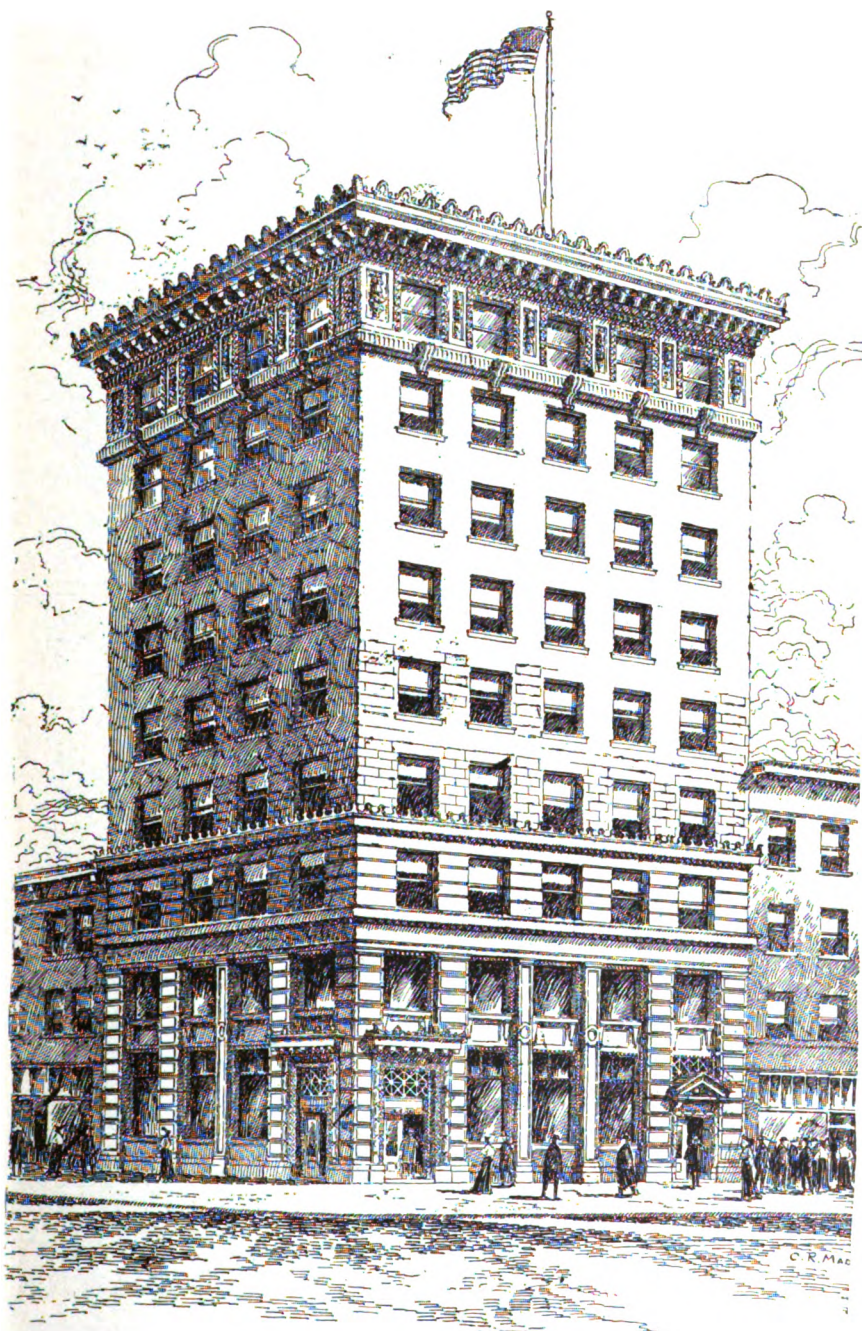
FIRST FLOOR PLAN.

SKETCH FOR BANK OF ITALY.

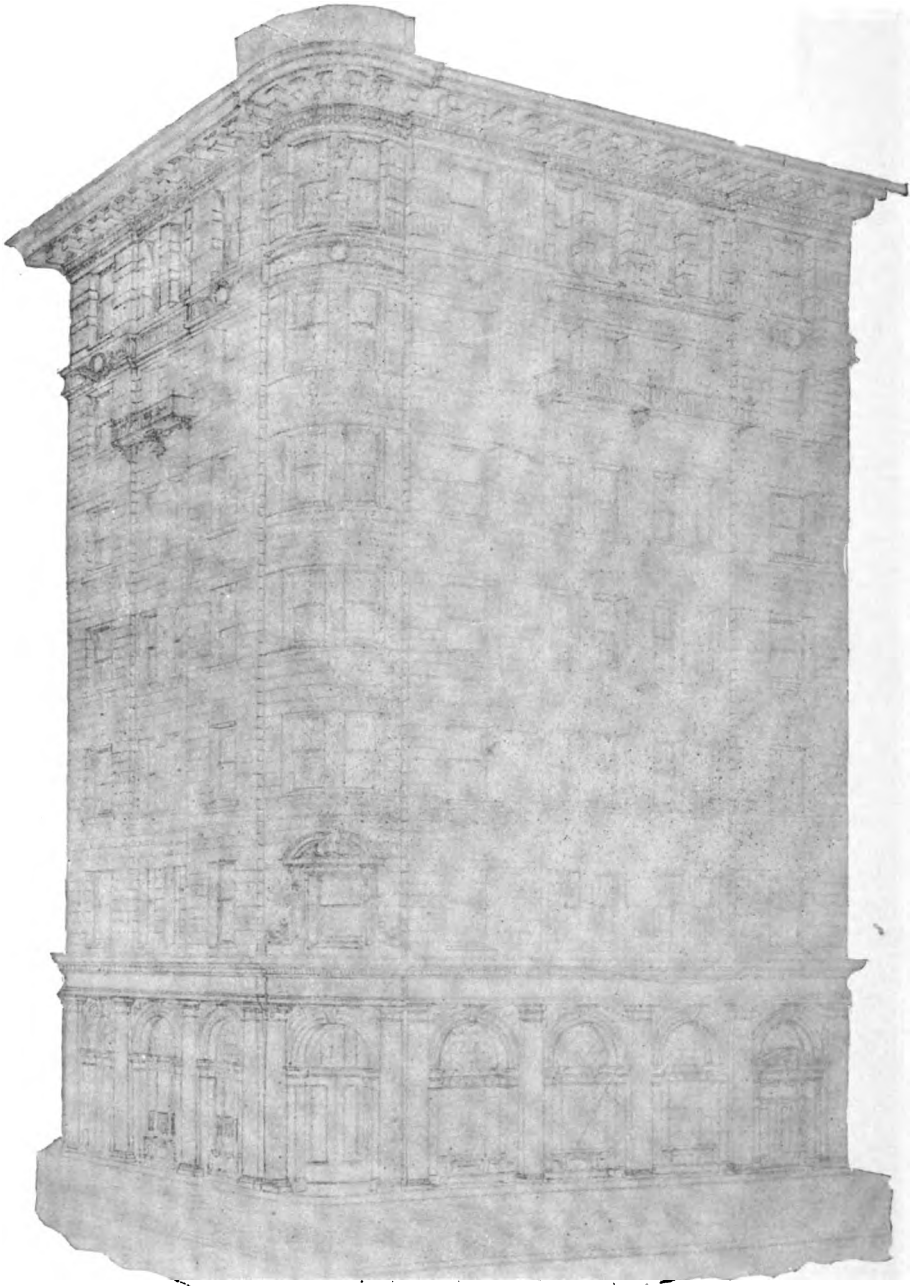
SYTTON AND WEEKS ARCHT'S



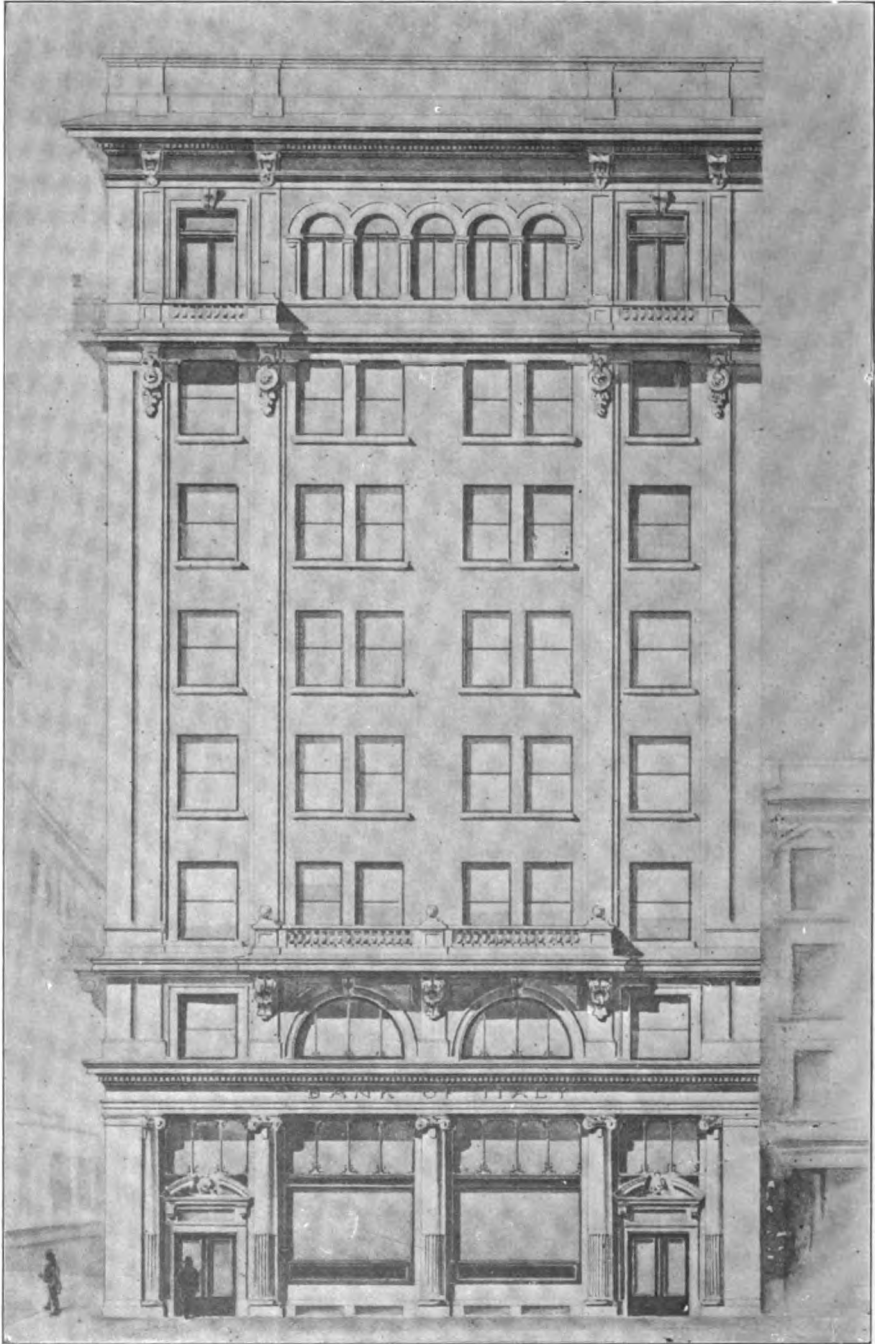
Charles Paff & Company, Architects



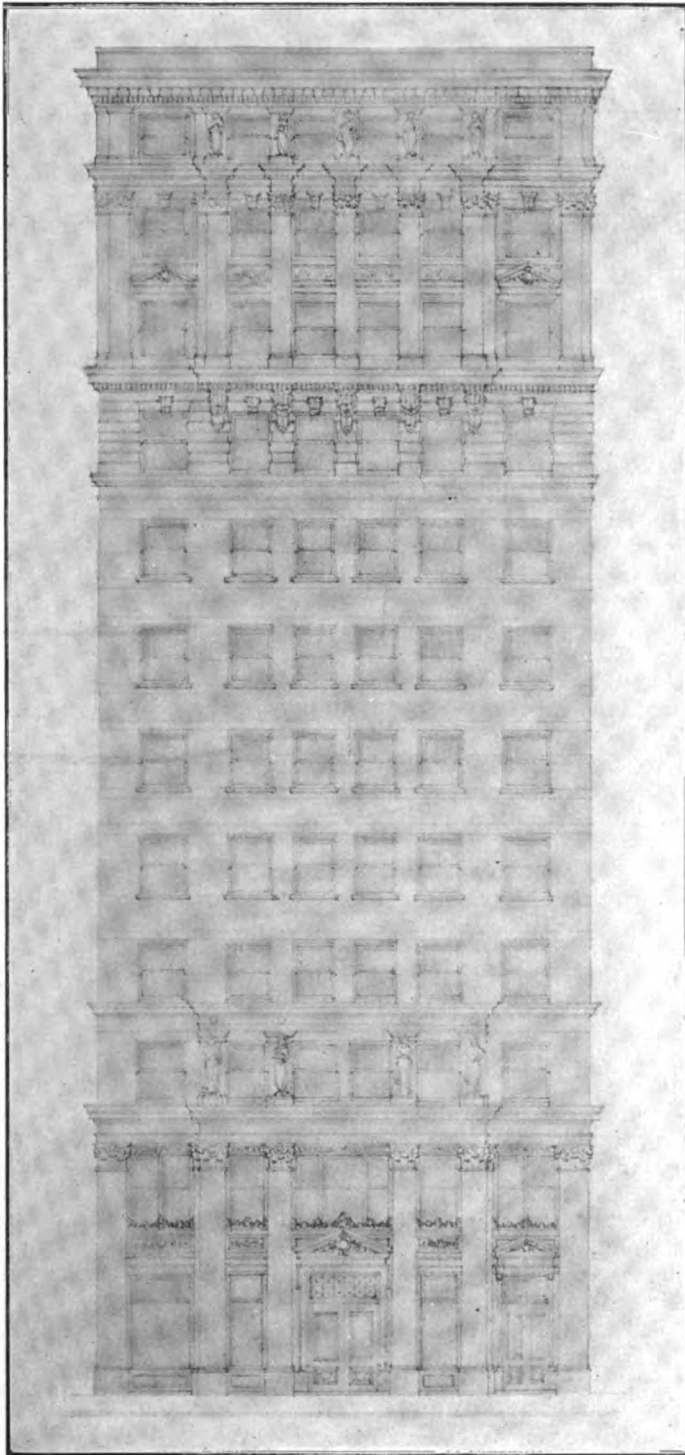
William Mooser & A. M. Milwain, Architects



Stone & Smith. Architects



L. Mastropasqua. Designer



Loring P. Rixford. Architect

Government Buildings and the Tarsney Act

By WILLIAM A. NEWMAN, Architect

THE construction of Government buildings has always been a matter of public interest and at the present time in the various magazines appear several complimentary articles, giving much credit for the good work and construction which has been shown in our Federal buildings.

Certain of the larger public buildings in this country, such as the Post Offices at Cleveland, Ohio, and Indianapolis, Indiana, and the Custom House buildings at New York City, Baltimore and San Francisco, have been designed by successful architects in competitions authorized by what is known as the Tarsney Act.

As a general rule the smaller buildings are usually assigned to the office of the Supervising Architect. The largest building which Mr. Taylor has designed and completed at this date, is the magnificent new Post Office and Court House building in San Francisco.

If a building is to be constructed by the Supervising Architect of the Treasury Department, all the drawings and specifications are gotten out and the contracts awarded at his office in Washington, where a large force of expert assistants is constantly employed. As soon as operations begin a Government Superintendent of Construction is stationed at the building to direct the progress of the work, until its completion and acceptance.

If, however, the building is to be erected under the provisions of the Tarsney Act, the following is a synopsis of the *modus operandi*:

The United States Statutes at Large, Vol. 27, Chapter 146, authorize the Secretary of the Treasury, for such buildings as he may select, to obtain plans and specifications for the erection of public buildings for the United States authorized by Congress, by competition among architects; provided that the general supervision of the work shall continue in the office of the Supervising Architect of the Treasury Department, who is the representative of the Government in all matters connected with the erection and completion of such buildings.

At least five architects of good professional standing, who are citizens of the United States, shall be invited to submit plans, drawings and specifications, to be passed upon as to merit by a commission appointed by the Secretary of the Treasury, consisting of the Supervising Architect of the Treasury Department, and two architects, or experts in the construction of buildings.

Full data and information as to cost and general requirements of the buildings will be furnished competitors.

The successful architect will receive in compensation for his full professional services, including local supervision of the building, a fee computed at the rate of 5 per cent upon all sums up to \$500,000; 3½ per cent upon the next \$500,000, or any part thereof, and 2½ per cent upon any excess beyond \$1,000,000.

The Department agrees to make selection from the designs submitted, if, in its opinion, one suitable in all respects as to design, detail and cost be submitted; but reserves the right to reject any or all, and reopen the competition if no suitable design has been received.

A detailed estimate of cost must also be furnished by the competing architects.

A competitor will forfeit all privileges, who shall violate any of the conditions or who seeks in any way directly or indirectly to gain advantage by influencing in his favor any of the commission.

No member of the commission or employee of the Treasury Department shall have any interest whatever in any design submitted.

The drawings are to be forwarded without any distinguishing mark, accompanied by a sealed envelope containing the name and address of the competitor, which will be numbered, and opened when the final selection has been made.

The commission is to examine the drawings, etc., and give to each the rank to which, in their judgment, its merit entitles it, and submit their findings to the Secretary of the Treasury.

The selection of one of the designs by the Secretary of the Treasury, the Postmaster General and the Secretary of the Interior, shall be final and conclusive.

Upon the award of the contract to the successful architect all designs of unsuccessful competitors will be returned to them, and no use will be made of any drawings not accepted, or of any part that may be original without consent of the author.

Among the appropriations, of interest to this Coast, passed at the last session of Congress for the purchase of sites and erection thereon of new Federal buildings may be mentioned the following: Sub-Treasury, San Francisco, \$375,000; Baker City, Oregon, \$65,000; Ogden, Utah, \$120,000; Santa Rosa, Cal., \$70,000; Eureka, Cal., \$120,000; Santa Cruz, Cal., \$15,000; San Diego, Cal., \$150,000.

* * *

Some Pointers on the Contracting Business

RESPONDING to an inquiry, a correspondent of the National Builder makes the following suggestions to a man about to embark in contracting. Some of the suggestions may appear biased, but they are given for what they are worth:

You may be ever so good a mechanic, understand every detail of the work from A to Z, systemize your work and give it your whole undivided attention for sixteen hours a day throughout the season, and all this will not get you there!

A knowledge of business tact, of graft and put-up-jobbery, is as essential to the successful contractor as is a knowledge of the use of the steel-square to the roof-framer. For in the contracting business a job is not awarded to the party making the fairest bid, but to the party making the lowest bid, and any time a half-dozen bids are tendered for any job, it is a safe assumption that two of those bids are below any reasonable profit to the contractor. In the face of this competition it is up to your would-be-contractor to somehow swing a job unto himself at a remunerative figure. I have read all sorts of works on how to do things about a building, but until the student has learned this other thing, he is as unfit for the open field as is a wooden pup unfit for a field trial.

The power that an architect holds to make or unmake a contractor is to be respected, not because of its moral exercise, but because of its potency. The extent to which the general building public can be operated upon is one of the amazing wonders that will appear to your correspondent as he ripens in the service.

However, here are a few general rules that I would lay down to the young contractor.

Keep an accurate and full account of every item that enters into the cost of every job. After a time these accounts will be a handy reference

and means of comparison between the jobs done and the jobs being figured upon. This should prevent any serious variation from the actual cost of constructing the building under consideration.

Do not take any one's word for what any building has cost! Here is where many a young contractor is caught. Few contractors will acknowledge having lost anything on a job. To do so would be to admit their own inability to estimate and handle work properly. The architect is usually there also with an under-estimate unless some favored contractor is concerned. The reason is this: The prospective builder employs an architect to draw up a plan for a \$3000 cottage. If he draws such a plan the prospective builder will not be satisfied. He has heard of a cottage here and there, that was built for \$2870 and a much better cottage. He knows that \$3000 should get him a much better building. The architect anticipates this or he would have done his work for nothing, so he draws up a \$3500 plan. The owner is satisfied and it is up to the architect to get this job done for \$3000 or lose his work. These are the snares that get the uninitiated and incompetent contractors.

Do not lose any time in trying to get a job that does not appear to be coming your way. Do not bid upon it if you believe that any other contractor is preferred. If your bid is wanted very much, you will find it out in time. Unless you feel that you are the favored contractor, tender a sealed bid at the hour of opening and see to it that all envelopes to be opened are in sight before any of them are opened.

Do not be in a hurry to get in your figures. It is here where the eleventh-hour man is not so easily handed the worst of it. In nearly all put-up jobs the last man to bring in figures is the protected party.

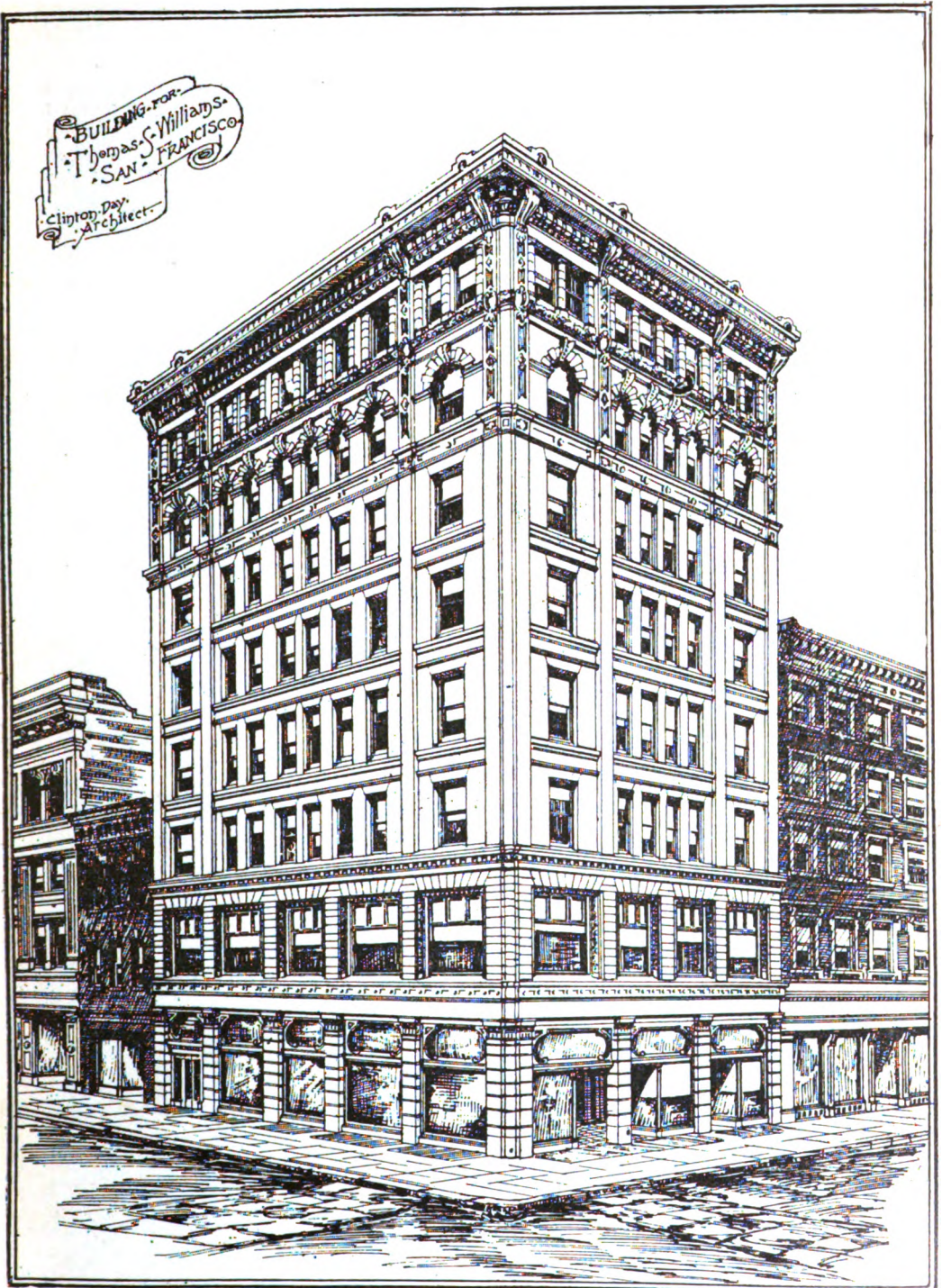
When all is said and done there is little use in trying to get any job that is fixed up for another. A sucker is born and not made and you will lose lots of valuable time in trying to lure a sucker from his fate with trout flies. You will do much better to cut out a sucker from the vast multitude for your own exploitation. A trout belongs to whoever gets him, but a sucker belongs to whoever sees him first.

Then there is much to be learned in diplomacy in turning off work. Here again is where the architect gets in his deadly work. Read your specifications very carefully and study your plans thoroughly. You may be able to erase and rewrite the copy that is used as "exhibit" in your contract and protect yourself from a lot of imposition. Unless you are the favored contractor, the imposition will be there laying for you.

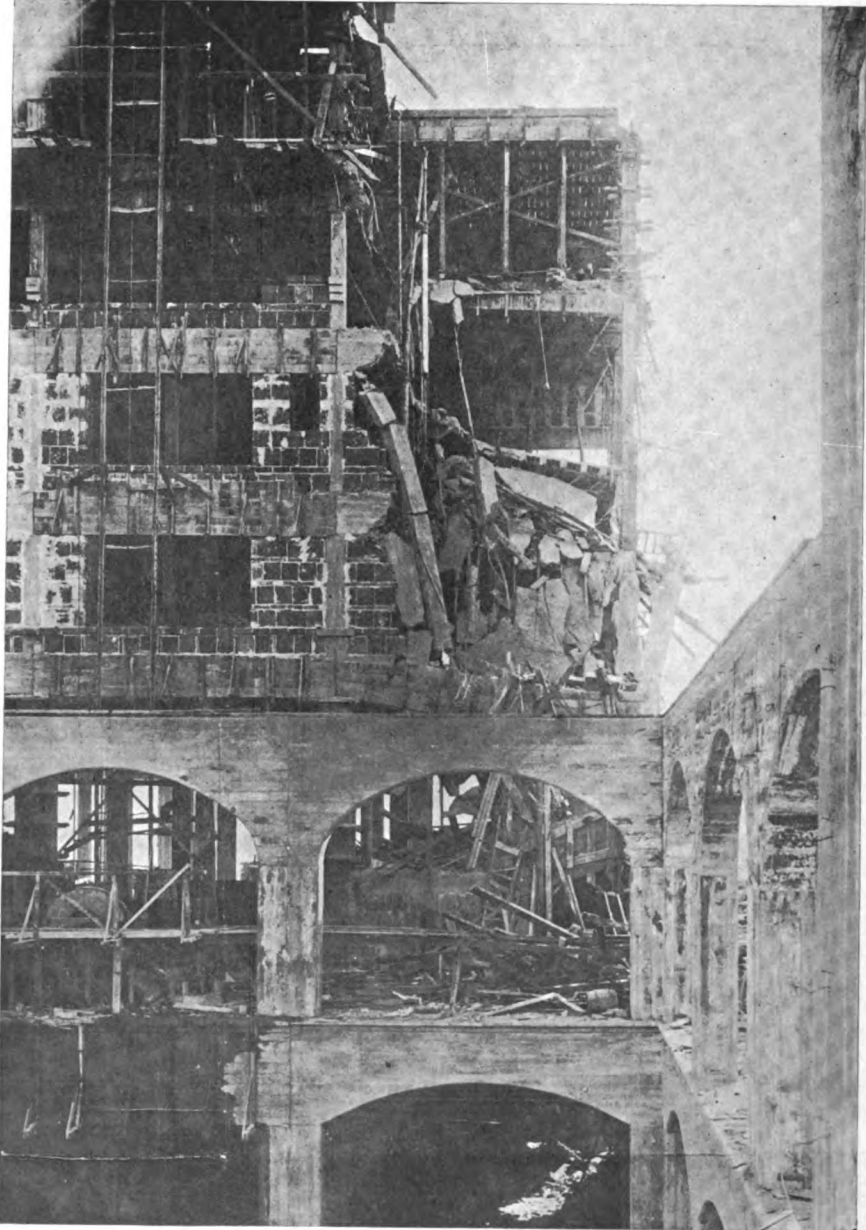
Do not stand for unnecessary complaints and criticisms from the owner. If you want his respect and fair treatment, call him down in a sincere and business-like manner. Do not argue or discuss the job with him. You know when the work and material are right, let that settle it. If you submit to any ill-humored complaints, there will be no limit to what will be coming to you and the impression will go out that it is all due you.

If there is anything about your work that you do not understand, be careful that no one finds it out. Your own men will advertise it and your enemies will use it against you.

As a rule, do not employ men who are forever talking about how to do work. It is these who usually know the least about it. And any sincere student will study his work at a leisure hour in a silent manner. Cut out those who are forever talking about tools and work.



*The Williams Building now under construction in San Francisco
Clinton Day, Architect*



View of center wing of Bixby Hotel, showing where supports were removed under the north panel of the fifth story floor. The concrete on the roof is twenty-four hours old; the floor slab of the fifth story is twenty days old.

Partial Collapse of the Bixby Hotel at Long Beach

ON the morning of November 9th last the Bixby Hotel at Long Beach, Cal., one of the largest reinforced concrete buildings in the world, partly collapsed. In this accident ten lives were lost and about a dozen workmen were injured. The collapse of the hotel, aside from its tragic features, has proven an event of no little significance in the building world. At first there were grave fears that the disaster might result in a setback for reinforced concrete construction, but careful investigation by those in a position to judge has resulted in a complete vindication of this type of construction. The accident, appalling as it was, has served to call attention to the absolute necessity of employing good men and using good material in reinforced concrete work. In this case there appears to have been nothing wrong with the material—the real cause, apparently, being the absence of proper engineering supervision. The accident will probably result in the employment hereafter of only competent persons to design and build structures of this particular type. And it is bound to prove of great benefit to San Francisco builders in warning them of the dangers in taking liberties with the method and in demonstrating the necessity of the utmost precaution both in architecture and engineering.

The architects for the Bixby Hotel are Messrs. Austin and Brown, of Los Angeles, and the contractor, F. L. Spaulding of Long Beach.

It is gratifying to note that following the examinations by experts of the collapsed hotel, reinforced concrete, as a structural material, has in no way been shown to be a failure. The investigations proved that the floors in the upper stories of the hotel were not of the purely reinforced type, but were a composite in which 60 per cent of burnt tile was used. The lower floor, which was entirely of reinforced concrete, withstood the shock of the tons of debris that fell.

The inquiry further demonstrated that the supports or forms were removed before the cement was thoroughly aged, and had the cement been properly handled in the course of construction there would have been no collapse. The owners of the hotel have shown their confidence in the type of construction by ordering the architects to proceed at once to rebuild that portion of the structure which was damaged.

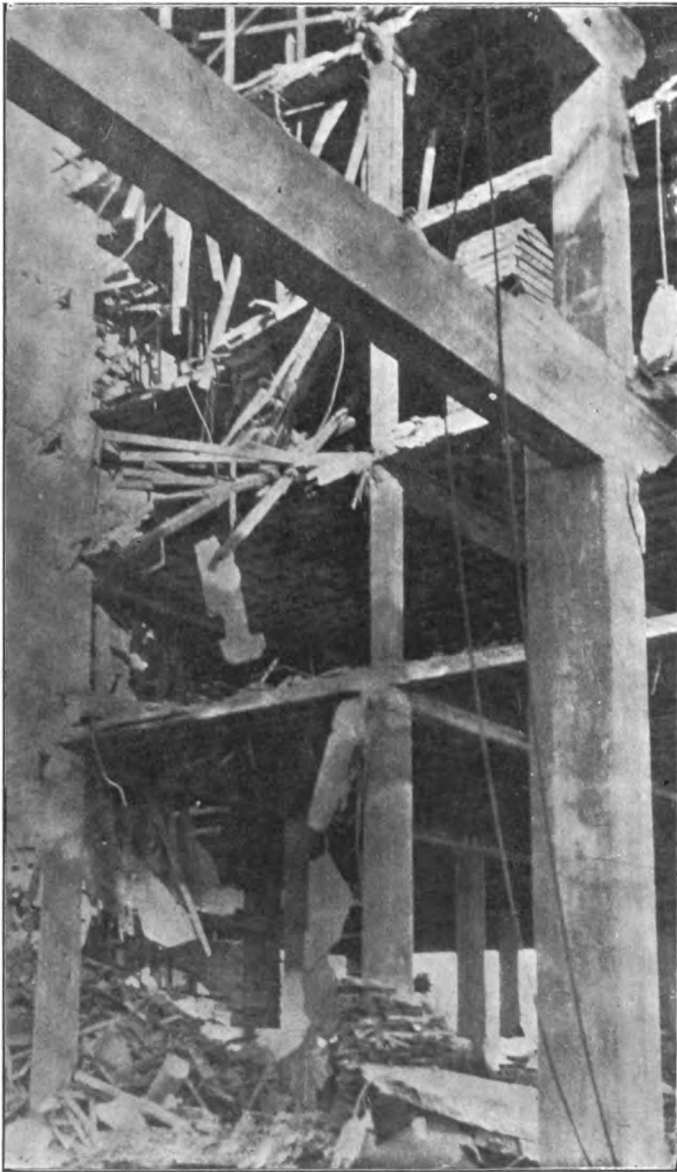
The estimated cost of the Bixby Hotel was \$350,000. The loss as a result of the accident will probably not exceed \$50,000. The plans called for a five-story building, the latter being shaped like the letter "H." It was the bar to the "H" which gave way and carried down the five stories. The Kahn system of reinforcing was used in the construction of the building.

Heber & Thayer, representing the Trussed Concrete Steel Company in Southern California, claim to have had no part in the designing of the building further than the beams and floors. The concrete beams were used for the floors, the space between the joists being filled with a row of hard burned terra cotta tile with scored sides, to insure a firm connection with the concrete. The tile has no bearing power, its chief advantage being to lessen the dead weight. The Kahn representatives assert that their system was not being used on the roof, at least not in conformity with their designs. They declare an additional story was added by the architects after the original plans were made, and that a young and inexperienced engineer was employed. It was this last story that gave way while the workmen were busy pouring the cement into the roof forms.

A coroner's jury rendered a verdict three days after the accident. The jury found that the collapse was occasioned by the premature removal of part of the timbers supporting the fifth floor.

SAYS COLLAPSE STARTED FROM THE TOP

By JOHN C. AUSTIN, of Austin & Brown, Architects



*Showing One of the Reinforced Concrete Spandrel Girders,
Bixby Hotel, Long Beach*

AFTER making a careful examination of the Bixby Hotel at Long Beach, for which we are the architects, we have been unable to find any other cause for the failure of a portion of the center wing other than the following:

The fifth story floor had been in place eighteen days, and the supports and forms for the roof were installed over the floor of the fifth story, and all of the concrete for the roof was being poured when the collapse occurred. One or two days before the collapse the forms under the fifth story floor in two panels, each panel being the full length of the wing, had been removed, leaving this floor only eighteen days old to support its own weight, the weight of all the forms, and the dead weight of the roof.

Our theory is that the fifth floor and the roof started simultaneously, and

that the impact, plus the weight, was too much for the fourth story floor to carry. It is well demonstrated on this building that the method of construction was perfectly capable of sustaining the loads for which it was designed when the concrete was of sufficient age.

As will be seen by the photographs, several of the floors are now carrying in the form of debris, many times the weight they are supposed to be



View Showing Condition of the Basement after the collapse.

capable of sustaining. All of the evidence goes to show that the collapse started from the top, and that before the falling material had time to reach the first and second stories it was possible for men to escape to the side wings from a position of at least twenty feet under the fallen part.

We are now uncovering the piers to demonstrate that no change has taken place in their position, and our instructions from the hotel company are to proceed with the building to its final completion without any deviation from the original plan, and with as little delay as possible.

* * *

BLAMES HOLLOW TILE WALLS

By OTTO H. NEHER, Architect

AFTER having gone through the ruins of the Bixby Hotel, I am more than ever before convinced that there is no better method of construction than reinforced concrete. I am absolutely opposed to the use of hollow tile in flooring as well as in curtain walls, and I am convinced that this accident could not have happened if the ceilings and curtain walls had been constructed of reinforced concrete.

Curtain walls and ceilings of reinforced concrete are particularly desirable for withstanding earthquake shocks, for a steel structure as well as for a reinforced concrete skeleton; brick or hollow tile and mortar will not stand a severe shock, no matter how good the construction.

* * *

CALLS IT MONGREL CONSTRUCTION

By LOUIS A. HICKS, C. E.

MADE a special trip to Los Angeles, and in company with Carl Leonardt made a minute examination of the collapsed building. I discovered first of all a lamentable lack of continuity in the line of cleavage at the jointure in the beams and columns. I found several instances where the columns had shifted at the beam joints with no evidence of severe weight of falling debris to cause it. A fallen pillar showed us how the concrete had been poured separately and no continuous bars were run up through the

columns. This thing of pouring the beams, floors and columns separate, though never good judgment, is likely to be avoided in the future by builders. I agree with Mr. Leonardt, who calls it "mongrel" construction.

* * *

VICTORY FOR PURE TYPE OF REINFORCED CONCRETE

By CHARLES F. WHITTLESEY, Architect

THE collapse of the Hotel Bixby, instead of being an injury to the cause of reinforced concrete construction of the pure type, such as is used in San Francisco and Los Angeles, should be a great victory for it. The hotel is not what you would call an example of the pure type of reinforced concrete construction. It is more of a composite construction of a new type in which about 60 per cent of burnt clay tile is used with 40 per cent of reinforced concrete in all of the upper floors. In the single instance where reinforced concrete was used entirely the results were most satisfactory. I have reference to the lower floor, which stood the tremendous weight of the great mass of debris which crashed down upon it from the four stories above.

The failure clearly started at the top, where the concrete was being deposited in the roof forms. The spans were long and the mass of wet concrete was very heavy and the temporary supports for the form boxes and false work were weak and insufficient. These gave way and precipitated the whole mass with terrific impact upon the next floor below, the fifth story, which was yet green and from which the forms had been recklessly removed too soon, for use in other parts of the building. Not having had age enough to stand so great a shock it went down with its load to the next floor, which was likewise unable to stand the constantly increasing load, moving with increased momentum. Thus each floor below was attacked in turn, all of them falling until the lower floor, before mentioned, was reached. This being of the all reinforced concrete type proved to be capable of sustaining the shock and did not fall except in the center span where the mountain of debris fell with such awful and irresistible attack that it went through to the basement, which stood 20 feet high when I saw it.

This should be an object lesson to those having a little knowledge of the theory of reinforced concrete construction, yet lack the experience for its practical application. In this case I think that the blame cannot be placed with the architects of the building, for they frankly acknowledge their inexperience in reinforced concrete work and intrusted the structural design to engineers who professed a knowledge of the subject, but who had had little or no actual experience.

While the floors would have been able to sustain any ordinary load, they were weak in design. There was no adequate provision made for shear at the beam ends and the reinforcing metal was not placed in accordance with the best engineering practice. There were no bracket connections at the intersection of beams and columns and because of the introduction of so much tile in the construction the whole system was very weak in resistance to shear. The superintendent of the work for the contractor was a man known to have a reckless, dare-devil spirit, and through his lack of discretion and caution more than any other cause is due the catastrophe.

As an instance of the possibilities of reinforced concrete construction let me mention that in the new Los Angeles Auditorium, which is an all reinforced concrete building of great size and for which I had the honor of preparing the plans, there are three concrete girders of 42-foot span carrying a concentrated center load on each of 100 tons. There are also concrete roof trusses in this building having a clear span of 112 feet.



Figure 3. (Note Smooth End of Column)

The Failure of the Bixby Hotel

By JOHN B. LEONARD, C. E.

THE recent unfortunate failure of the Bixby Hotel, November 9th, at Long Beach, Cal., has aroused an increased interest in reinforced concrete type of construction. Knowing that the public is particularly anxious to investigate the subject, the writer submits the results of his investigation of the existing conditions together with some conclusions as to the probable cause of failure.

The location of the building is at Long Beach, a suburban town about twenty miles from Los Angeles. From the ocean the site has a clear exposure to the severest storms that may occur on the Southern California Coast.

Figure one shows the general plan diagram of the building, which, as will be noted, consists of two wings and a connecting portion. The part that failed is indicated by the section lining. The building has a total height of five stories, with a clear distance of eight feet four inches each above the second floor and of nineteen feet between the first and second floors. (All general dimensions of the building are as accurate as could be determined in the field by careful measurement with a two-foot rule.)

The foundations were placed upon a sandy beach at an elevation, so the writer is informed, of about two feet below low tide level and are six feet square. The basement floor was laid directly on the beach sand.

There is but one system of girders in each of the floors. These girders run parallel to the long dimensions of the wings and in the connecting portion in a direction normal to the wing girder. The roof construction over the connecting portion of the building consists of concrete girders dividing its area into rectangular panels. On these girders at the time of failure, there was being constructed a reinforced concrete slab four inches in thickness. On the wings the roof construction consisted of concrete columns supporting concrete girders

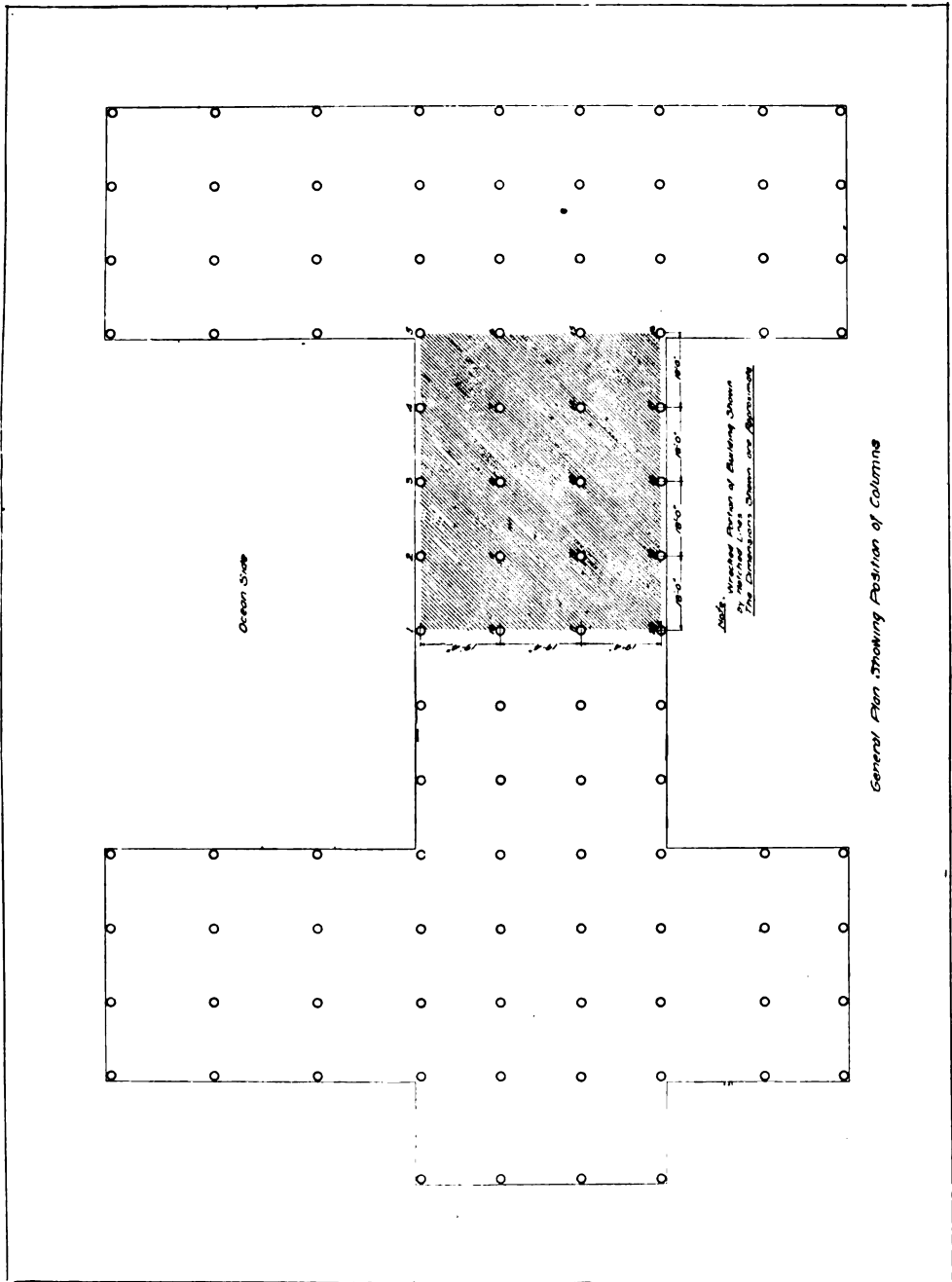
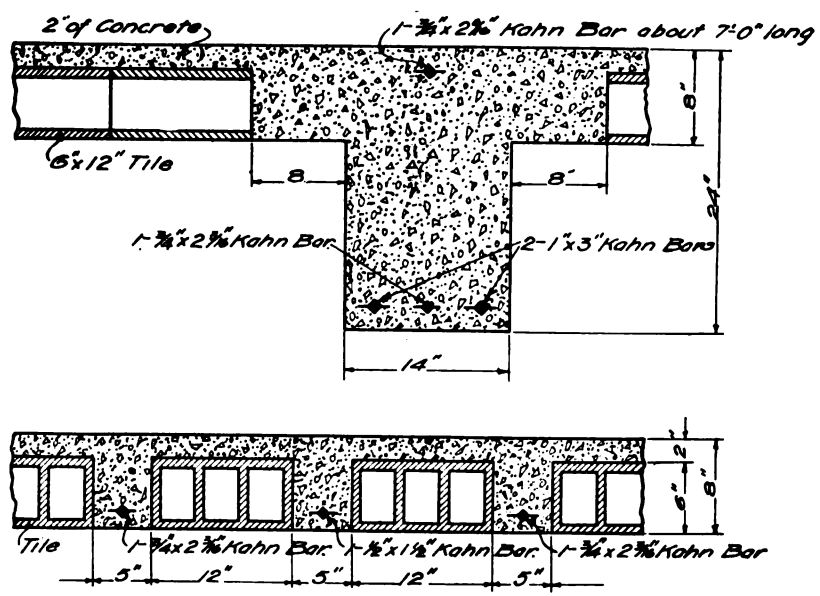


Figure 1



Typical Construction on First Floor.

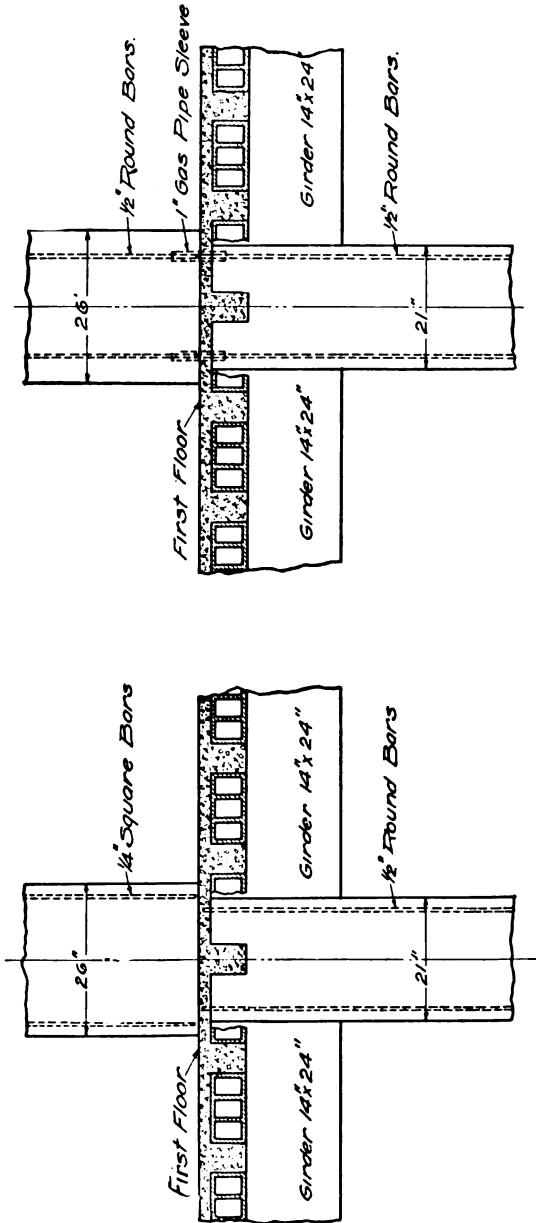
Figure 2

running parallel to the girders of the floor system. On top of the concrete roof girders, there were bolted wall plates to which were being nailed two by six-inch ceiling joists. The roof construction was to have been of timber frame covered with tile.

The girders of the first floor are fourteen inches wide by twenty-four inches deep, reinforced with three bars having a sectional area of 3.62 sq. in. On the other floors the girders are twelve inches wide by eighteen inches deep, and the Superintendent insists that they have the same reinforcement as on the first floor. The girders are constructed T shape, as shown by Figure two, and have 0.78 square inches of metal for continuity reinforcement, which projects about three feet six inches each side of the column center. None of the girders are provided with haunches or brackets.

The slab construction consisted of five inches by eight inches concrete beams placed seventeen inches center to center and reinforced alternately with bars having a sectional area of 0.38 sq. in. and 0.78 sq. in., respectively. Between the beams is a row of six inches by twelve inches hollow tile, which is placed in a line normal to the girders and parallel to the beams, the twelve-inch dimension of the tile being horizontal. The detail of this construction is shown in Figure two. On top of the tile was placed a two-inch layer of concrete which contained no reinforcement.

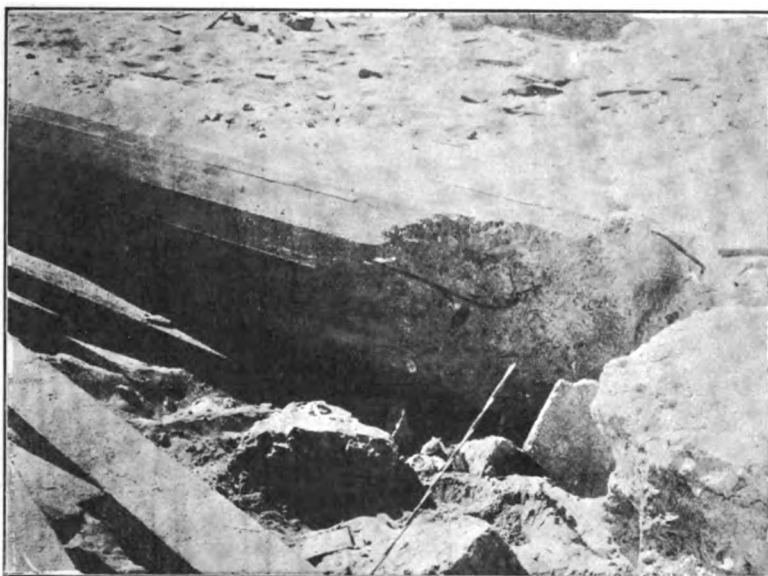
The columns are built of concrete and contain, usually, for reinforcement, four one-half inch round bars. In the wrecked portion, the basement columns are twenty-one inches square, while those of the first story are approximately round as shown in Figure three, being about twenty-six inches at the base and tapering to twenty-two inches at the top. Their reinforcement consists of four one-quarter inch square bars. The second story columns are twelve by twelve



Column Connection on First Floor
of Wrecked Portion of Building.
Note Absence of Tie Between
Columns at Floor Level.

Figure 4

Column Connection on First Floor
of Wrecked Portion of Building
Note Absence of Tie Between
Columns at Floor Level.



Showing Fractured End of First Story Column

inches, and the third, fourth and fifth story columns are ten by ten inches. Figure four shows the detail of the joint between the first and second story columns. In some cases, there was evidence of wire wrapping about one-sixteenth inch diameter spaced about sixteen inches; in other cases, there was no evidence of wrapping whatever. In several instances some of the bars were as far as six inches from the edge of the column and others only three-quarters inch, as can be clearly seen in Figure five. If the reader will carefully study this view, he will note the position of the rule which verifies this statement.

The rods in the columns at the floor levels are made to abut one another by means of a gas pipe sleeve. The ruins gave evidence that in some instances even this precaution was omitted, as can be seen in Figure six. In no case was there any evidence that reinforcement had been provided to enable the columns to transmit transverse moment to the girders and columns below. There was ample evidence that the work had been constructed by casting the column up to the elevation of the bottom of the main girders. A period of time had been allowed to elapse before the girders were fabricated. After a second interval of time, the construction of the column for the next story was commenced. This was apparent because of the smooth fractures which occurred at these places. Such reinforcement as was provided in the columns was insufficient to overcome the weakness of the lower joint and there was none at all at the floor level to safeguard the possibility of a weakness at this point.

In the wall columns, there was an eccentric condition of loading through the imposing of a sixteen-inch column on a twenty-one-inch column whose outside faces were flush.

The wall construction consists of a series of concrete spandrel beams with a curtain enclosure of double six-inch hollow tile.

The concrete was fabricated in the proportion of one part of cement, two parts of sand and three parts of gravel or rock. The gravel was screened and the coarser particles were crushed. A quarried rock was used in the construction of the columns. The sand was obtained from a nearby creek and such samples as were obtainable, showed it to be clean, sharp and coarse. The



Figure 5

cement was the brand known as Golden Gate and is manufactured near Suisun, Cal. The character of the concrete, where it was placed in position with precaution to insure a solid mass, was of such excellent quality that there can be no suspicion of this failure being caused by an inferior quality of cement.

In one case, I am reliably informed, such carelessness existed in the placing of the concrete as to necessitate the removal of a column after the floors and columns above had been constructed. This reconstruction was accomplished by placing two two by four inch shores underneath the girders, one each side, and closely adjoining the column. The concrete was then removed for about half the length of the column and poured anew. This column can be seen in Figure six, and it will be noted that the column is not true to its original position.

The formwork appears to have been very lightly constructed, the uprights being two by four inches, oftentimes spliced midway of their length. The primary cause of the failure seems, from the best information obtainable, to have been the collapse of the formwork of the roof while the roof was being cast. The weight of the roof impinging on the fifth floor incurred a condition which the construction was unable to resist. The fifth floor was a little over two weeks old at the time of the accident. The constantly increasing load was sufficient to destroy each of the succeeding floors and to carry down with them all the interior construction.

The building was designed to carry a live load of forty pounds per square foot. The writer was unable to learn that there was any load even approximating this on the floors at the time of the accident. A calculation of the

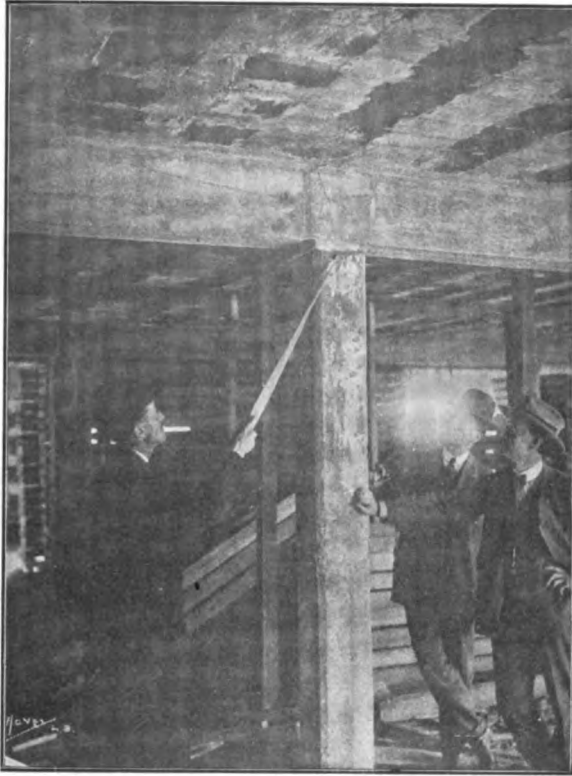


Figure 6

strength of the girders of the first floor in accordance with the parabolic theory shows that there would exist a fibre stress of about 11,000 pounds per square inch on the steel and 400 pounds per square inch on the concrete for live and dead loads. On the ten by ten inch columns in the third floor there existed a unit stress of about 750 pounds per square inch under dead load only. Assuming the live load of the roof to have been twenty pounds per square foot, there would have been a unit stress of 1100 pounds per square inch on the concrete. The building laws of San Francisco place a limitation of 450 pounds per square inch on concrete under such a condition as this.

It will be well to note that an attempt in construction has been made here that is not sanctioned by the most advanced constructors, that is, the elimination of transverse girders and the placing of entire dependence for horizontal transverse forces upon thin slab construction. The entire elimination of haunches or brackets together with their reinforcement is a serious sacrifice of lateral stability, particularly so in a location where a structure may be called upon to endure very severe wind conditions.

A building having steel columns resting one on top of another with nothing more than a dowel pin connection would inspire no feeling of security. It therefore, becomes difficult to understand why a concrete structure whose columns contain no more reinforcing material to give strength at the floor level than would be obtained in the above steel connection, should be cited as an example of failure of the reinforced concrete type. Again, imagine the designer running only a single line of girders between the above steel columns at each

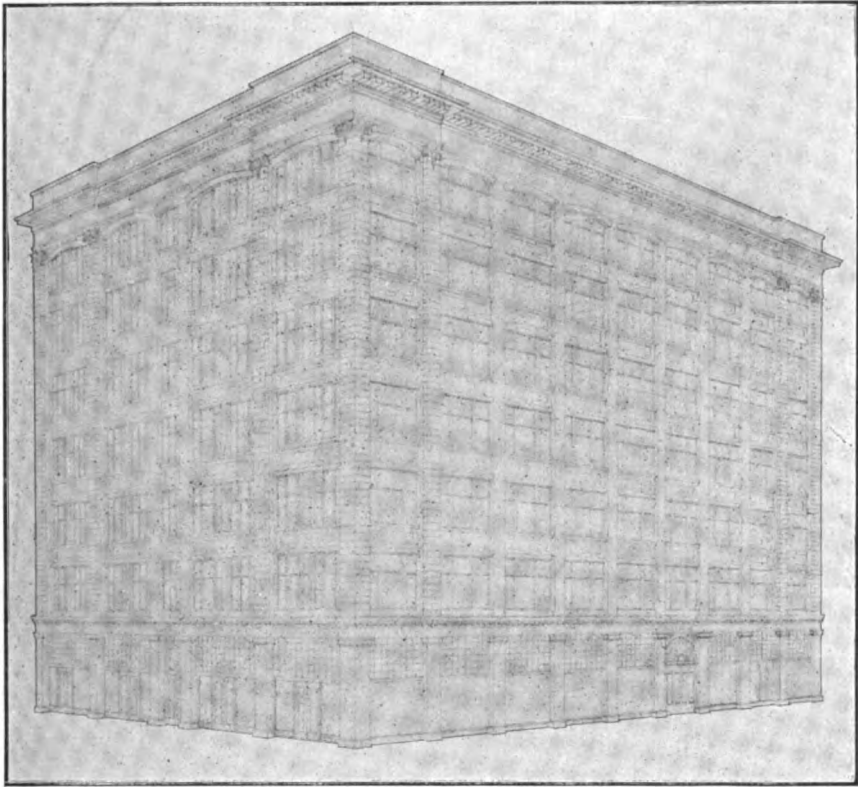


Showing Absence of Transverse Girders in Floor Construction

floor level in a five-story structure and the faults and weaknesses of the general design are apparent.

Only the opponent of reinforced concrete construction would dignify the columns of the Bixby Hotel, by classifying them as examples of this type of construction. It is true that they contain some metal, but the amount is so deficient and the placing so careless and inefficient that they can never develop the strength that columns of such dimensions should possess, and will have when properly reinforced. The defects existing in the columns would have contributed much less toward the magnitude of the disaster had the proper transverse girders been included in the construction. In fact it might reasonably be assumed that such girders would have confined the failure to a very small area and might have stopped it at the fifth floor.

The ruins of the Bixby Hotel show clearly that great care must be taken in the design and execution of such structures. They also confirm the belief that when these precautions have been taken, reinforced concrete contains the merits and security that have been advanced in its favor.



*The Mark Sheldon Building of Reinforced Concrete, now under construction
Benjamin G. McDougall, Architect Jno. B. Leonard, C. E., Consulting Engineer*

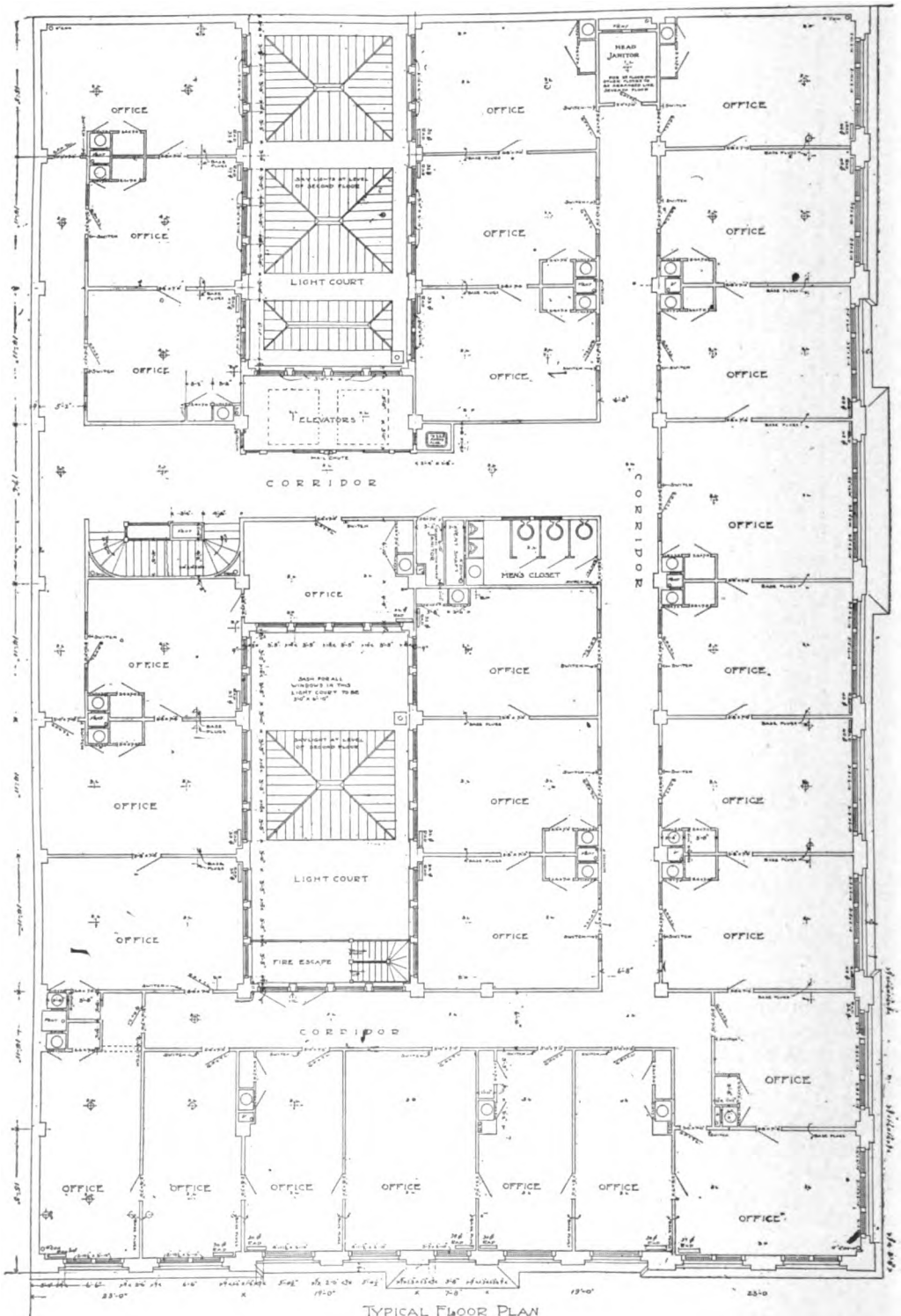
Seven-Story Reinforced Concrete Office Building

By BENJ. G. McDOUGALL, Architect

AMONG the leaders in the building of the New San Francisco are the Mark Sheldon Company, who are to erect at the southeast corner of First and Market streets a seven-story office building. It is to be of reinforced concrete, faced with buff terra cotta, and will be 137.6 feet deep with a frontage on Market street of 91 feet 8 inches.

The exterior is treated in a style that has been evolved for office buildings in this country—and which lends itself well to a structure that must have abundance of light. The ornament has been concentrated at the first story and at the cornice. The effect of repetition is broken by a slight offset of the two bays at either end of the facade, these breaks being emphasized by the addition of cartouches immediately below the capitals of the three end pilasters.

The ornamental treatment in the first story is confined to the entrances to the offices which occupy the six upper floors of the building. The main entrance which will be on First street is given a simple Doric treatment, with banded columns supporting an entablature that ties in and lines up with the heavy belt course which marks the top of the first story. The Market street side, while a little smaller, is treated in the same general style, having pilasters instead of columns—the entablature being the same as for the main entrance.

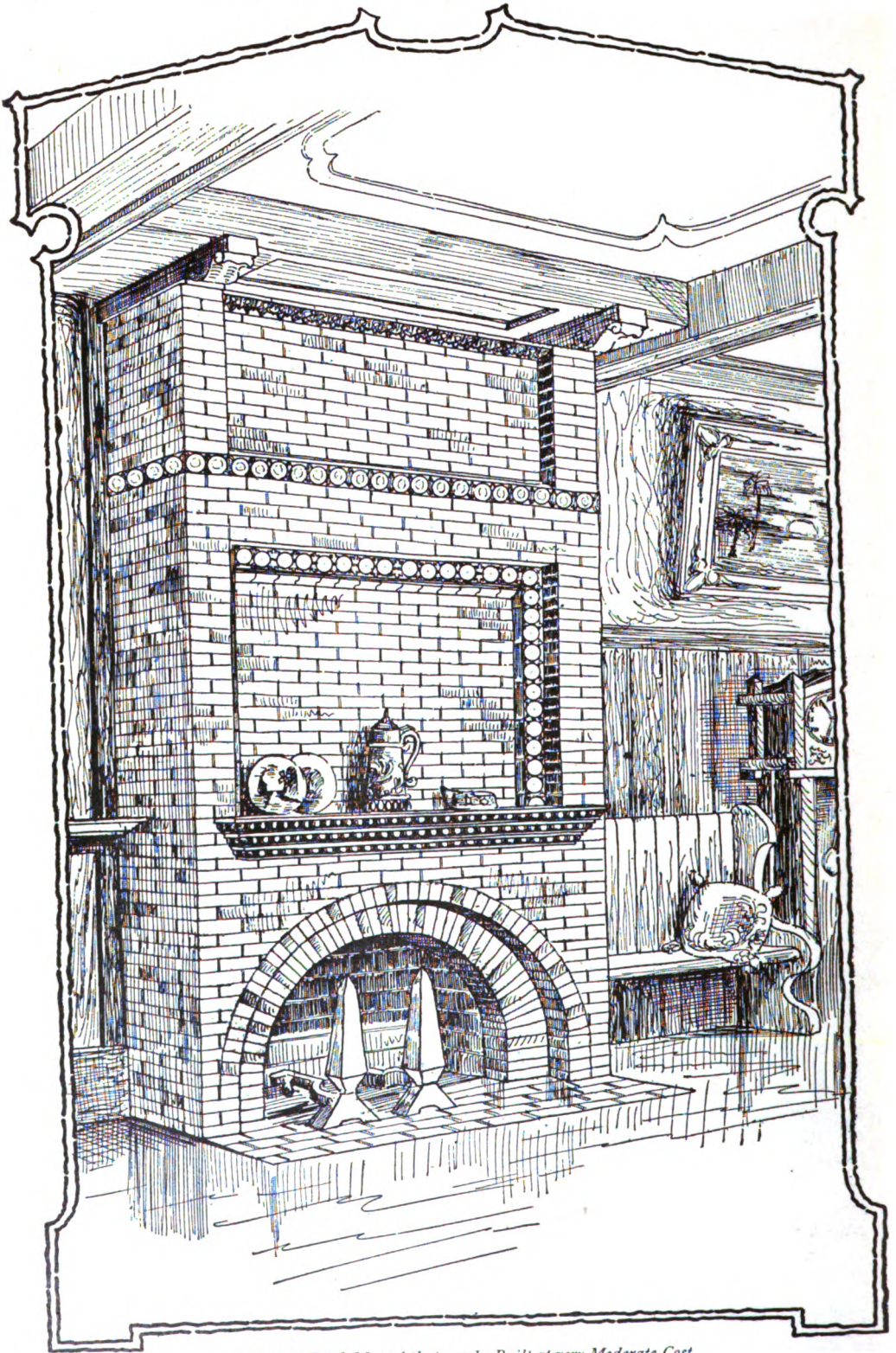


TYPICAL FLOOR PLAN
SCALE 1/8" = 1'-0"

BUSINESS PREMISES FOR THE MARK SHELDON COMPANY, . S. E. COR. 1ST & MARKET ST'S., SAN FRANCISCO.
DENJ. G. McDougall, ARCHITECT. 417 MONADNOCK BUILDING, SAN FRANCISCO



Market Street Elevation of Mark Sheldon Building, San Francisco
Benjamin G. McDougall, Architect



A Pressed Brick Mantel that can be Built at very Moderate Cost

Terra Cotta and Brick

The Fireside

By W. E. DENNISON, President of the Steiger Brick and Terra Cotta Company

WITH the approach of winter naturally come thoughts of shelter. The prudent man looks first to his roof. He knows that without shelter there may be no comfort. When Boreas slams the shutter and Pluvius dances across the roof, what joy comes to the household if no shingle rides the wind and every tile is tight.

Beneath a staunch roof no feature of the home has contributed more to the cheer of man than the fireside. Remember this, the careful man lays in his winter's fuel before the sun looks with oblique and dubious warmth from the winter solstice. Then with garnered fruits of his sleeping field may the wise man draw close the domestic circle about the blazing hearth and enjoy the sweets of his summer's toil. Thrice happy he if the old song should apply:

"He never cares to wander from his own fireside;
He never cares to ramble or to roam.
With his children on his knee,
He's as happy as can be;
There's no place like home, sweet home."

And now come memories trooping fast, bringing a wealth of happiness past. The gnarled and knotty log, defiant of the wedge and maul, is dragged across the oaken floor. The wintry blast rushes through the hall with a wail for the dismembered monarch of the forest and howls in anger when the door is closed. The andirons are hustled aside; the ashes and coals raked forward; over and over is rolled the unwilling one and the snow dropping from its frozen sides hisses on the hearth. At last it bumps against the chimney back. The blazing fagots and red-hot coals are heaped against the back log's sputtering hulk. The andirons are piled high with dry limbs. The flames leap around the blackened kettles swinging on the crane. Savory odors fill the room and almost let the supper's secret out. Potatoes are buried in the coals while impatient tots dance about unmindful of their mother's warnings and the flying sparks. The surly old back log finds willing recruits in the crackling hickory limbs, all rebelling against the compelling cheer of that glorious fire. Many a shout, "A coal's on the carpet," attests the accuracy of the hickory sharpshooters. Then the horny-handed son of toil with dignified deliberation picks up the impious coal; dances it on his naked palm; throws it back to the firing line and saves the rag creation. No Turkish rug can ever down the memories of those rag-carpet days.

At last the housewife's fork attests the fact that the potatoes are done. Little hands with childish slaps contend for the honor of draw-

ing them from their smoking bed. The mysterious kettles are emptied into the great white tureen and platters. Supper is ready. Around the white board gathers the family. Mother, flushed with her labor of love, endeavors to quiet those ravenous children, while father, the great provider—the man of mystery, the one who subdued the back log—bows his head and asks a blessing on them all. Before that blessing could possibly arrive, how well remembered is sister's sure kick to keep brother from getting the first potato.

After the repast, the old folks take to the chimney corner, he to read from the Weekly Tribune the speeches of Lincoln and Douglas, she to mend and knit while the children crack nuts on the limestone hearth or parch corn in the skillet over fresh drawn coals. And then the sharp cider from the frozen barrel on the north side of the house. "Children, it's time for bed!" brings forth the flannel night gowns to warm before the fire, and "Now I lay me down to sleep" in the old trundle bed, closes this simple picture of an old-time fireside.

* * *

Enduring Brick

Superiority Claimed for the Ancient Building Material

UNDER the above heading there is an interesting addition to current literature on brick, by Mr. Albert A. Gery, of the United States Brick Company, Reading, Pa. It was written to and published in the New York Sun of August 18, in reply to an editorial entitled "Falling Brick," which the Sun published August 5, and which Mr. Gery states, while intending to be scientific in its nature, was a conclusion drawn from wrong premises. The editorial begins by commenting upon the recent drop in the price of brick in New York City, coupled with the prediction that it will not rise again, and then deplores the consequent depreciation in the value of all brick buildings as a public calamity. Mr. Gery's reply to the editorial states that nothing has happened but the scotching of another trust, which he considers a public boon.

"Let us note at the threshold," he continues, "that the brick walls of a building are the least expensive part of it, all the bricks laid in place amounting to less than an average of 10 per cent of its cost. A rise or fall in the price of brick, therefore, is so inconsiderable an item that its influence in encouraging or retarding building is insensible.

"The price of brick in New York for the last six months has been abnormally high as the result of a mischievous combination of brick manufacturers on the Hudson River, the increased price in due course stimulating the output and breaking the combination, to the general public relief.

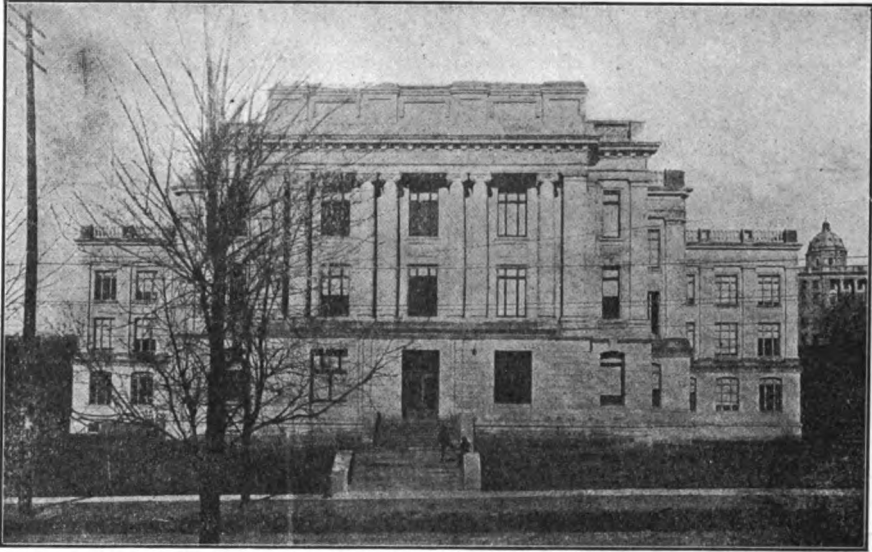
"Brick is the least variable in price of all commodities, because the prime condition of raw material is not a factor. With inexhaustible supplies of shale and clay and constant and unlimited markets, there are no elements involved but labor and fuel, and the modern method by which the bricks are handled and heated but once instead of twice or thrice, has reduced the cost to such an extent that there is no chance of a substitute for this enduring, convenient and economical commodity, which neither moth nor rust can corrupt, and which is insensible to the ravages of fire and time. Bricks have stood the test of ages. The history of Babylon and Nineveh, inscribed upon their faces thousands of years ago, are as legible today as when the text was written. The old Roman walls of Vienna, discovered in recent excavations, disclose the bricks in perfect condition, while the cement in which they were laid has crumbled into dust.

"Making bricks is the oldest of all the industries, and the bricks made for the Tower of Babel were produced by the same crude methods as those now in use on the Hudson River. It is the one undeveloped industry of modern times, and offers the greatest opportunity and inducement for genius and capital. The present price is good enough for modern plants with a product greatly superior in quality to that of the antique yards that now supply your market.

"The purpose of the article referred to was not so much apparently to depreciate brick as to commend cement, which it declares is displacing brick all over the country. This statement is so gross an error that the Sun will not be willing to stand sponsor for it after even a slight investigation. The substitution of poured cement is entirely experimental, and the extent of its use does not make the slightest impression upon the brick market. According to the statistics of the United States Geological Survey, the value of clay products stands third among the natural industries of the country, amounting to \$120,000,000 a year, being exceeded by coal and iron alone, and exceeding in value all the gold, silver, copper and petroleum together. The value of cement has not been proved as a building material, and it has not been shown that it will endure the vibrations to which the walls of town houses are constantly subjected. The San Francisco buildings which sustained the temporary shock of an earthquake were sustained by the iron frames, and not by the cement which covered them. The National Builder says on this subject:

"'It is a mistake to suppose that concrete made with Portland or any other cement is absolutely a safe material to build every sort of work with, or that as now employed it is a perfect fireproof substance. There have been a number of serious failures of concrete construction, commencing with the fall of three floors of the Hotel Oswego, which fell last October; a warehouse in Pittsburg, belonging to Kaufman Brothers; the Wonderland Theater of Detroit; the Bell Telephone Company's building in Philadelphia; the Paddington apartment building, Chicago; the Conservatory apartment, Boston; the Johnson Service Company's building, Milwaukee, and the Lawrence Savings Bank of Newcastle, Pa. These are only a few of the failures, the most prominent. We could name a number of others of more or less magnitude. It is not likely these failures are simply because of the concrete being insufficient. More probably the faults lay with the methods, both of using the material and the mode of construction. As a fireproofing material concrete may be all right, but the many failures in which this material has been depended upon throws suspicion on its efficiency. Perhaps the failures are due to bad methods, careless workmanship or insufficient inspection, or all of these combined.'

"There is this thing that must be taken into account with concrete construction: Cement making is a delicate process, and even in the most carefully managed factories it is impossible at all times to secure absolute uniformity in the product. Of course there are constant tests at the factory, for the makers of a recognized brand realize how essential it is to keep their product up to the highest standard. Cement deteriorates rapidly under certain conditions, and new and untried brands are constantly coming into the market. The engineers of a great work have their own tests, which they regularly apply to the cement they use, and so they protect themselves. With the ordinary job there are no facilities for testing, and the cement is used without question as it is delivered. Sometimes a batch of bad cement will find its way into a job. Upon this weak and slack material may be erected a massive superstructure that will collapse with appalling disaster. Then it will be found necessary to go into the entire question of concrete construction, and put it under stringent regulation. In our craze for novel methods we seem to forget that concrete is not like stone or brick masonry in having the test and approval of the centuries."



Chemistry Building. University of Wisconsin. Faced with Sand-lime Brick

Sand-Lime Brick for Building

WHILE the manufacture of sand-lime brick is a comparatively new industry in this country and at present is attracting more than ordinary attention of contractors and builders, it might be of interest to know something of the nature and manufacture of the brick. There are in this country more than 100 plants at present making sand-lime brick successfully. One of these is represented on the Pacific Coast by the W. F. Barnes Commercial Company of San Francisco. The brick is made from sand and lime is used as a binding material. It is shaped in moulds. It is dried or cured in steam cylinders under a pressure of about 120 pounds in about twenty-four hours. In Germany in the earlier manufacture of sand-brick they were sun-dried, the process requiring several months. From recent tests made by L. S. Anderson, formerly of Wellsville, New York, now of Jackson, Michigan, the following results were gained:

After drying the brick to constant weight, the bricks were weighed, and placed in water an inch deep, remaining there forty-eight hours, and again weighed with the following results:

No. 1, Detroit clay brick, dry, 4 lbs. 6 oz.; wet, 5 lbs. 4 oz.; absorption, 20 per cent.

No. 2, Toledo clay brick, dry, 4 lbs. 12 oz.; wet, 5 lbs. 1 oz.; absorption, 19 8-10 per cent.

Jackson Sand Lime Brick:

No. 1, dry, 5 lbs. 9 oz.; wet, 6 lbs. 1 oz.; absorption .09 per cent.

No. 2, dry, 5 lbs. 14 oz.; wet, 6 lbs. 4 oz.; absorption, .06 4-10 per cent.

No. 3, dry, 5 lbs. 9 oz.; wet, 6 lbs. 1 oz.; absorption, .09 per cent.

No. 4, dry, 5 lbs. 14 oz.; wet, 6 lbs. 4 oz.; absorption, .06 4-10 per cent.

Mr. A. B. Stevens, City Engineer, accompanied Mr. Anderson to Ann Arbor and witnessed the tests made at the University.

Tests of tensile strength were made with knife edge supports, 7 inches apart, from centers, with knife edge above, in center.



Detroit sand lime brick broke at 635 lbs. pressure.
 Piece of same, 4x4 in., crushed at 17,200 lbs. pressure.
 Detroit clay brick broke at 1640 lbs., was not crushed.
 Toledo clay brick broke at 1570 lbs., piece 3¼x3¾ crushed at 37,860 lbs.

Jackson sand-lime brick, No. 2, broke at 1330 lbs. pressure, and a piece 3¼x3¾ crushed at 38,100 lbs.

Jackson S. L. Brick, No. 4, broke at 1500 lbs., and a piece 3¾x3¾ crushed at 42,540 lbs.

The above bricks, made by the Jackson Pressed Brick Co., were only one week old and would have made a better showing had they been older. The tests were considered highly satisfactory by Mr. Stevens, and also by Professor Tilden, instructor of civil engineering, under whose supervision the tests were made. They will be used in the city water purification plant now under construction.

The cut shows the Chemistry Building of the University of Wisconsin at Madison, Wis., which is faced with sand-lime brick, and is one of the best illustrations of the beauty and stability of the brick, which gets harder as it grows older. It is one of the newest buildings of the University, having been erected about three years ago. It is a fine example of what can be done in the way of ornamentation, and artistic treatment with this new building material. The sand-lime brick develops a very handsome building, whether it is used in its entirety or in combination for decorating window caps, coping, or for facing.

* * *

Brick Bungalows

A new type of residence architecture is being introduced in the city of Denver, Colo., in the shape of what is locally called "brick bungalows" of attractive style and finish. The prime mover in the undertaking is C. K. Ingram, who is having plans prepared for the first dozen, to cost on an average about \$3500 each. The houses are unusually low, with broad and deep verandas as part of the house, and not merely as an incidental attachment. The materials for one of these cottages are cream brick set in bright red mortar and trimmed in red terra cotta. A roof with wide spreading eaves is also to be painted in bright red. A massive columned porch will adorn the front. Both within and without the red and cream tints will be carried out. There will be fireplaces in the principal rooms and the finish will be in warm tinted oaks. The ceilings will be paneled in oak, with the heavy beams of "mission" architecture. The bungalows will be of all sizes, ranging from those with four rooms and kitchen up to those accommodating families of half a dozen or more.—Ex.

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Bricks from Petroleum

A foreign correspondent of the Department of Commerce and Labor writes that Professor de Humy, French scientist, has invented a process by which petroleum can be converted into solid bricks as hard as anthracite coal. Common petroleum oil, it is asserted, has been thus solidified, and the blocks in burning give off an intense heat and are slowly consumed. One ton of solid petroleum used as fuel is said to be equivalent to thirty tons of coal. The comparative cost of the two forms remains to be ascertained.—Richmond Leader.

Effect of Moisture on the Strength and Stiffness of Wood

VERY little is definitely known about the influence of moisture on the strength of wood, even by those experienced in handling the material.

Since the whole subject is one of great importance, the Forest Service has been making a thorough study of it during the past three years and is about to publish the results of his investigation in an exhaustive technical bulletin entitled, "Effect of Moisture upon the Strength and Stiffness of Wood."

The chief points presented by the study are:

1. The relation of moisture to strength follows a definite law which can be graphically expressed. Proper drying very greatly increases the strength of all kinds of wood, the amount of increase in strength depending upon the species and the dryness. The increased strength given to green wood by thoroughly drying it, is so great that it will surprise many. For example, the strength of a piece of unseasoned red spruce may be increased over 400 per cent by a thorough drying at the temperature of boiling water. Strength decreases again, however, as the wood reabsorbs moisture. Air-dried wood, protected from the weather, and containing 12 per cent of moisture, is from 1.7 to 2.4 times stronger than when green, varying with the species. Stiffness is also increased by drying. These conclusions, however, are drawn from small-sized pieces not exceeding 4 by 4 inches in cross-section such as are used in vehicle work, tools, etc. Large timbers require years of drying before the moisture is reduced to the point where strength begins to increase. It must also be taken into consideration that more or less checking always occurs when large timbers dry; and if this checking is excessive it may cause weakness to counterbalance, partially or entirely, the strength gained in drying. Consequently it is not safe to assume that the average strength of large, so-called seasoned timbers is much greater than that of green or wet ones.

2. The fiber saturation point of a number of species has been determined. This point, which varies with conditions and species of wood, designates the percentage of water which will saturate the fibers of the wood. It has been found that, under normal conditions, wood fiber will absorb a definite amount of moisture; beyond this the water simply fills the pores of the wood like honey in honey-comb. Only that water which permeates the wood fiber has an influence upon the strength. For the following species, the saturation point occurs at the given percentage of moisture based on the dry weight of the wood:

Longleaf pine	25	per cent moisture
Red spruce	31	per cent moisture
Chestnut	25	per cent moisture
Loblolly pine sapwood.....	24	per cent moisture
Red gum	25	per cent moisture
Red fir	23	per cent moisture
White ash	20.5	per cent moisture
Norway pine	30	per cent moisture
Western tamarack	30	per cent moisture

3. Prolonged soaking in cold water does not reduce the strength of green wood below that of its fiber saturation point, provided it remains in perfect

condition. When wood has been dried and is resoaked, it becomes slightly weaker than when green.

4. Wood soaked in heated water absorbs more moisture because the amount of water which the fiber will contain is increased. This causes a reduction in strength and stiffness, as in wood that is heated or steamed for bending.



Clay

By W. E. DENNISON

Men are but gilded loam or painted clay.—RICHARD II.

WHEN Noah stood on Ararat,
His foot slipped on the slimy fat
Of Mother Earth, and I recall
Some words of his, although not all,
"The rotten stuff!"

He little thought that clay met clay,
As he went sliding on his way.
I was beneath his dignity,
And got his old malignity.
I was the stuff.

Nor reck'd he that I bore the tree,
Whose branch proclaimed my victory
O'er boundless waters of the flood;
Invited his assorted brood
To get the stuff.

His children's children, all, my cup
Have snatched and drained with bottom up;
And as they drank, unheeding they
That maybe I was their own clay.
Their very stuff.

How then can man, whose end is mud,
Sit up and boast of his blue blood?
When all the ichor in his veins
Is but the liquor, with my brains.
To make the stuff.

I know not why, who bends the bow,
Or he who plodding wields the hoe,
Or he who rules with kingly power
Should fill with brags his every hour,
That he's the stuff.

Why, I'm the feet of every man
Who treads on me, and e'en the ban
Of all his other mortal parts,
Save what eludes death's fatal darts,
Immortal stuff!

Aye, there's the rub. I shape the bowl
With man's remains, but of his soul
I know not, save it gives me mould.
I hold but dross, while it is gold
And priceless stuff.

And still, I am the envelope
Of loving man and misanthrope.
I hold them both within my thrall;
It seems to them that I am all,
The only stuff.

One thing I know, while round is round
In this my own terrestrial bound,
That all of earth's own facts are mine,
And all the myriad suns will shine,
Shine on my stuff.



*The Lichtenstein Hotel of Reinforced Concrete, now under construction on Market Street, San Francisco
Chas. J. Rousseau, Architect*

Cement and Concrete

Development of the Cement Brick Industry

By C. J. HELM

CONCRETE, the greatest of all building commodities, has in its rapid development naturally swung into twofold complexity. Placing this material while in its plastic state in the position of permanency after which curing takes place, forms one division. Therein are included the various forms of monolithic construction. Forming or manufacturing concrete and placing it in position after it has been cured comprises the second division. In this class belong cement blocks, caps, sills, much of the ornamental work and cement brick.

The manufacture of cement brick is now receiving such marked attention and consideration that it merits a review in these columns of the development of this industry.

The increase of this field cannot be termed anything less than remarkable, growing up unassumingly under cover of the development of the general cement field and without particular attention having been paid to it to any great extent by the press, excepting as it has been brought to attention from time to time by manufacturers of brick machinery.

This development must be considered the more remarkable from the fact that a brick is a brick the world over and the adoption of cement brick in the place of the clay article has been the result of educating the people to the intrinsic value of the former and its advantages over the latter, while with the cement block, for instance, its introduction into foundations and such work in the place of natural field stone gave this form of concrete a claim on popular demand without meeting the opposition raised by such an aggregation as the clay brick manufacturers, though they are now thoroughly aroused to the inroads being made into their field by the combined branches of concrete work.

Notwithstanding that all conditions under which this industry was developed were not exactly favorable, it has reached a point where it is recognized as one of the best branches of concrete work, and is so well established that its future success is assured.

This industry is of such importance that the originators in the line are no longer alone in their field of endeavor. It is to be noted that nearly all the manufacturers of cement block machinery have added the brick machine line. Such a condition has been brought about by the fact that a large percentage of the sales of brick machines are made to operators of concrete plants already running block machines. This field has developed to that extent that the operator of the block plant or the man in kindred lines sees the necessity of completing the plant by adding the brick machine.

The fact that the use of cement brick in no way violates the architectural laws founded on brick form of construction, but allows the advantages of concrete, without antagonizing labor, has been the prime factor in insuring success in this line. The architect will not be bound by the limitations of the block plant and the advent of cement brick, used in connection with blocks, has done much to serve the purpose of the architect and place this form of construction in higher favor.

The fact that various grades of brick of a superior quality are produced has made this proposition especially attractive. The builder or contractor is enabled to go to such a plant and place his specifications, the product being made to order to meet his desires if it is not already in stock, and the matters of freight and expensive delays are overcome. Various colors are produced and some very beautiful effects in shades and tints can be produced, but the feature of producing deep colors without increasing the cost of product too much can scarcely be said to have been satisfactorily worked out, though this holds true with any form of concrete. Were it possible to retain the shades of colored concrete when just tempered in the mixing process, the problem would be solved.

The development of the cement brick field so far as the brick maker is concerned, has been accomplished by operators of small plants rather than by the activities of large capital. This is a healthy condition, of importance to concrete operators of limited capital, and to the purchaser of the products as well, because it stands as an industry beyond the influence of combines.

Some of the merits of the cement brick are now well known and the erection of a cement building in a locality serves to bring out very favorable comments and to develop a profitable trade. This of course depends always on the quality of product that is made. As in any other concrete work, care must be exercised in producing good brick and curing them well before using. That they are superior to the ordinary run of clay brick, there is no question. The testimony of brick-layers is to the effect that the cement brick lay faster than clay. In many instances they are sold in competition with cheap clay brick, but being superior in quality they ordinarily bring a better price, in fact, at a higher price they prove cheaper in cost laid in the wall, with lasting qualities, which are also to be considered. The production of high grade facing-brick brings the best profit, but the quantity of this product used is much more limited than a good quality of common brick, on which the operator ordinarily bases his calculations.

The machinery for cement brick now on the market follows two different systems, one the tamping system, similar to that used in blocks generally, and the other that of pressing with a uniform mechanical pressure.

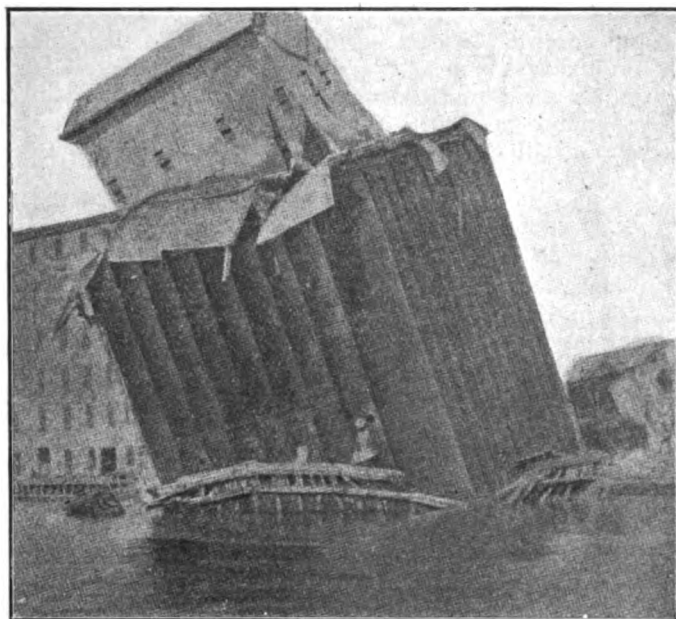
There is no cause for doubt that the industry will make as rapid strides forward in the future as it has in the past. Its success, of course, is limited by the success of each plant that enters the field and this is dependent always on the production of good concrete.—Concrete.

* * *

Go to Work

"Lives of great men all remind us
We can make our lives sublime,"
If we'd only work instead of
Idly loafing half the time.

—*Boston Globe.*



A Steel and Concrete Elevator Falling into the River

A Curious Accident to a Grain Elevator

ONE of the most peculiar accidents which might befall a modern grain-handling plant occurred at Fort William, Ont., recently when the gigantic elevator of the Ogilvie Milling Company slid from its foundation into the Kaministikwia River in much the same manner as a vessel leaves her ways on being launched.

The structure, which cost \$250,000, was of the tubular steel type, 60 feet wide, about 100 feet long, and 180 feet high, built on a concrete foundation, which was supported by 65-foot piling driven through clay to solid rock. The elevator had a storage capacity of 500,000 bushels, and contained about 400,000. It was built but two years ago, and was one of the most modern grain-handling plants on the continent, it being electrically operated throughout, induction motors supplying the motive power, says the *Scientific American*.

It is generally believed that defective concrete work was the cause of the accident. The cement foundation was 16 feet high and only 16 inches in thickness, which it is now claimed was not sufficient to withstand the enormous weight. The foundation gave away at one corner, and the whole wall immediately went to pieces, letting the building slide 30 feet into the river. The structure at the time the accompanying picture was taken stood in 20 feet of water at an angle of 25 degrees. It was a total loss, as the tanks were twisted and pulled completely out of shape. Holes were tapped in the sides of the tanks, and the wheat run off through these openings into scows in the river below, from which it was transferred to boats, about 50 per cent of the grain being lost.

Progress in Design of Reinforced Concrete

IN its latest bulletin, the Association of American Portland Cement Manufacturers publishes a paper by Ross F. Tucker, a civil engineer, who sketches the progress and logical design of reinforced concrete. Basing his conclusions on the increased output of Portland cement in this country, Mr. Tucker finds that reinforced concrete has made tremendous strides in popularity.

Mr. Tucker hits one of the difficulties on the head in his observation on the attitude of the architect toward reinforced concrete construction. "It is the general practice," he says, "to design in brick, stone and steel, and then to call upon a reinforced concrete engineer to reproduce a structure in reinforced concrete. This is an imperfect and unscientific method and unfair to the development of the true value of the concrete structure." It is also pointed out that the cost of cement and of labor involved in the handling of concrete are not the real factors in determining cost, which depends almost entirely on the cost of wood work and centering required. Elaboration of form means of necessity increased cost, and this is one of the things that the average architect has still to learn. Simplicity in detail and the proper use of repetition make for economy.

It is possible to beautify the plainest building by an intelligent arrangement of proportions and modern practice enables the designer to introduce tiles or mosaic work into concrete buildings, with resulting effects of a pleasant character. Simplicity is by no means ugliness, though some designers seem to think that it must be. Mr. Tucker believes that under proper handling a truly American school of architecture may be evolved in reinforced concrete, and we are inclined to be of his opinion. As he says, "The future is replete with possibilities. We have learned thoroughly how to make concrete strong; let us learn how to make concrete beautiful."

* * *

Painting Cement

THE following method of painting a cement wall was described at a recent convention of master painters. The building had become discolored in places and the joints were of a different color from the surface of the blocks. Two parts of Portland cement were mixed with one part of marble dust and mixed with water to the consistency of thin paint or a thick whitewash. The wall must be well wetted before the application of this paint and kept constantly wet while the material is applied, and then must be kept wet for a day longer, in order to make the cement wash adhere to the cement surface. The wash was applied with ordinary whitewash or calcimine brushes, and a man was kept busy playing a hose on it while the work was being done. The whole secret of success lay in keeping the wall constantly wet. A price could not well be quoted on such work, but on a scaffolding job, it should be worth not less than a dollar a yard.

A well-known painter, who is one of the largest contractors in the country, in commenting on this, said that he had frequently been called upon to paint the cement panels in half-timbered houses, and the best material he could find for the purpose was an English material known as Duresco. This comes in paste form and is thinned with water to the consistency of thin cream and to this a little of a so-called "petrifying liquid" made by the manufacturers is added. This material is the same color when it is wet as when it is dry—differing from ordinary water paints in this respect. It can also be used on pressed brick fronts.—Carpenter and Builder.

Heating, Lighting and Electrical Work

Fire Protection for Buildings

By GEORGE J. WELLINGTON

THE fundamental principle of fire protection is the elimination of causes of fires; second, the reduction to a minimum of combustible materials; third, confining of fires as much as possible to points of origin; and last, the providing of means for ready extinguishment. All of the features mentioned receive substantial recognition from Underwriters' Boards and Associations, and should receive from owners as much, if not more, attention than anything else in the construction of buildings.

Earthquakes are due to natural causes, their occurrences are uncertain and cannot be prevented, while fires are a common enemy and may in every instance be provided against.

A Fire Protective Engineer's first consideration should be the proposed occupancy of, and the exposures to a building. His work should commence with the principles in the order as mentioned in the beginning of this article, and should accompany that of the architect and structural engineer from the first lines drawn upon plans.

It is acknowledged that a man with a bucket of water or chemical solution at the start of a fire—provided he has knowledge of the proper method of handling it—is the best fire protection known; but as yet, no one is capable of determining at which point a blaze will occur. The employment of many men with filled buckets is impracticable; thus, the Automatic Sprinkler presents its value to both owner and underwriter. Rates of insurance upon Class C buildings thus equipped are lower than those upon Class A structures not protected. Metal clad woodwork is but a poor apology for fire proofing when properly constructed and containing ordinary glass. Sprinklers are not intended to check conflagrations, but to extinguish or control fires in their incipiency; therefore, due consideration should be given their opportunity for advantageous operation.

With each system an alarm device, which operates a mechanical gong, with slight delay upon the opening of one or more heads, is installed. The electric alarm is uncertain of operation and should be installed only as an auxiliary to that set in motion by a water motor.

The alarm system of the Pacific Hardware & Steel Co.'s building, San Francisco, is the most complete upon the Coast. It not only sets the mechanical gongs in operation, but indicates upon drop annunciators the section of building, the story and portion of floor where the head is discharging.

Proper consideration at the time of preparing building plans permits of valuable economies in costs of installation of Private Fire Protection. Portions of savings thus effected may be devoted to better quality, which, in

any event, cannot be overdone, not being essential to conduct of trade or manufacture. Fire protection is the most neglected of all adjuncts to a building; therefore, the necessity of its being as nearly self-sustaining as possible, and fire proof.

Each class of hazard requires different treatment, and no general rule can be applied. Fees for this, as well as other classes of engineering, should be based upon gray matter and not upon quantities of materials used.

Inside stand-pipes with hose constantly attached, and approved chemical extinguishers are of great value in augmenting protection afforded by Automatic Sprinklers.

Ridge, cornice and window sprinklers are efficient in lessening the hazard of exposure fires. It can be stated with confidence that wire-glass in properly constructed metal frames augmented by window sprinklers, with proper water supplies, is equal, if not better than any shutter manufactured. The latter soon deteriorate from weather and lack of attention, and are rarely closed when needed.

Contents of roof tanks of gravity flow, except as secondary supplies, to sprinkler systems, are practically useless for fire purposes when discharged at less than fifty feet below the bottoms.

Basement reservoirs with flexible and non-deteriorating linings or flowing wells both of sufficient capacity and furnishing suction for steam or gasoline driven pumps, are the solution of perfect private water supplies in sections susceptible of seismic disturbances. This point is borne out by the operation of pumping plants at the Palace Hotel, Merchants' Exchange, and Western Electric Company after the earthquake of April 18th. The building of the Western Electric Company was saved from destruction more through the private water supply than from its wire-glass windows. Electrically driven pumps are impracticable on account of uncertainty in their supply of current.

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Colossal Old Ruins

The oldest architectural ruins in the world are believed to be the rock temples at Ipsampool, on the Nile in Nubia. One of the ancient temples consists of fourteen apartments hewn out of solid stone. The largest single stone used in this work is one which forms a veranda-like projection along one side of the main temple. It is 57 feet long, 52 broad and 17—one of massive square pillars, four in each row and each 30 feet high. To each of these pillars is attached a colossal figure of a human being, reaching from floor to roof. In front of the main temple are seated still other colossi, four in number, the two largest being 65 feet high. The ruins are supposed to be four thousand years old.

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The Omnipresent Cow

When the historic cow kicked over the barn-lantern that started the destruction of Chicago, she achieved an immediate place in the hall of fame. Chicago rose from her ruins, as San Francisco will do, bigger, better and more enthusiastic than before. Another cow has made a bid for undying reputation. The story comes from Harlem, Chicago, where cows are rarer than goats and less sure-footed. The cow fell through a wooden sidewalk and broke a leg. Subsequently several people, following a vicious example, did the same thing, and now Harlem will spend \$135,000 for new cement walks. The enthusiastic denizens are now talking of a monument to the cow—something along the lines of the Roman wolf.—Concrete.

The Proper Kind of Heating Apparatus

By T. M. CLARK

DURING the early fall of each year architects frequently hear from friends and clients, "What is the best furnace?" or, perhaps, "What shall I put in, to heat my house?" The injudicious architect is apt to reply to this question with a promptness which he sometimes has occasion to repent of afterwards for few things are more difficult than to adapt satisfactorily a heating-apparatus to the requirements, or, possibly, the whims, of the people who are to use it. One person has a very large house to warm; another has a small one; a third has a passion for fresh air, and is not happy unless he feels a breeze constantly blowing upon him; while a fourth lives in deadly fear of draughts. A fifth cannot breath in an atmosphere which is not kept constantly moist; while a sixth takes cold in such an atmosphere; and, of the seventh and eighth, one requires an average temperature of eighty degrees in his house in winter, while the other is uncomfortably warm with the thermometer at sixty. Of course, none of these people mention their abnormal tastes, and it is left to the architect to divine what they really want, and to supply it, according to his judgment and experience, without offending them by appearing to notice their eccentricities.

In general, tall, thin and old people like to be warm. Their circulation is poor, and their feet and hands, in consequence, disposed to be cold. Moreover, as their respiration is apt to be superficial, in correspondence with the sluggish action of the heart, they are, as a rule, less sensitive to impure air than persons of more vigorous constitution. Such people, therefore, usually, although not always, prefer a powerful heater, such as a wrought-iron furnace, or direct steam radiation, either of which affords them an opportunity for warming their feet and hands, at the same time that they breath a hot, stimulating atmosphere.

Where people of this temperament are happy, those more vigorous constitution are wretched. Such persons, coming, in winter, from a brisk, healthful walk into a room suited to an old or anaemic subject, break out into a perspiration which is not only annoying, but dangerous; their heads throb with the stimulus imparted by the heat to the circulation, and they gasp for the oxygen to which their lungs are accustomed.

Children, again, require special treatment. Being active, and having rapid circulation and sensitive lungs, they need plenty of fresh air, at a temperature not too high; but they have little power of resistance to cold, and a chilly atmosphere, in rooms for their use, must be avoided. It is to be remembered, also, in arranging for children's day-rooms, that the little people live in the stratum of air next the floor, which is always at a lower temperature than that in which their elders move, and is often so much cooler than the air above it that young children, playing on the floor, may be seen with their hands and faces blue with the cold, while the grown people about them are perfectly comfortable.

For children's rooms, the sovereign remedy for this state of affairs, which in conjunction with the cruel fashion of dressing babies so as to show their little bare legs and arms, has brought desolation to many a household, is to provide an open fire. A simple fire on andirons, in a brick or soapstone fireplace, is a rather inefficient heater for our climate, so that warm air should, in addition, be brought into the room from a register, or around the fireplace

itself; or a jacketed open stove, with air-supply from outside, may be substituted for the fireplace. By any of these devices not only is the atmosphere of the room kept pure, and at a comfortable temperature, but the floor in front of the fireplace or open stove is warmed by direct radiation from the blazing fuel, so that it imparts warmth to the little limbs, instead of chilling them, at the same time that the temperature of the general atmosphere of the room may be kept low enough to avoid debilitating the children. Of course, little children must be kept from falling into the fire, or trying experiments with it, by an efficient guard. This will generally have to be made to order, as nothing suitable is kept in stock, and should be three feet high, of heavy wire netting, in an iron frame, forming three sides of a square, about three feet on each side. Such a screen will be heavy enough not to be easily tipped over, and will keep the children at a sufficient distance from the fire, while it can be bronzed or painted, so as to be inoffensive in appearance.

Grown people, especially invalids, would often find advantage in the cheerful radiation and the rapid change of air, afforded by an open fire; but an open fire involves labor and expense, and is not usually sufficient for comfort in the American winter climate, so that some form of what the Germans call "central heating" is practically indispensable for our houses; and, as the central apparatus is generally presumed to have a capacity enough for warming the house without aid from open fires, the latter have come to be looked upon as luxurious, to be only sparingly indulged in.

A generation ago, the most common device for central heating in American houses was the "hall stove," a large sheet-iron stove, set up in the staircase hall, often with its smokepipe carried up through the well of the staircase, as additional heating surface, nearly to the top of the house. Although the sight of one of these stoves, with its red-hot funnel carried up twenty or thirty feet through the narrow well room of a pine staircase, was calculated to give an insurance man bad dreams for a week afterward, they were useful in furnishing a supply of warm air in the middle of the house, which could be admitted to the rooms by opening the doors; and they were simple, cheap, and easily kept in order. The successor of the hall stove was the brick-set furnace, many examples of which are still doing duty, after twenty years or more of useful existence. Although much more expensive than the hall stove, the brick-set furnace, placed in the cellar, had the advantage of being out of the way, while the tin pipes leading from it supplied the various rooms with warm air directly, and more satisfactorily than was possible where it was necessary to keep the doors open to let in warm air from the hall.

As usually built, the brick-set furniture consisted of an inclosure of brick walls, five or six feet square, covered with brickwork, laid on iron bars, which rested on the walls. The walls were usually made double, with an air-space four-inches wide to prevent loss of heat. The tin hot-air pipes were built through the brick covering, and the air was heated by a complication of corrugated or spiked surfaces and convoluted smoke-pipes inside. The earlier furnaces of this sort were made with heavy castings, and were very well designed for utilizing as much of the heat of the fuel as possible. Their capacity was however, notwithstanding their bulk, comparatively small, and they were intended to be operated at a high temperature. With the wood-burning patterns, which were often used, the air delivered from the registers was frequently hot enough to set fire to a match, and a comparatively small proportion of air at this temperature was sufficient, mixed with the other air of a room, to bring the whole to the desired average. Very commonly, the air to supply the registers was taken directly from the cellar; but people who had whims on the subject of ventilation, sometimes insisted on having "air-

drains" provided, by which a limited amount of fresh air was brought from the back yard, under the cellar floor, to the air-chamber of the furnace.

By degrees, architects and householders became dissatisfied with this form of heating-apparatus. The intense fire which it was necessary to keep up in such furnaces heated the cellar, notwithstanding the double walls of the setting; the mass of brickwork was accused of "absorbing" a quantity of heat which did not belong to it, but ought to be transmitted to the rooms above; and people began to find that their registers delivered to them "burnt smells," "carbonized dust," "scorched air," "carbonic oxide," and many other unpleasant things, in place of the "June atmosphere" which the furnace advertisements had led them to expect.

The first attempts at correcting the imperfections of the furnace air took the form of supplying it with moisture. Not only were water-pans inserted in the air-chamber of the furnace and kept sedulously filled with water, but dish-pans and tin wash-basins were to be seen standing on the registers in houses which aspired to the reputation of being the home of advanced intelligence, and huge sponges or towels soaked with water were often hung in the room to increase the evaporating surface. The care of all this apparatus was, however, a serious burden to the housekeeper, and the virulence of the air-moistening fever soon disappeared. Meanwhile the designers of furnaces, recognizing the advantages of increasing the supply of air and reducing the temperature proportionately, had modified their patterns, and, little by little, the modern type of hot-air furnace was evolved.

As now made, furnaces for central heating in dwelling-houses combine, in a greater or less degree, the best features of the various types which have preceded them. In the old brick-set furnaces, which contained a complication of heating surfaces, flues, pipes and domes, it was often found that a part of the pipes was useless, the smoke and heated gases taking a short cut through the nearest, and leaving the others cold. To prevent this the flues were, in certain cases, constricted, so as to force the smoke to divide itself among them; but this device had some practical inconveniences and was not always effective. At the same time that manufacturers were beginning to find defects in the multiplied radiating members of the old furnaces, a sudden outcry was raised against the use of cast-iron for heating, on the ground that carbonic oxide passed freely through its "pores" and affected the health of persons breathing air warmed by it. Although this notion was afterward completely disproved, it seized upon the popular imagination, and a demand arose for wrought-iron furnaces with riveted joints, which would be impervious to noxious gases.

The first furnaces put upon the market in response to this demand consisted simply of a cast-iron fire-pot, lined with fire-brick, upon the top of which was set an inverted tub of boiler iron, with riveted joints, having a smoke-pipe issuing from it, the whole being enclosed in a casing of galvanized iron. Air was brought in between the fire-pot, with its boiler-iron "dome," and the galvanized-iron casing, and escaped, after warming itself by contact with the hot surfaces, through tin pipes carried from the top of the casing to the various rooms. Nothing could be simpler, and under suitable conditions this form was, and still is, very effective. It is, however, applicable, in its simplest form, only to small houses, or, at least, to houses which, like summer cottages, are provided with only a small number of registers. The quantity of air which can pass up between the casing and the dome of a furnace of this sort and becoming warmed by actual contact with the hot surfaces is very limited, and to try to distribute it among a large number of registers results only in disappointment, where the same furnace would supply a small number of registers with satisfaction to everybody concerned.

Although these very simple wrought-iron furnaces will supply two or three rooms with warm air with remarkable certainty and effectiveness and are less affected than those with more extended radiating-surface by sudden changes of wind, the comparative smallness of their capacity has led to modifications in them, for the sake of increasing the amount of air which can be warmed by passing through them, and thus enabling them to supply a larger number of rooms. In a good and inexpensive modern furnace this end is attained by giving the wrought-iron dome the form of a short telescope, the casing remaining cylindrical. With this arrangement a larger quantity of air can be admitted under the casing, as that which fails to come into actual contact with the surface of the dome or the casing accumulates in the space around the upper segment of the dome, and either comes in contact there with the upper surfaces of the dome, or has time to mix with the hotter air which has been in such contact before issuing from the registers.

This modification, although it increases very sensibly the heating capacity of the furnace, without interfering with its good qualities, does not confer upon it the ability to supply hot air for a large house, and, for this purpose, the heating-surfaces must be again increased, so that more air can be brought in, with the certainty that none can escape through the tin pipes above without coming in actual contact with hot iron. After many experiments, furnace manufacturers have very generally adopted as the best type of furnace of moderate cost, for houses of comparatively limited size, a type in which a large fire-pot, roughly hemispherical in shape, is surmounted by a dome, and this again by a ring-shaped flue, through which the smoke and hot gases from the dome are conducted, and from which they escape to the chimney. In a furnace of this sort the air admitted between the fire-pot and the galvanized-iron casing, now generally substituted for the brick casing of the past generation, passes upward, warming itself by contact with the walls of the fire-pot and dome, and the inner surface of the casing, until it comes into collision with the annular flue, which extends out over the space in which the air has been traveling, almost to the casing. The interposition of this hot obstacle in the path of the air practically insures the collision with it, and consequent warming of whatever air may have escaped contact with the heated surfaces below; but, to make assurance still more sure, the air is then led, before it can reach the tin heating-pipes, laterally along the underside of the hot annular flue, to openings in the middle, through which it rises freely to the outlets provided for it. By this means a large amount of air is warmed with rapidity and certainty and is delivered very freely into the heating-pipes.

Although different makers adopt variations in this general type, some making the annular flue deep and some shallow, some constructing it of cast-iron and some of wrought-iron, some corrugating the dome and fire-pot to increase their heating-surface, and some leaving one or both of them smooth, the principle is the same in all, and the ease with which the annular flue is cleaned out, the evenness of distribution of the hot gases through it, and the certainty with which it intercepts and warms the air without too much checking its flow, make it, perhaps, the most valuable improvement ever introduced into furnaces for houses of moderate dimensions.

For very large houses, however, even greater air-warming capacity is required, and a furnace which would heat in a perfectly satisfactory manner eight or nine rooms may, if called upon to supply warm air to fifteen, fail to keep any of them comfortable, for the reason that the additional heating-pipes draw from the furnace a certain amount of warm air, which is chilled in its feeble progress through them and fails to produce any satisfactory effect in the rooms which they supply, at the same time that the subtraction of this warm air from

the supply of the other rooms prevents them from being warmed. It is therefore essential, where a large house is to be heated, to provide for the introduction of an adequate supply of air. All this air must be warmed by actual contact with a heated surface before it enters the room, and for this purpose the furnace must present a large amount of heating-surface. It is useless to give a wide space between an ordinary furnace and the casing so that a large amount of air can pass, trusting to keeping up a hot fire to warm it all, the result of this being simply to supply hot air to the registers most favorably situated and cold air to the others.

For large furnaces, therefore, a certain complication of heating parts is necessary, in order to extend them sufficiently to intercept and heat a large volume of air. In several excellent furnaces large pipes or flues, either straight or curved, are provided, passing through the fire-dome and opening at top and bottom into the air-chamber. The air from the lower part of the air-chamber passes up through these flues and issues from the top, heated by its journey through and over the fire, and joins in the upper part of the air-chamber the portion which has ascended between the furnace and the casing. The capacity of the furnace for transmitting air is immensely increased in this way, and the portion which passes, by means of the air-flues, through the fire itself is quite as effectually warmed as that which passes through the narrow space between the fire-dome and the casing.

A variation of this type is made by building up the fire-pot and dome of cast sections, which inclose between them, when put together, vertical air-flues, opening at the top and bottom into the air-chamber, as in the case just described, and serving in the same way to add to the volume of air passing up outside the fire-dome a large additional quantity, passing through the fire-dome, in close contact with the fire. As the upward current through these strongly-heated flues is very rapid, the sides of them are formed with horizontal waves, or corrugations, so that the air will not only be held longer in contact with the hot iron, but will be thrown with a certain force against it, this being found to favor the heating effect.

A pattern of furnace somewhat similar in appearance to those with air-flues running through the fire-pot has a number of vertical smoke-flues carried down through the air-chamber, the smoke being drawn out from them either through an annular flue at the bottom, communicating with the smoke-pipe, or through a similar annular flue at the top. If such furnaces are well managed, and if the conditions are favorable, they are powerful heaters; but if the chimney draught is poor or the fire burns sluggishly or unevenly, the smoke and hot gases may find their way out through one or two of the flues, leaving the others cold, so that only the tin pipes from the side of the furnace over the active flues will supply warm air to their registers, the registers supplied from the other side of the furnace being cold.—The American Architect.

* * *

Cement shingles are fast coming into popular demand, as their advantages become more widely known. In their most modern and best form they are only a trifle heavier than slate, and in cost they amount to little more than the best wood shingles, while they are of course much longer lived. A large variety of designs for different purposes is manufactured and most of them are reinforced with a metal skeleton, which provides means for securing them to the roof. Cement shingles are practically everlasting, since the only effect of water upon them, when properly made, is to increase their hardness and density.

Interior Decoration



One of the New Friezes

New Styles in Wall Paper

IT is possible to reproduce for a nominal sum the wall coverings and decorations of the earlier days, which Americans of large fortune duplicate at a cost of many thousands of dollars.

It is no unusual thing, for instance, for twenty thousand dollars to be spent by New Yorkers in decorating the walls of a drawing-room, says an exchange. On the other hand it is possible by the aid of the latest wall papers to get a very pleasing imitation of a twenty-thousand dollar effect for sixty or seventy dollars. Carved wood, gold leaf appliques, painted canvases, are all suggested in the latest wall papers, the more artistic of which are designed to bring to the front panel effects. Never before have panel effects been so popular, not only in drawing-rooms, but in dining-rooms and in bedrooms, and it rests with the housekeeper whether she will have an ordinary plain papered wall or a wall broken up by oblongs of contrasting paper into a very pleasing copy of a French or Italian salon of the seventeenth or eighteenth century.

"There are hundreds of women of small means who have not the smallest conception of the possibilities in wall paper," said a New York dealer.

"What the New York woman of average means or of small means sadly lacks is a disposition to study period effects in relation to house furnishing and decorating."

In describing panel effects of inexpensive grades and their cost, the decorator gave as a rough estimate from one to two dollars a roll as about the minimum cost. This means the use of fifty cent and one dollar a roll paper. The cost of paneling a room is just about double that of the paper on account of the waste and extra work.

For a wall to be covered between a ten-inch baseboard and a molding near the ceiling with a long paneled effect, the least expensive method is to cover the room first with a solid-toned moire paper at forty cents a roll and then merely outline panels with a six-inch wide border representing a floral or conventional design, the corners of the panels being elaborated to give variety to the stiffness of pattern.

The widest of the panels, in one outlined design of pale gray moire paper bordered with pink roses and green leaves, was about twenty-five inches and the narrowest panels between doors and windows about fifteen inches. All the panels stopped within six inches of the molding and the same distance from the baseboard, and were about eight inches apart in the wider spaces of the room.

A pale green wall with panels outlined with darker green and gold; a yellow wall outlined with brown, green, and gold; and old rose outlined with white and gold, were among the combinations.

Next to this method the least expensive way of having a paneled room is to use fabric paper for the panels; that is, paper of small, rich patterns, either figured or striped—preferably striped—cut out in fancy designs at the corners. As in the case of outlined panels, the room is first covered with plain paper and the panels afterward applied.

An illustration of this sort of panel was furnished by a Louis XV fabric paper of roses and bow knots on a plain cream color foundation. A more dignified design had panels in arabesque and scroll pattern of copper color, gold and green on a dull green foundation.

The panel designs this season are by no means confined to long effects, many of them showing short, almost square panels arranged above a paper wainscoting, if it may be called so, about twenty inches wide above the baseboard made of the same paper as the panels. Occasionally this wainscoting is one yard or more deep. This idea is particularly appropriate to dining-rooms, with rich wall papers taking the place of the lighter colors preferred in parlors and bedrooms.

Among the most attractive of the newer nursery effects is a double frieze from thirty to forty inches wide, the lower edge of which is finished with a shallow shelf of enameled wood. The lower half of the frieze near the shelf is of plain paper, the upper half shows fancy picture designs of animals, sporting scenes, and clowns, or nature studies of trees, mountains, and rivers. A small patterned paper is generally used to cover the wall below the frieze, and the shelf is used for pictures.

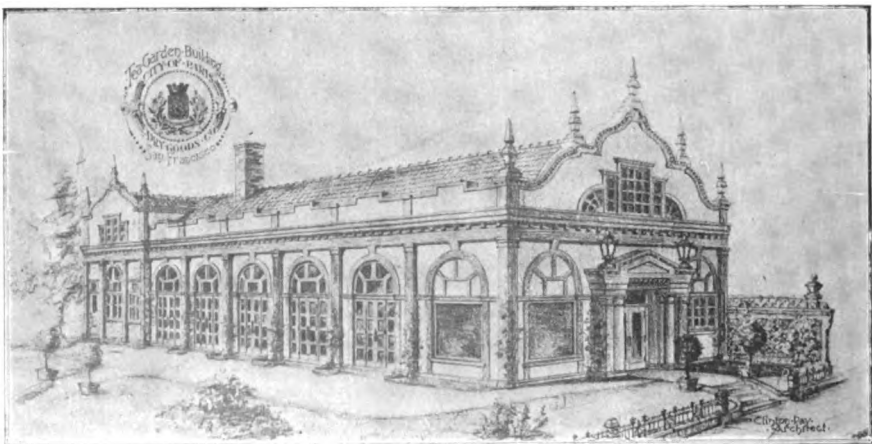
For sleeping-rooms there is a new fashioned bouquet pattern, hand-polished paper which is one of the most beautiful seen in some time. The most attractive designs have a white background sprayed with clusters of roses, lilacs, carnations, in large bouquet effects. This paper sells for six dollars a roll.

A rival paper in style and price shows no background, the pattern being a compact mingling of foliage and birds of natural color. Although used to cover an entire wall, the most effective arrangement of this paper is in the form of a thirty-eight inch deep frieze drooping over a plain wall. The frieze is not divided from the plain paper with a molding, and its lower edge instead of being straight is irregular, following the line of flowers and foliage.

A new paper which sells for one dollar a roll and is particularly appropriate for halls, libraries and dining-rooms, is called silk fibre and is heavier and two inches wider than the average paper. It is of solid colors only, and yet it cannot be called perfectly plain, like cartridge paper, for example, because of a mottled effect which gives a sort of shimmer to the surface. The golden browns, rich deep reds, and foliage greens are particularly desirable.



*Design for a Hotel
Clinton Day, Architect*



*Tea Garden Building for the City of Paris, San Francisco
Clinton Day, Architect*

The Brother of the Cross—A Story

By BURTON RICHARDS, in *The Craftsman*

ABOVE the town a huge stone cross was set on the hillside. The high-road ran just below, and a little path led from it straight to the foot of the cross. A tiny stream sprang from a rock near by. Many a weary traveler turned from the dusty road to drink of the cool water and to rest in the shadow of the cross. Here one day came a young sculptor. He lay down to rest at the foot of the cross, and as he dreamed he had a beautiful vision, fairer to him it seemed than the heart of man had ever conceived. "I will tell my dream in marble," he said: "here on the hillside by the cross I will place it, that the hearts of men may be touched by its beauty."

He had received from a great sculptor a gift of a flawless piece of stone. Before this block he stood one morning, chisel in hand, ready to begin work in the very shelter of the cross. He had scarce struck the first blow when a man called to him from the road below: "I pray thee, good sir, come down to help. My beast is heavy laden and has fallen on the road." The sculptor had laid down his chisel and turned toward the path, but in that moment he saw the vision more clearly than yet before. Never doubting, he grasped his chisel, and called to the man: "I work a great work, I cannot delay." Day after day with zeal he wrought, each line a new revelation. Through the long nights he lay beside his marble under the stars, and dreamed again the dream. Many wayfarers besought him for alms. Rarely he stopped to toss a coin. More often he said, "I work a great work, I cannot delay," and so the marble grew under his hand.

One day an old woman approached by the path and would have lain down to rest in the shelter of the cross. Her trembling limbs would hardly bear her up the steep ascent. "I pray you, good son," she called, "for the love of her who bore you, help an old woman up the path." The sculptor turned to look down upon her, but he shook his head and made reply: "I work a great work, I cannot delay." Even as he spoke his chisel slipped and a deep scratch appeared in the marble. Many questioned him of his work, but he made no answer. "I will carve so fair," he said to himself, "that the marble will speak and none shall need to be told." Earnestly he toiled and the vision grew fairer under his hand, yet each day that he refused aid to a brother man, that day some flaw appeared in his work.

On the morning of the day which should fulfill his task, he was interrupted by the approach of an aged priest, who, tired and footsore, slowly climbed the hill and prostrated himself at the foot of the cross. "Son, son," he called feebly, "a drink of thy cool water, in the name of Christ." The sculptor heard him not. He called again, with no answer but the ring of the chisel on the stone. At last he painfully made his way to the stream to drink.

"Son," he said again, "I need thy aid. I have traveled many weary hours. I am spent; yet in that cottage yonder on the hillside is a sick child. A shadow lurks outside. I must be there, but I am weak. Will you give me your strong arm to help?" The sculptor paused but a moment to make answer: "I work a great work, I cannot delay." Long the priest plead, but the sculptor gave no heed. "What is your great work?" at last he sadly asked; and the sculptor pointed to his marble, the form of the woman, stooping in tender pity to raise the sinner, prostrate at her feet, and proudly made reply: "I work the supreme work of love." The priest leaned against the strength of the cross as he solemnly made answer, "Woe unto him that saith to the wood, Awake! To the

dumb stone, Arise! it shall teach. Behold it is laid over with gold and silver, and there is no breath at all in the midst of it," and so saying, he went his way.

At evening the sculptor threw down his chisel. "It is done," he exclaimed. "With my hand I have wrought supreme love." As he spoke, he stepped back to view his work. He stood by the cross to look upon it. But what was this? He brushed his hand hastily across his eyes. Where was the pity, the tenderness he had dreamed in the face of the woman? What trick was this? The face was the face of stone. No soul was there. Slowly he saw the truth. In despair he hurled his strength against the mocking stone and with a mighty blow cleft it in twain. Through blinding tears he laid his hand among the pieces of his broken Love. All the night long he lay in bitterness of grief, and when the day had come all was gone—hope, the vision, the marble, even the stream and the sky, and in the darkness he could only grope his way to the cross and cling there.

In the morning the people of the town found him and brought him food and comfort; and because he was happier by the cross, they made a shelter for him, and there he lived. Scarce a traveler came to the cross that did not bring him something for his comfort. Never a traveler left the cross that was not cheered by his loving care. The simple folk from all the country brought to him their griefs and joys, sure of finding sympathy for each alike. "Brother of the Cross" they called him.

So the peaceful years passed. One day his hand fell upon his chisel. He called his friends about him and plead that they would bring him a piece of marble. They looked in wondering pity upon him, but they brought him a piece of his shattered Love. "He is old and blind," they said. "He can not know."

Again, day after day he carved, joying in the feel of the marble under his hand, yet often stopping to give the cup of cold water and refreshment to the weary. One day a traveler reached his door and fell exhausted, stricken with mortal agony. Earnestly the sculptor tried to give relief. "But one thing can avail," said the voice of the traveler. "And that can not be. I bear the pain for many." "Then," said the sculptor, "I, too, can bear. I am of no use; I am blind. Let me bear your pain."

The traveler laughed a low, sweet laugh. "That is the one thing," she said. "The joy of your bearing has made me free." "Ah, if I might see your joy!" said the sculptor. "You have seen it already," she said. "You have found it in every soul to which you have brought comfort. I am Love," and she led him to his marble and gently opened his closed eyelids, and lo! the face of the marble and the face of Love were the same.

* * *

To Stain Floors

Here is a good recipe for staining floors and also for staining around the carpet in a bedroom: First get the floor perfectly clean. If there are cracks between boards fill them, then mix linseed oil and burnt umber together, a tablespoonful to a pint of linseed oil. Stir it thoroughly. If you wish it darker, put in more umber; if lighter, use more oil. Put it on the floor with a clean paint brush. Rub it evenly. After a few days, when dry, put on a second coat. Try a little of the stain on a piece of wood first to get the color you wish. When it gets soiled or dirty mop it off with a little warm borax water, which will clean and not hurt the stain. You can retouch it now and then if it needs it. This finish resembles a hardwood floor.

Advantages of Government Interest in Concrete

MEN who are really interested in the forward development of the concrete industry are gratified by the large number of important works recently undertaken by the federal government. Their satisfaction rests upon the knowledge that governmental undertakings are ordinarily of sufficient importance to attract widespread attention. The impersonal character of the work of supervision and construction opens the way to a wide notice at the hands of the daily press—notice that an individual or a private corporation would fail to excite. Descriptions and photographs of public works are generally circulated and knowledge of them, in one form or another, is brought to a very large number of people. This increases public interest in concrete as a construction material, which is something much to be desired.

Again, where the government undertakes important work, the design and specifications are prepared by experts of unquestioned ability and experience. The question of price enters into competition, but the government is anything but niggardly in the sums it expends upon permanent improvements; if anything, it leans too far the other way. Thanks to the comparative newness of concrete work, there has as yet been little chance for the school of graft to be established, and the government works in concrete have been on the whole substantially constructed, at a fair price. Careful specifications and care in seeing that they are carried out to the letter result in completed work that is not only substantial but attractive and the fine appearance of public works in concrete is an object lesson to private enterprises.

Of very recent years a large number of important operations in concrete have been carried on under federal supervision. Enormous irrigation dams in the arid lands of the Middle West, artificial harbors and breakwaters, lighthouses and public buildings of all kinds are being put up every year. A gratifying feature of the government's interest is that the more construction there is done along this line the more there will be. In practically every case, concrete has fully justified itself in its behavior at the hands of government builders.—Concrete.

* * *

For Finishing Walls

A rather novel method of finishing the outer surface of the walls of a reinforced concrete building was recently adopted in connection with a structure in Knoxville, Tenn., says *The Record*. The sides of the building have curtain walls of concrete brick, while the front and back walls are of monolithic construction. When the work was completed, the front elevation was treated to a cement solution applied by means of whitewash brushes. The solution consisted of water and cement of the consistency of thin grout, which was strained through cloth to remove any coarse particles that might scratch the concrete surface of the building. The coated surface was given a light and quick rubbing with carborundum bricks until a very smooth surface was obtained. The thickness of the solution prevented it from running off the wall and served as a plaster as well as a dressing. The result is a front of one color, which closely resembles limestone.

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Regular meetings, the second Friday in January,
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Wrecking the Palace Hotel

The Palace Hotel, the sturdy walls of which have stood since the fire as grim reminders of its past splendors, will soon be a memory, as are already the many brilliant fetes which once took place within its glittering ball-rooms. In four months not one vestige of the world-famed hostelry will be left on its site. The work begun a week ago by the E. W. McLellan Company, in razing the staunch walls is progressing rapidly, and already the Annie and Jessie street section has been wrecked and carted away.

The Palace Hotel was perhaps the most solidly constructed building in San Francisco. Erected over thirty years ago it stood as a splendid sample of the architecture of the seventies. The bricks were molded together with a mortar composed of lime and cement, with strips of Norway iron and steel cables intercepting. The mortar is so adhering that it is impossible to scale the bricks by machinery, and all this work is being done by hand. Massive girders of iron weighing seven tons each, formed the supports. There were one hundred of these in the building.

While considerable difficulty is being experienced tearing down the walls, when they do come down, they fall in

complete strips, the bricks failing to become dislodged even after striking the ground, and it is necessary to then bring into play the pick and chisel. Two mighty hoist engines, of thirty horsepower, equipped with inch and a half cables are used in the work. These engines have a pulling strength of 5,000 men.

A force of three hundred men is now employed in the work, and soon will be working night and day. Two steam shovels will be brought into play for the purpose of conveying the debris to cars and wagons.

There are 120,000 cubic yards of material in the structure. It will take 80,000 wagonloads to remove this. These wagons if placed in a row, would reach from San Francisco to Mt. Shasta and encircle its snow-crowned crest. It is estimated that there are 40,000,000 bricks in the building. These if placed in a row, would extend across the Pacific to the Hawaiian Islands. The hotel was equipped with separate fire places and flues. These would make a wireless pole as high as Niagara Falls. There were 200 tons of fire-escapes, which would make a ladder long enough to cross the Golden Gate.

An extremely novel and unique electrical process is being used in the work of cutting up the wrought-iron girders which formed the supports of the great glass roof of the court. These fell into a disordered, twisted heap to the bottom of the court, and it is impossible to remove them by hoist. The method used is known as the electrical arc process, and is of late invention. By forcing electrical heat of 5000 degrees, generated by a huge dynamo, into the mass of iron, a gash is rapidly melted out and the girder cut into pieces easy to handle. It takes about twenty minutes to cut through a foot girder. The glare from the tip of the needle used is so intense that it cannot be looked at, and the men operating are compelled to use a queer cap with goggles.

Laborers digging below the surface of the sidewalk were compelled to desist

the other day because of hidden fires which were uncovered. In many places a combination of wood, plaster and mortar had formed a sort of charcoal, which, secluded from the air by piles of debris, has been smoldering since the fire. The sand seems to pulse and throb with the heat, and in some places water has exuded at a boiling point.

Five Story Building

The George Brown Estate Company has commenced the erection of a substantial permanent building on Larkin street, at the southwest corner of Walnut avenue, with an L extending southward which has a twenty-five-foot frontage on Post street. Architect August Nordin has prepared plans for a five-story and basement structure, and the work of excavation is now in progress. The entire building will be of reinforced concrete and built in the most substantial manner. The exterior walls will have a cement surface, and all the cornices and ornamentation will be of concrete and cement. The entrance to the upper floors will be on the Post-street side, where there will be fast-running elevators, with an elaborate hallway worked in marble and mosaic. The cost of the building will be about \$75,000.

Brick Building

A substantial four-story and basement brick building is in course of construction on the northwest corner of Pacific and Sansome streets, covering the site 68:9 by 137:6, for account of I. Levy, to be occupied by the Standard Biscuit Company. The building is designed with a view of adding two more stories if needed to accommodate the requirements of the business. The floors are calculated to bear heavy loads, and are supported entirely on steel columns and girders. The exterior of the building will be faced with red pressed brick, trimmed with sandstone sills and belt courses. Three large freight elevators constitute part of the equipment. The piles for the massive foundation are already in place, and the work is to be rushed to completion. The cost of the building is estimated at \$70,000. Sylvain Schnaittacher is the architect.

Big Lodging House

E. Rolkin has applied for a permit from the Board of Public Works to erect a \$100,000 three-story brick lodging-house on his lot on the west side of Third street, a short distance north of its intersection with Brannan. The building will have a

frontage of 120 feet on Third, with a depth of 160 feet. Sutton & Weeks are the architects, and Cook & Young will build the structure.

New Berkeley Building

The central business section of Berkeley is soon to be graced by a handsome \$60,000 three story, reinforced concrete and brick structure.

The building will be erected by B. F. Brooks, the well known capitalist of that city and Eugene Brock of the Ferrier-Brock Realty Company, and plans are now being drawn.

The upper floors will be devoted to large apartments, while the first floor and basement will be for business purposes.

F. W. Foss & Co. have the contract for the excavations, but the structural and masonry work has not been let.

To Use Roman Stone

White Roman stone will be used to face the new Knickerbocker building for which architect John C. Pelton is now making plans. The building will occupy a desirable site at the corner of Second and Natoma streets, San Francisco. It will be six stories and will represent an expenditure of \$120,000. The building will have a steel frame and will be a class A structure.

New Oakland Building

Architect Charles W. Dickey of Oakland, is making plans for a three story building for the Pacific States Telephone Company. It will be a sub-station, but will be quite an imposing structure. Brick with elaborate staff and stucco work will be used as an exterior facing. The building will cost \$40,000. Mr. Reed is no longer a member of the firm of Dickey & Reed. He is to take a two years course in a technical school.

Bids for Steel Work

Figures are now being taken by Architects Oliver and Foulkes for the steel work of the new twelve-story Class A Scott and Van Arsdale building on Stockton street. There will be many tons of steel required.

New Warehouse.

Officials of the Southern Pacific are making plans for the erection of a new warehouse to take the place of the Sunset receiving shed destroyed by fire a few weeks ago. According to the present plans the new structure will be of steel frame, and will probably be covered with galvanized iron to make it absolutely fire-proof. As the warehouse has been three times destroyed by fire, it is the determination of the officials to break the "hoodoo" and build a warehouse this time that will be fireproof.

Olympic Club Five Stories.

Five stories, not nine as stated in the daily press, will be the height of the new home of the Olympic Club, and reinforced concrete will be the material used. The building will occupy the site of the old Olympic Club quarters, with an additional lot now owned by the club. The latter has received its insurance in full, amounting to nearly \$300,000, all of which, with an additional \$100,000, will be spent on the new building. William G. Harrison is president of the Club and chairman of the building committee, and Henry A. Schulze is the architect. Work on the building will be started about January 1st.

BUILDING REPORTS

Six-story building, Stockton street, San Francisco.

Architects—Oliver and Foulkes, Eddy and Franklin streets.

Owner—Scott & Van Arsdale.

Cost—\$100,000.

This building will replace the old Monarch building, which was burned. It will have a steel frame with brick walls and plastered exterior. The building will contain stores and offices.

Warehouse, Front street and Broadway, San Francisco.

Architect—Albert Farr, 2053 Sutter street, S. F.

Owners—Owens & Unger.

Cost—\$125,000.

This building will be six stories and absolutely fire-proof. It will be built of reinforced concrete with metal window sashes and door frames, wire glass windows, etc.

The Pacific Cement Construction, second floor Monadnock Building, have just been given the general contract.

Five-story building, Jessie and Stevenson streets, S. F.

Architect—William Curlett, Mutual Bank Building, S. F.

Owner—R. McElroy.

Cost—\$100,000.

Two bids will be taken on this building, one for brick walls and reinforced concrete floors and partitions, and the other for entire reinforced concrete construction.

Residence, Fair Oaks, Cal.

Architect—Albert Farr, 2053 Sutter street, S. F.

Owner—Edward Pringle.

Cost—\$20,000.

This house will be of reinforced concrete and will have all modern conveniences, including elaborate heating and lighting fixtures.

Office building, Market street, S. F.

Architect—Herman Barth, 2500 Fillmore street, S. F.

Owner—B. Schwatzer.

Cost—\$65,000.

Bids are now being taken for this five-story brick building.

Theater, Thirteenth street, Oakland.

Architect—Walter J. Matthews, 967 Broadway, Oakland.

Owner—W. J. Laymance, President of Laymance Real Estate Co., Oakland.

Cost—\$125,000.

The plans call for a four-story brick and stone building, with an elaborate entrance of stucco work and electric lights. The building will be 80 by 200 feet and will seat 2000 persons. The Orpheum Company will take a ten years' lease of the building.

Hotel, Sutter and Gough streets, S. F.

Architects—Salfield & Kohlberg, 1039 Buchanan street, S. F.

Owner—E. L. Goldstein Company.

Cost—\$225,000.

The building will be four stories, with pressed cream-colored brick and terracotta exterior, and will contain 260 rooms with 150 bath rooms. The main entrance will be thirty feet wide, with a vestibule of green marble and a lobby of the same material. Every room will be equipped with telephone, electric reading lamps and patent wall beds.

Twelve-story Class A building.

Owner—Metropolis Trust and Savings Bank, S. F.

Cost—\$450,000.

The building will have a steel frame and will be faced with stone. The location is the corner of Market, Montgomery and Post streets. The bank will occupy the ground floor, the rest of the building being converted into offices. The name of the architect has not yet been given out.

Temporary Theater, Van Ness avenue and Grove street, S. F.

Owners—Gottlob, Marx & Co.

Cost—\$25,000.

As it will take two years to complete the Columbia Theater, the managers have decided to erect a temporary frame playhouse at once. It will have a seating capacity of 2000 and will be completed in 90 days.

Five-story business block, southeast corner of San Pablo avenue and Seventeenth street, Oakland.

Owner—William A. Barrett, Oakland.

Cost—\$170,000.

Architect—Not yet selected.

Mr. Barrett has just bought the lot and he intends to have plans drawn at once for a substantial, up-to-date business building. Albert S. Day, of Oakland, will give further details.

Hotel alterations, San Jose.

Architect—W. H. Weeks, Merrimac Building, San Francisco.

Owners—Vendome Hotel Company, San Jose.

Cost—\$75,000.

Plans are now being drawn for extensive alterations to the hotel, which was badly wrecked by the earthquake. The interior will be elaborately finished.

Three-story frame building, Broadway and Vallejo streets, San Francisco.

Architect—Charles J. Rousseau, 820 Stanyan street, San Francisco.

Owner—H. M. Rogers.

Cost—\$40,000.

The building will be used for hotel and store purposes and will be modern in every way. It will occupy a lot 68x137 feet.

Three-story brick building, First street between Minna and Howard streets.

Architects—Miller and De Colmesnil.

Owner—E. B. Jennings.

Cost—\$40,000.

Work on this structure has already begun. It will be of brick and will be occupied by the Worthington Pump Company.

Stores and Rooms, Washington street and Stout alley, San Francisco.

Owners—Eastman-Lewisson Company, real estate dealers.

Cost—\$40,000.

Plans for this building are now under way. There will be three stores on Washington street and four on the alley. There will be 135 rooms.

Two-story building for offices and stores, Kearny street to Webb and California street to Sacramento.

Architects—Miller and De Colmesnil.

Owner—Rudolph Spreckels.

Cost—\$60,000.

The structure will be of brick, with walls sufficiently strong to carry two more stories. The building will have an arcade running from Kearny street back to a second arcade. There will be twelve stores and 85 offices.

Church, 317 Seventh street, San Francisco.

Architect—S. Andrio.

Owner—Greek Society.

Cost—\$20,000.

The building will be of frame construction, ornately decorated, the dome and roof being supported by eight pillars. N. Damianakes is president of the Society, which meets at 1735 Market street.

Four-story frame building, north side of Sixteenth street, west of Spencer street, San Francisco.

Architect—H. G. Corwin, 2215 Bush street, San Francisco.

Owner—Mrs. Hannah Power.

Cost—\$40,000.

The building will contain six five-room flats and two stores.

Brick hotel, west side of Dupont street, near Pine.

Architect—Chas. J. Rousseau.

Owner—Name withheld for present.

Cost—\$45,000.

The building will be three stories, of brick and terra cotta.

Twelve-story office building, Fourth and Jessie streets, San Francisco.

Architects—Stone & Smith, Midway Building, San Francisco.

Owner—Richard Garnet.

Cost—\$150,000.

Plans are being finished for a handsome office and store building, class A, of brick and terra cotta, high speed elevators, etc. Additional data will be given later.

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There is a fund of good common sense in Mr. F. W. Fitzpatrick's article on "The Municipal Encouragement of Better Buildings," printed elsewhere in this magazine. Coming as it does from one so eminently qualified to speak on this subject, Mr. Fitzpatrick's paper deserves careful, intelligent perusal, and we feel confident that you will agree with us that the suggestions he makes are practical. Mr. Fitzpatrick taxes on a sliding scale, arranged according to class of buildings—Class A, Class B. and so on. He would have the minimum rate assessed against the very best buildings, while structures of inferior design and poor construction, he would have taxed to the maximum rate.

The fundamental purpose of this sliding scale is to encourage the erection of better buildings and at the same time serve as an incentive to the general improvement of property and the elimination of the so-called fire-trap. The insurance companies could help along the good work by making their rates on poorly built buildings prohibitive. Thus the property owner would be virtually compelled to build well. It would not cost the city one cent to adopt this plan. The argument that the municipality would, under Mr. Fitzpatrick's sliding scale plan, receive less money in taxes if all buildings were constructed along fireproof lines, is offset by the fact that with good buildings a very large percentage of the expenditure now incurred for fire protection could be dispensed with.

* * *

While the volume of building in San Francisco since April has equaled, if not exceeded, the expectations of the most optimistic, still it has not been all that one could wish, especially from an architectural standpoint. We fully agree with Mr. Theodore Starrett in the October Architect and

Engineer that shelter must first be given our people, and after that there is time to build permanently. But there has been a tendency to build structures that are neither permanent nor temporary. Buildings have been thrown together hastily on old foundations with brick taken from the ruins. In some cases part of the old walls which stood the fire and shake have been used without so much as a girder or beam to strengthen them. There are numbers of instances where burned steel has been straightened and painted and put into new buildings without any thought as to the ultimate consequences. This sort of thing should not be tolerated, especially in the business section of the city. Not only are such structures a menace to the safety of those who must work and live in them, but they are an eyesore to the neighborhood and a disfigurement to the street.

If San Francisco had an intelligent, honest government such abuse of the building laws would not be countenanced.

* * *

San Francisco is not to be the City Beautiful after all. The Burnham plans will not be followed except possibly in a very remote manner. It is really too bad that the civic pride of our city officials, if they possess any, could not have been aroused sufficiently to have encouraged, yes insisted, upon the carrying out of at least the main features of Mr Burnham's splendid scheme. But the city government is not alone to blame. Property owners who were heard to shout loudest for wider streets, boulevards and spacious parks have, we regret to say, been the very ones to block the beautification scheme. This opposition has been most pronounced in the business section, where it was desired to widen certain streets and build new structures with some degree of harmony about them all.

It was thought that architects of adjoining buildings about to be erected might be able to influence owners to sacrifice their individual preferences in the interest of a pleasing architectural effect to this or that thoroughfare, but efforts in this direction have been unsuccessful, simply because the owner did not care to give up any of his property, or put up a building at all like his neighbor's. He would rather have an ugly street with his building exposed to the spread of a possible second conflagration, than surrender a small piece of his lot, or plan his building to conform with others. If we had an administration with any backbone at all, a law would be framed requiring that certain streets be widened, and if property owners rebelled, condemnation proceedings would be in order and the owner could fight it out in the courts.

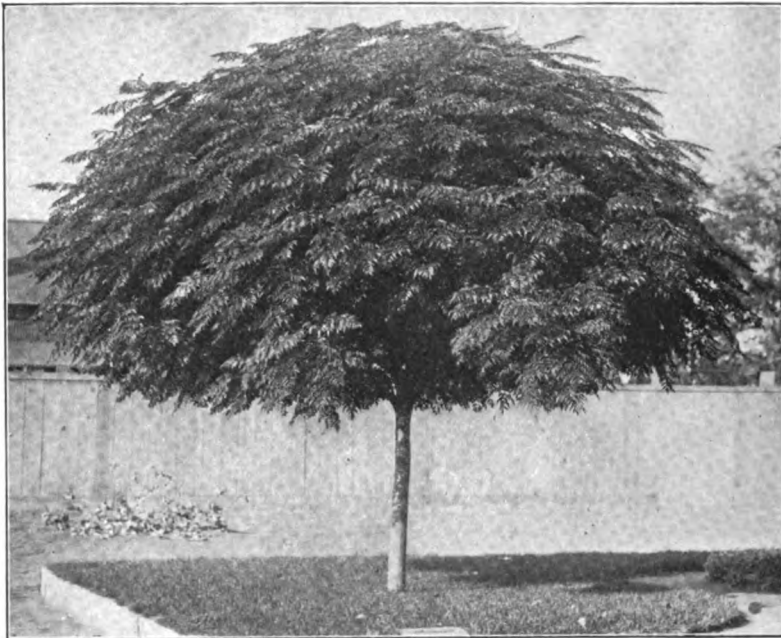
* * *

To Build on Site of Lick Hotel.

Although the Lick House is not to be rebuilt for hotel purposes, it is a satisfaction to know that this large piece of ground, comprising sixty-one thousand square feet and located in the heart of the burned business section of the city, will be occupied by a substantial building that will carry the name of the pioneer miner. The plans for the structure have just been completed by Architects Miller & DeColmesnil, and have been favorably passed upon by Rudolph Spreckels, president of the Real Property Investment Corporation, for whom the building is to be constructed.

On the ground floor there will be thirty-one stores, while the upper story will be finished in one hundred and forty-two offices. Brick will be the material used. There will be an arcade running from Montgomery street to Lick alley and through to Ver Melu alley, which runs to Kearny street. The rear of the stores will have show windows opening on this arcade, allowing a view through the stores.

The Publisher's Corner

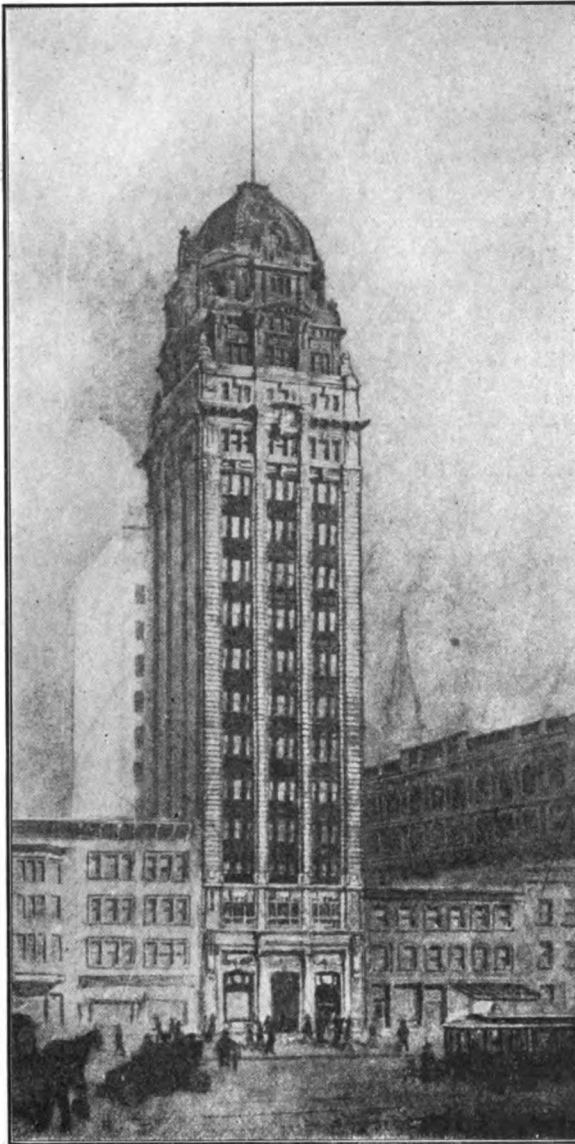


A Texas Umbrella Tree

Landscape architecture is a comparatively new departure in California and while still in its infancy it bids fair to become exceedingly popular, especially with the owners of palatial country homes and the proprietors of large tourist hotels, where the beautification of the surroundings are as necessary as the attractive arrangement of the houses themselves. The well-known firm of S. W. Marshall & Son, nurserymen of Fresno, is devoting much time and attention to a landscape gardening department, and the firm has in its employ high priced men whose years of experience is guarantee that only the best results shall be given. Original plans and designs, of any work, with estimates, will be cheerfully submitted. Close observation of soils and climatic conditions enables the Marshall staff to give practical and valuable advice to any one wishing to plant out a new place or remodel an old one. The firm can furnish all kinds of ornamental stock and if desired will plant, prune and take care of the same until it is thoroughly established.

The list of ornamental trees handled by Mr. Marshall is a long one and includes such varieties as have shown a tendency to thrive in the California climate. The illustration on this page shows a Texas umbrella tree in flourishing condition. It is, indeed, a beautiful tree, remarkable for its extensive foliage and one of the best shade trees readily grown in almost any soil. As the name implies, it resembles a gigantic umbrella, and its bright, dark green leaves and sweet lilac-colored flowers make it a most attractive addition to one's garden or lawn. Mr. Marshall will be pleased to mail his latest Catalogue, profusely illustrated, to any reader of the Architect and Engineer. His address is P. O. Box 161, Fresno, Cal.

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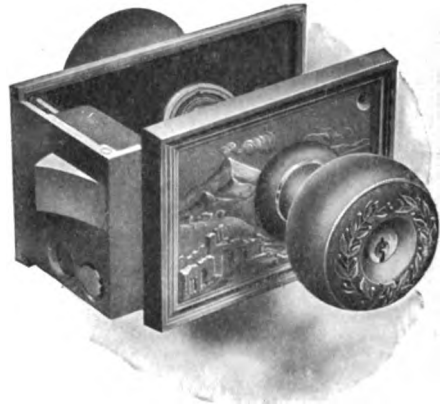
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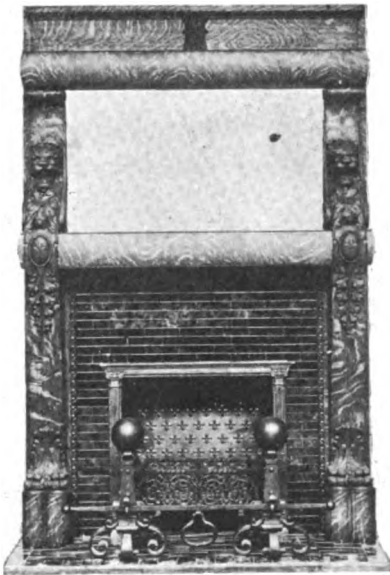
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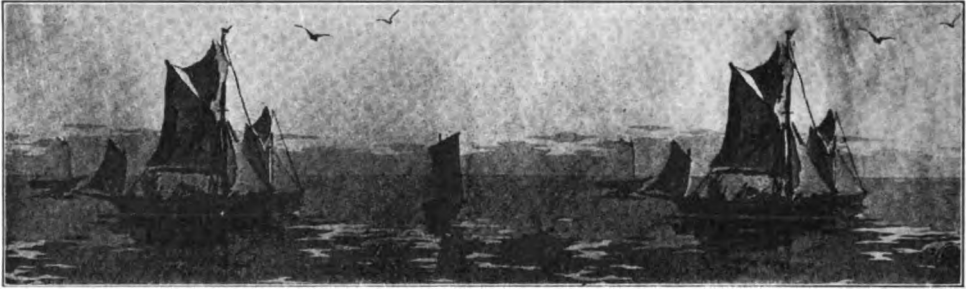
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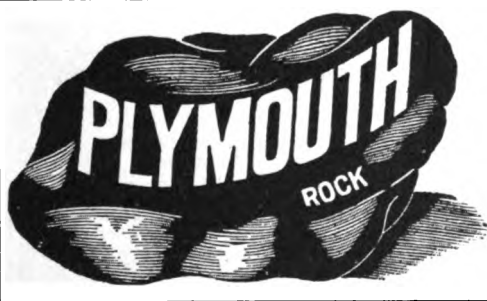


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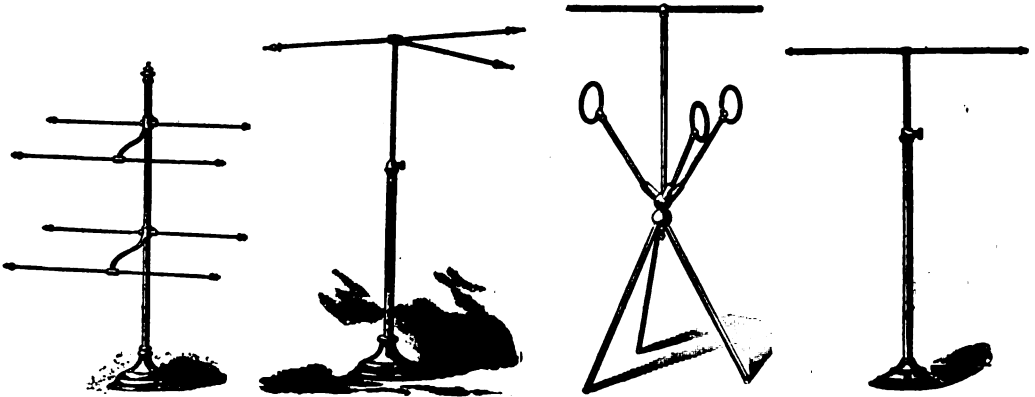
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Store Stools
Mirrors
Metal Signs
Etc.

Designs and Details for
Architectural Steel
a Specialty

Charles F. Archer
Structural Engineer

621 GOLDEN GATE AVE.
 Room 4
 Corner Van Ness Avenue
 SAN FRANCISCO

Ralph Barker J. T. Walsh

Barker & Walsh
Consulting Engineers

Formerly with
 D. H. Burnham & Co., Chicago
Foundations Steel Structures Reinforced
Concrete
 Specifications and Estimates for all classes of
 Steel Construction
2504 A Clay St. San Francisco, Cal.

W. H. MALOTT, General Manager
 Residence, 250 Scott Street, S. F.
 O. C. JOHNSON, Secretary

Western Roofing Materials Co.
GENERAL ROOFING BUSINESS

Felt and Gravel Roofs, Repairs, Roof-
 ing Felts, Asphalt, Etc.

Office and Works.
 SEVENTH AND HOOPER STREETS
 Phone Mint 4371 San Francisco

Oakland San Francisco Stockton

THE TIBBETTS ROOFING CO.

Roofing Repairing
and Roof Painting

Ready Roofing Gravel Roofs Brick Work

O. B. Tibbetts, 425 15th St., Oakland

[Builders' Exchange] Tel. Oakland 366

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The First Office to be Erected in the Burned District After the Fire

NOW OCCUPYING NEW PLANT

WESTERN IRON WORKS
(Incorporated)

*Structural Iron and
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Gas Holders, Vault Linings,
Jails, Etc. Beams, Channels,
Angles and Steel Wheelbarrows
Carried in Stock

125-127 BEALE STREET

SAN FRANCISCO, CAL.

W. R. Grace & Co.

Room 224, Montgomery Block, San Francisco
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**JOSSON AND OTHER BRANDS OF BEST
BELGIUM AND GERMAN**

Portland Cement

WM. SCHROEDER, President

CALIFORNIA ART GLASS BENDING AND CUTTING WORKS

(Formerly 120 Second Street)

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BEVELING, STAINING; CHIPPING, Etc.

938 Howard Street
Between 5th and 6th

San Francisco

TRADE MARK

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REGISTERED

READY ROOFING DURABLE. EASY TO LAY, FIRE-PROOF, INEXPENSIVE
 Factory: E. Oakland
 Salesroom: 3279 16th St., S. F.

Empire Plaster Company

**Manufacturers of Hard Wall Finishing
and Dental Plaster**

SPECIFICATIONS FOR EMPIRE HARD WALL PLASTER

Metal lath three-coat work:
 First or scratch coat—One part Empire hard wall plaster fibred, two parts sharp clean sand (fresh water sand preferable). Thoroughly mixed and applied within two hours after mixing.
 Second or brownling coat—One part Empire hard wall plaster, two parts clean sharp sand floated up even with grounds.
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 Sand finish—One part Empire hard wall plaster, two parts clean sharp sand.
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 White coat and sand finish same as for metal lath.
 Finishing coat should be applied within 48 hours after first coat is put on.

16th and Harrison Sts., San Francisco

Oakland Warehouse { **ADAMS' WHARF**
Phone Oakland 6421

ARTIFICIAL MARBLE, SCAGLIOLA
AND IMITATION CAEN STONE

Specialist in Imitation Granite

KNICKMANN & NOCENTI

Contractors for the New Fairmont Hotel

HIGHEST GRADE WORK FOR WAINSCOT COLUMNS,
PILASTERS, PANELS, BALUSTRADES, MANTELS, ETC.

525, 527, 529, 531 WEST TWENTY-SIXTH STREET
NEW YORK CITY

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Antioch Sewer Pipe and Terra Cotta Plant in Operation.

W. F. Barnes, president of the sewer pipe and terra cotta works of the California Brick and Clay Manufacturing Company at Antioch, reports that the factory is now in operation. The company has an abundance of excellent pottery clay close to the works. The intention is to produce as fine a pipe, hollow tile, brick and conduits at Antioch as can be made in the United States, and to that end the most carefully selected clays and the best modern equipment are used.

THEODORE H. SKINNER
Architect
Western Representative of
PUTNAM & COX
RAND & SKINNER

Boston	W. E. Putnam
Chicago	Allen H. Cox
San Francisco	Theo. H. Skinner

Reinforced Concrete Structures a Specialty
Rooms 801-7 Atlas Bldg., 604 Mission St.
San Francisco

John McGuigan & Co.

Permanently located at
1913 Mission Street
SAN FRANCISCO

—
Telephone Special 2081
—

Sidewalk Lights
(patent allowed)

All Steel Waterproof Doors
(Licensee under Priddle Patent)

**Metal Fire-proofing, Furring
and Lathing**



This Is It

The KLEIN Furnace
"BUILT SQUARE"

Especially Adapted for Dwelling Houses.
Churches, Schools and Halls

Clean, Reliable, Simple, Economical

Architects and Builders Investigate This.
Write for booklet entitled, "A Square
Talk on a Square Furnace."

F. KLEIN
53 South Second St., San Jose, Cal.

Cement
Structural Steel
Pig Iron
Coke, Etc.

G. W. McNEAR

210 BATTERY STREET
San Francisco, Cal.

When writing to Advertisers mention this Magazine.

Their first kilns of sewer pipe certainly leaves nothing to be desired. The pipe is straight and very strong, taking remarkably fine glaze, inside and out.

Hand in hand with manufacturing, the construction work at Antioch goes steadily on. The foundations are being laid for a brick building 150x75 feet to be used as a dry room. This structure will be ready for use by the time the rains set in, and will give an abundance of dry floors during the rainy, damp, winter months, enabling the plant to operate to its full capacity the whole time. New kilns are to be added just as rapidly as the work can be done.

Of course all of the brick used in the buildings or kilns will be made at the company's own plant, and they will also make their own fire brick for the kilns.

The main building is completed and in use. The machinery has been installed there and is in full operation.

T. V. Galassi Mosaic Co.

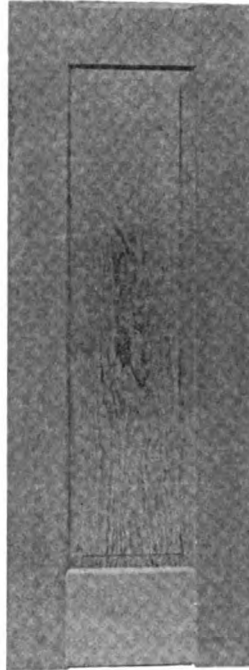
T. V. GALASSI, Pres. & Mgr.

Importers, Manufacturers, Dealers and Contractors

Marble Steps and Wainscot
 Terrazzo Steps and Wainscot
 Terrazzo and Mosaic Floors
 Venetian Mosaic Tile Floors
 Marble and Mosaic Mantels
 Cement Tile Floors
 Roman, Venetian, Glass, Pearl and Ceramic Mosaic Decorations.

Office, Factory and Display Rooms

1121 Fell Street, near Devisadero
 SAN FRANCISCO, CAL



**RED
 WOOD
 PINE and
 CEDAR
 DOORS**
 —
*Large
 Stock on
 Hand*
 —
 Windows
 Mouldings
 Mill Work
 House
 Finish
 Tanks, Etc

**Redwood
 Manufacturers
 Company**

W. A. Boscow, Manager
 1st. & Alice Sts., Oakland

BEAUTIFUL AND
 ORIGINAL DESIGNS
 IN

J. FRED JURGEWITZ

Center Pieces, Mouldings, Brackets, Gables,
 Friezes, Carved Panels, Capitals, Etc. . . .

**Staff and
 Stucco Work**

Phone, Vale 2082

1017 East 16th St.

EAST OAKLAND

When writing to Advertisers mention this Magazine.

To illustrate the spirit of thoroughness with which this plant has been built, it is being equipped with its own blacksmith shop and machine shop, with lathe, planer and drill press, and they are even installing machines for cutting up the lumber to facilitate the construction work and for getting out the various dimension stuff, such as pallet boards, of which a pottery and brick works use so much. A large dynamo and independent engine are also being installed, it being the intention to operate the plant at night as well as in the day time.

The California Brick and Clay Manufacturing Company is now ready to make deliveries of anything in the sewerpipe or terra cotta line, including chimney pipe and flue lining, and can ship in car-load lots or in smaller quantities via the Southern Pacific, Santa Fe, or by boat.

Communications should be sent either to Antioch, or the San Francisco office, W. F. Barnes, President, 2301 Scott street.

Cement on the Way

Attention is called to Mr. A. Breslauer's advertisement on page 93, to the fact that a cargo of the excellent cement Gillingham is due to arrive in San Francisco on the Steamship Suerie from London, Eng., on or about December 12, and it would be beneficial to intending purchasers to order of Mr. Breslauer at once.



WHITE BROTHERS

Importers and Dealers in

Hard Wood Lumber

Ship Plank and Oak Timber. Cabinet Woods. Veneers. Walnut. Primevera Oak. Hickory. Ash. Mahogany. Cherry. Spanish Cedar. Poplar. Maple. Etc.

S. E. Cor. Spear and Howard Sts.
SAN FRANCISCO, CAL.

THE ENOS COMPANY

Of New York

Makers of LIGHTING FIXTURES

SPECIAL DESIGNS *Gough and Pine Streets*
AND ESTIMATES **SAN FRANCISCO**

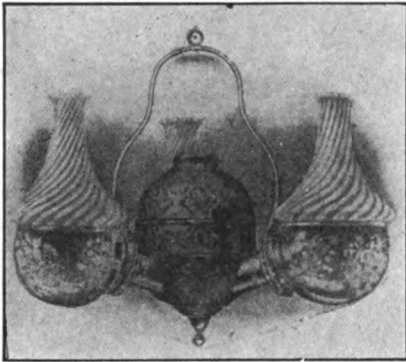
Alameda County Representative:
THE STATE ELECTRIC CO.
128 Telegraph Ave., OAKLAND

T. A. PETTUS

GENERAL CONTRACTOR

ARCADE BUILDING, 109 O'FARRELL STREET
SAN FRANCISCO

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JUST THE THING FOR THE BUNGALOW

ANGLE LAMPS

NO SMOKE NO ODOR LITTLE HEAT

COSTS LESS TO BURN THAN AN ORDINARY LAMP

As easy to operate as gas or electricity—and better than either.

Lighted and extinguished like gas.

Can be burned high or low without a trace of odor.

Send for catalogue or drop a postal and we will call.

BOESCH LAMP COMPANY

1135 MISSION STREET, - - - - - SAN FRANCISCO, CAL.

Keystone Boiler Works

MAIN AND FOLSOM STREETS

SAN FRANCISCO

PACIFIC COAST AGENTS FOR THE

PARKER WATER TUBE BOILER

SELF CLEANING _____
 _____ ABSOLUTE SAFETY _____
 _____ GREATEST ECONOMY _____

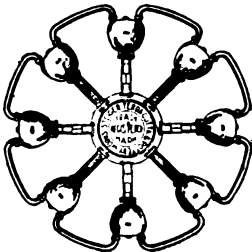
WRITE FOR CATALOGUE

W. E. DENNISON, President

JAMES H. BISHOP, Secretary

L. A. STEIGER, Manager

STEIGER TERRA COTTA and POTTERY WORKS



Manufacturers: Architectural Terra Cotta; Semi-dry Pressed Brick; Vitrified Salt Glazed Sewer Pipe; Hollow Tile Fire-Proofing; Terra Cotta Chimney Pipe; Electric Conduit Tile, Drain Tile : : : : :
 Brick Mantels; Tile Mantels; Urns and Vases : : : :
 Laundry Tubs; Kitchen Sinks; Flush Tanks : : : :
 Acid Jars; Acid Pipes; Acid Brick; Fire Clay; Modeling Clay; Fire Brick Dust : **Fire Brick; Fire Tile**


Main Office and San Francisco Yard:

EIGHTEENTH AND DIVISION STREETS

Factory: SOUTH SAN FRANCISCO, SAN MATEO COUNTY

When writing to Advertisers mention this Magazine.

“Couch” Telephones



¶ 1906 models are perfect. ¶ The result of years of experience in building and marketing high grade telephones. ¶ Artistic in appearance, scientific construction, lasting durability. ¶ Twenty models, meeting the demands of all classes of users. ¶ Illustrated catalog and prices on request. ¶ Systems suggested and plans furnished.

DECKER ELECTRICAL CO

157 MINNA near 3rd PHONE Temporary 1950

Light, Power, Bell, Phone Systems.

Motors - Repairs

HERCULES GASOLINE ENGINES

WILL PROVE BEST TO DRIVE

Brick Cleaning Machines, Swing Saws, Saw Tables
Concrete Mixers, Etc.

HERCULES HOISTING ENGINES Single and double drum, single motion or reversible, 5 h. p. to 250 h. p.

High Speed Multiple Cylinder Dynamo Engines ALL 1906 MODEL

The Hercules Gas Engine Works

Works and Office, 2329 Blanding Ave., near Park St., Alameda, California

'Phone Alameda 91

Joshua Hendy Machine Works

Incorporated 1882

IRON FOUNDERS, ENGINEERS, MACHINISTS

ARCHITECTURAL AND STRUCTURAL IRON CASTINGS

CONTRACTORS FOR THE INSTALLATION
OF ELECTRIC WIRING IN BUILDINGS

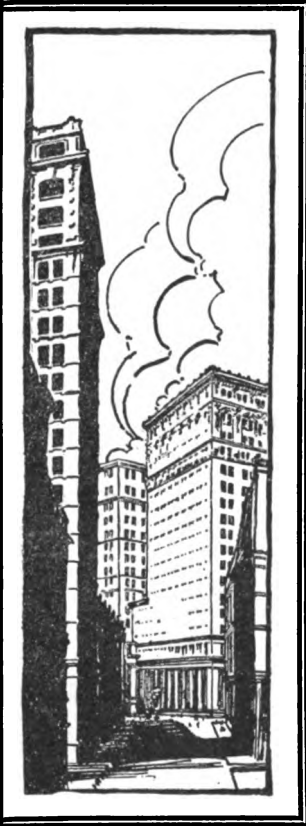
Works and Office Now Being Rebuilt at

BAY AND KEARNY STREETS

SAN FRANCISCO

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THOMPSON-STARRETT CO.



Builders AND Engineers

Class "A" and
"B" Structures
Our Specialty

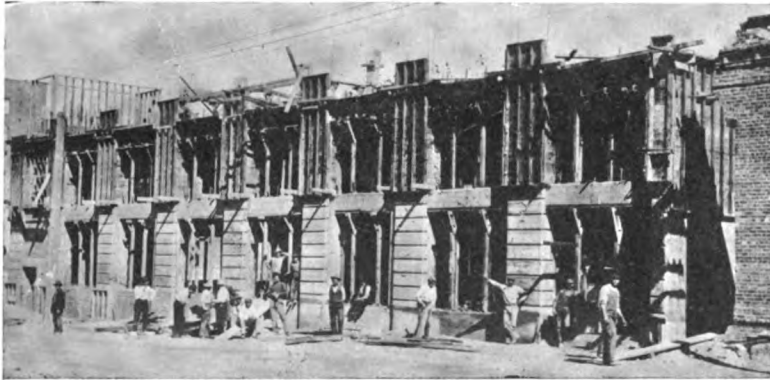
Reinforced Concrete Construction

Allan Pollok

Frank Kilpatrick

B. C. Dickinson

**2053 SUTTER STREET
SAN FRANCISCO**



Reinforced Concrete Warehouse, for Bemis Brothers, Sansome St., near Vallejo, S. F.
Kahn Bars exclusively used throughout.

M. C. COUCHOT, C. E., Agent
705-6 Atlas Building, San Francisco



KAHN SYSTEM FOR REINFORCED CONCRETE

THE SCOFIELD COMPANY

SAN FRANCISCO
KOHL BUILDING, Tel. West 6038

NEW YORK
PARK ROW BUILDING

PHILADELPHIA
PENNSYLVANIA BUILDING

Are prepared to CONTRACT FOR THE CONSTRUCTION OF STEEL AND REINFORCED CONCRETE BUILDINGS

We are equipped to handle with exceptional facilities such heavy construction as required in warehouses, factories, power-houses, railroad terminals, docks, piers, wharves, bulkheads and bridges of all descriptions. We have completed and are now engaged on some very important work for the Government and large corporate interests. Reinforced concrete a specialty

When writing to Advertisers mention this Magazine.

ELECTRICAL WIRING

IN ALL ITS BRANCHES

Estimates furnished on any plans and specifications. Our electrical engineering force will gladly give advice, without charge, to architects, builders or owners, on any contemplated improvements.

The Standard Electrical Construction Co.

has done a great portion of the important work in its line in San Francisco and vicinity, including St. Francis Hotel, Mercantile Trust Co., Jas. L. Flood Building, Crocker Estate, Stanford University Buildings, University of California.

STANDARD ELECTRICAL CONSTRUCTION CO.

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ALLEN ST. J. BOWIE, Vice-President

Formerly Rialto Building

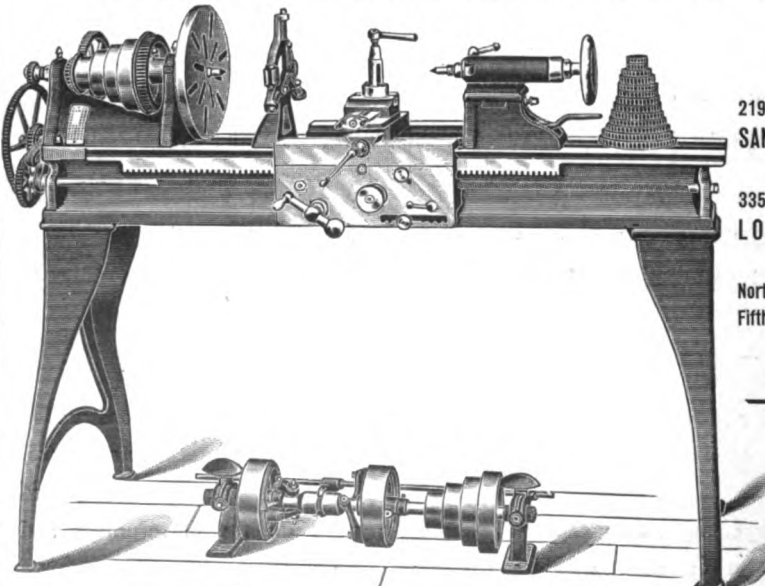
H. C. THAXTER, Electrical Engineer

HARRISON DIBBLEE, Secretary

Present Address, ATLAS BUILDING

HENSHAW, BULKLEY & Co.


Engineers and Machinery Merchants



219-221 Spear St.
SAN FRANCISCO

335-337 E. Third St.
LOS ANGELES

Northwest corner of
Fifth and Cypress Sts.
OAKLAND



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STRUCTURAL STEEL

For Buildings and Bridges

Estimates Furnished on Material Fitted Ready
for Erection

High Carbon Steel Bars

For Re-Inforced Concrete, Twisted Squares
Also Plain Rounds, Squares and Flats

Lock Bar Steel Pipe

For Power Lines, Water and Gas Mains

STEAM, GAS AND WATER PIPE
STEEL RAILS

Woods and Huddart

2123 PIERCE STREET : : : : : : SAN FRANCISCO

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American Construction Co.

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896 Eddy Street, San Francisco, California

PILE FOUNDATIONS

WHARF AND BRIDGE BUILDING

ERECTION OF STEEL STRUCTURES

When writing to Advertisers mention this Magazine.

THE LINDGREN-HICKS CO.

STRUCTURAL ENGINEERS

CONTRACTORS FOR

Steel Frame, Reinforced Concrete

BUILDINGS

OFFICES

Second Floor, Old Humboldt Bank Building

Opposite Palace Hotel

SAN FRANCISCO, CAL.

Western Builders Supply Company

GOLDEN WEST ROOFING

"Quality Counts"
For Temporary and Permanent Buildings

Interior Wood Finish Specialties, Capitals, Brackets, Mouldings, Etc.
Lane Joist Hangers, Clinton Mortar Stains, and Other Building
Materials. Office Phone

Also Telephone Builders Ex. Park 11
Ass'n "933

Fourth and Natoma Streets, S. F.

San Francisco Cornice Company

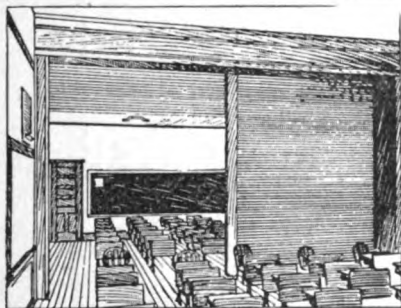
Manufacturers of
STEEL CEILINGS

(Old Mission and Spanish Tile)

Sheet Steel, Pressed Brick and Stone, Sheet Metal Cornices
Galvanized Iron Skylights and Windows, Tin and Corrugated
Iron Roofing and Siding, Galvanized Iron Chimneys

Fourteenth and Florida Sts.

San Francisco, Cal.



We offer to Architects and Builders a Perfect Rolling Partition. Dividing rooms of any size into many, or combining many into one at will. They work so smoothly and have so much to commend them to those designing or building Churches, Schools, Town Halls, Lodge Rooms and Assembly Halls, that we want you to write us for detailed information about them and our patent Inside Sliding Blinds.

THE UNION BLIND AND LADDER CO. (Inc.)

2243 Peralta Street, OAKLAND

REGISTERED PLUMBERS

HEATING AND VENTILATING ENGINEERS AND CONTRACTORS

GILLEY-SCHMID CO., Inc.

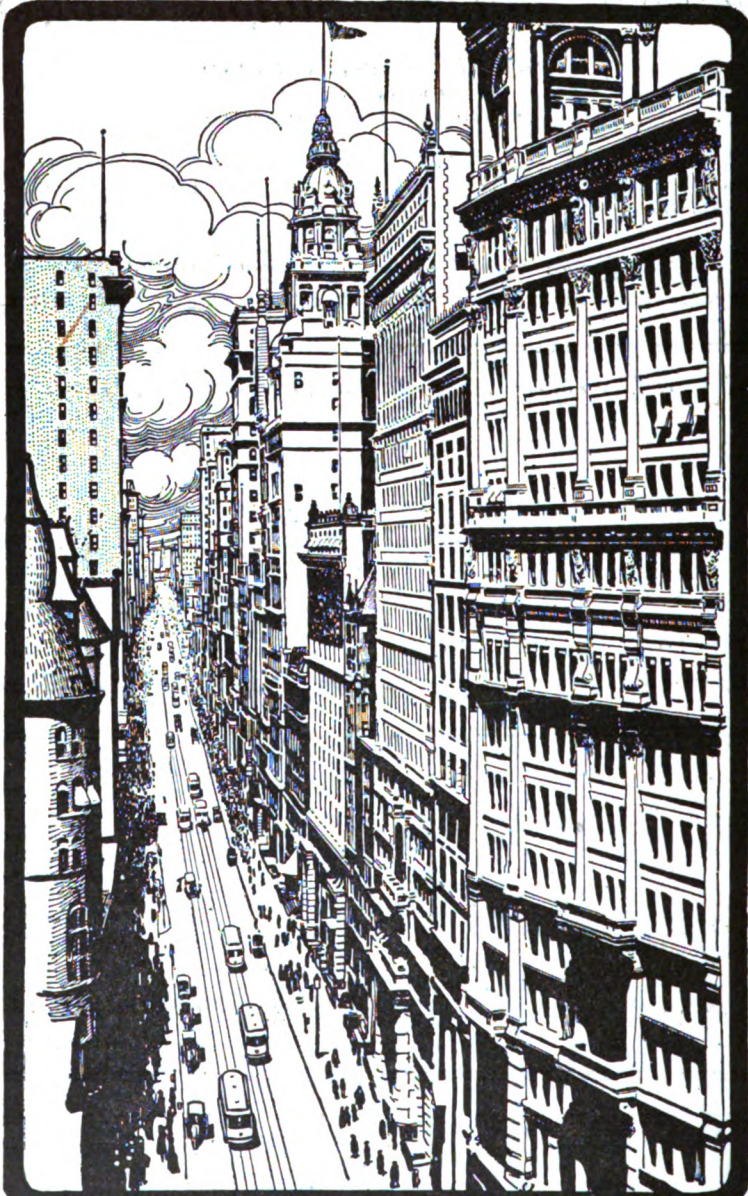
N. W. CORNER 13TH AND MISSION STS.

Phone, Special 965

COMPLETE OIL-BURNING PLANTS INSTALLED. HIGH OR LOW PRESSURE

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THE CANYON OF NEW YORK
 Made possible by **OTIS ELEVATORS**

Standard of the World for Over Fifty Years

Hydraulic	}	All methods	}	For Passenger	
Electric				of control	or
Steam Belted					Freight Service

OTIS ELEVATOR COMPANY, Stockton & North Point Sts.
 SAN FRANCISCO

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HERCULES PLASTER FIBRE

For Hard Wall
and Lime Plaster

GIVES BEST RESULTS

Length of time in mortar, hot weather or
hot lime will not injure or destroy it.

MANUFACTURED BY

HERCULES MFG. CO.

221-5 San Bruno Ave. San Francisco

For Sale by all dealers.

P. E. BOWLES
President

E. W. WILSON
Vice-President

**American National
Bank**

DEPOSIT GROWTH

Mar. 3, '02.....	\$ 387,728.70
Sept. 15, '02.....	1,374,983.43
Mar. 15, '03.....	2,232,582.94
Sept. 15, '03.....	2,629,113.39
Mar. 15, '04.....	3,586,912.31
Sept. 15, '04.....	3,825,471.71
Mar. 15, '05.....	4,349,427.92
Sept. 15, '05.....	4,938,629.05
Mar. 15, '06.....	5,998,431.52
June 18, '06.....	6,650,555.84

Merchants' Exchange Building
SAN FRANCISCO

FRANCIS CUTTING
Vice-President

GEO. N. O'BRIEN
Cashier

**READY TO SUPPLY
THE TRADE**

**CALIFORNIA'S NEW INDUSTRY
NOW IN FULL SWING**

**California Brick & Clay
Mfg. Co.**

223 MONADNOCK BLDG., SAN FRANCISCO

WORKS: ANTIOCH, CALIFORNIA

**Hollow Fire-Proofing
and Fire Face Brick
Our Specialty**

**Sewer Pipe, Chimney Pipe
Electric Conduit Tile
Hollow Brick**

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WEST 4194

IS THE PHONE OF

H. G. CORWINARCHITECTURAL
ENGINEER**2215 BUSH STREET**L. T. MCNAB M. A. ROTHCHILD
BUILDING SUPERINTENDENT MANAGER**McNAB & ROTHCHILD****General Contractors****Reinforced Concrete our Specialty**Tel. No. Temporary 2425
Room 44 Central Building**715 Market Street****San Francisco**

E. BIRK

JAC. WEGMANN

BIRK & WEGMANN
Structural EngineersDesigns and Details for all kinds of Steel
and Reinforced Concrete Structures**Rooms 27-29 Franklin Realty Building**
509 Golden Gate Ave., cor. Polk St., S.F.**George J. Wellington****Fire Protective Consulting
and Contracting Engineer****STANDARD
FIRE AND ELECTRICAL EQUIPMENT
AUTOMATIC SPRINKLERS****Kohl Building, San Francisco, Cal.**
SEATTLE LOS ANGELES**A NEW PAINT**
for Structural Iron

The Paraffine Paint Co. has a new paint that is especially adapted for Structural Iron Work. This paint has great covering capacity — will last FOR YEARS and serve builders most satisfactorily at a reasonably low cost.

Send for Special Folder

The Paraffine Paint Co.Union Savings Bank Bldg.
OAKLAND, CALIF.Temporary Sales Dept.
at 280 Guerrero Street
SAN FRANCISCO.

When writing to Advertisers mention this Magazine.

Scores of big buildings are now under construction in San Francisco.
A large per cent of these are of

REINFORCED CONCRETE

WE ARE PREPARED TO FIGURE ON THIS CLASS OF WORK

IN SAN FRANCISCO

SO MANY OWNERS HAVE EXPRESSED PREFERENCE FOR
REINFORCED CONCRETE THAT IT PROMISES TO BE

THE POPULAR MATERIAL

IN THE REBUILDING OF THE CITY

LET US FIGURE ON YOUR WORK

WORSWICK STREET PAVING CO.

GENERAL CONTRACTORS

FORSYTH BUILDING FRESNO, CALIFORNIA

KEUFFEL & ESSER CO. ^{OF} NEW YORK

40 Oak Street, San Francisco

Architects' and Drawing Materials

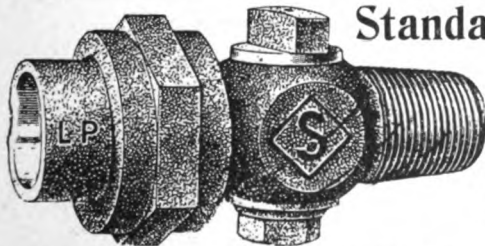
PARAGON DRAFTING INSTRUMENTS

...Builders' and Surveying Instruments...



PROFIT BY EXPERIENCE—If you intend to equip your Drawing Room, remember that KEUFFEL & ESSER CO.'s instruments and materials are still the standard of quality. We have all requisites for drawing and engineering, and all our goods are warranted. Complete illustrated catalogue (550 pp.) sent on request.

Highest Awards
St. Louis, '04 Portland, '05



Standard Brass Casting Co.

Brass Founders and Finishers

MANUFACTURERS OF

Brass Water Goods, Architectural and Ornamental Bronze, Phosphor Bronze, Gun Metal, Machine Brass, Lead and Zinc Castings.

S. F. Office With GREAT WESTERN SMELTING AND REFINING COMPANY
Spear and Folsom Sts., San Francisco Foundry, Oakland

When writing to Advertisers mention this Magazine.

We Are the First!

Yes, we are the first of the manufacturers of Terne Plates to suggest and adopt the plan of stamping the amount of coating carried by our brands of Roofing Tin, and of stamping all wasters as such.

This is a "square deal" which all Jobbers, Architects, Roofers and Property Owners have needed for so long—and already the move has shown a good effect.

In future, don't merely specify American Ternes, American Extra, American Special, American Old Style A, 2A, 3A, 4A, 5A, MF, or U. S. Eagle New Method—but examine the boxes when these arrive and see that the contents indicate exactly what you purchased. If the sheet isn't stamped with the coating, look along the edge for the mark "Waster."

If you'll use these precautions you'll find Roofing Tin to be the most satisfactory roof covering you can use—but you can't expect an 8-lb. Terne to do the work of the old time or present day 30 to 40-lb. coated plates.

Send for our booklet "From Underfoot to Overhead" if you would know how a high grade Terne Plate is made, and use MF ROOFING TIN, "The Terne which turns the elements," if you want the best Roofing Tin that can be had.

***American Sheet and
Tin Plate Company***

FRICK BUILDING

PITTSBURGH, PA.

Onyx for Vestibules

Think of the very finest marble, then imagine a polished translucent stone, infinitely more beautiful and you *may* get some idea of "Peninsula Onyx."

The price has been greatly reduced.

A postal will bring our representative with samples and it won't take more than two or three minutes of your time.

We want to "Show you."

NEW PEDRARA MEXICAN ONYX CO.

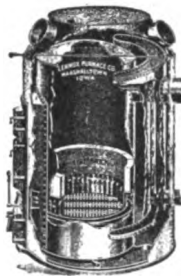
Head Offices: San Diego, Calif.

Branch Office:

84 BACON BUILDING, OAKLAND, CALIF.

Onyx for Bank Fixtures

Torrid Zone Furnaces



Are gas and dust proof because they are put up without a packed joint

Made in nine regular sizes and four special sizes for low cellars. We also make three especially large furnaces for churches, school houses and buildings. These furnaces are brick set. We are having a big demand for our ROOM HEATERS which are furnished in six sizes.

WRITE FOR CATALOGUE AND PRICES

Pacific Blower and Heating Co.
HEATING AND VENTILATING ENGINEERS
3261 TO 3267 SEVENTEENTH STREET
SAN FRANCISCO

EVERY HOUSE NEEDS A

—ROBERTS—

Combination Water Heater and Kitchen Boiler

Especially suitable for Apartment Houses, Flats, Barber Shops, etc. : : : : :

SIMPLE SAFE SAVING

See It Work at One of Our Salesrooms

OAKLAND - - 902 Market St.
Phone Oakland 21
BERKELEY - 2118 Shattuck Ave.
ALAMEDA - - 1420 Park St.

Ross McMahon Awning and Tent Co.

TEAMSTERS' RAIN GOODS
BAGS, TENTS
AWNINGS, HAMMOCKS
AND COVERS

Have resumed business at the old stand

35 Market Street
San Francisco California

C. F. WIELAND
Consulting Engineer
 Steel Frame and Re-Inforced
 Concrete Structures.
 Plans, Details and Specifications Pre-
 pared.
 Shop and Field Inspection
 Temporary Address
 S. E. Cor. Second and Folsom Sts.
 SAN FRANCISCO
 Tel. Tem. 1201. Member Amer. Soc. Mech. Eng.

SURETY ON BONDS
Pacific Surety Co.
 OF CALIFORNIA
Bonds Furnished for Contractors
 Cash Assets, \$425,000.00
Sale Deposit Building, 326 Montgomery St.
SAN FRANCISCO
Telephone Temporary 1293
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 JOHN BIRMINGHAM, Vice-President
 A. P. REDDING, Secretary

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United States Fidelity and Guaranty Co.
BURGLARY INSURANCE
LIABILITY INSURANCE
New Amsterdam Casualty Company
PERSONAL ACCIDENT INS.
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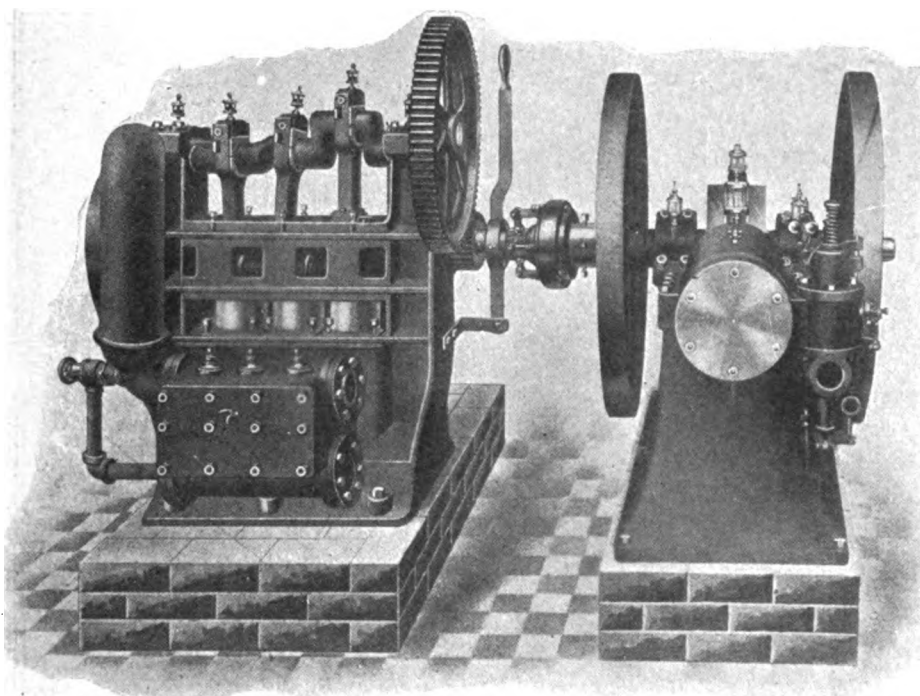
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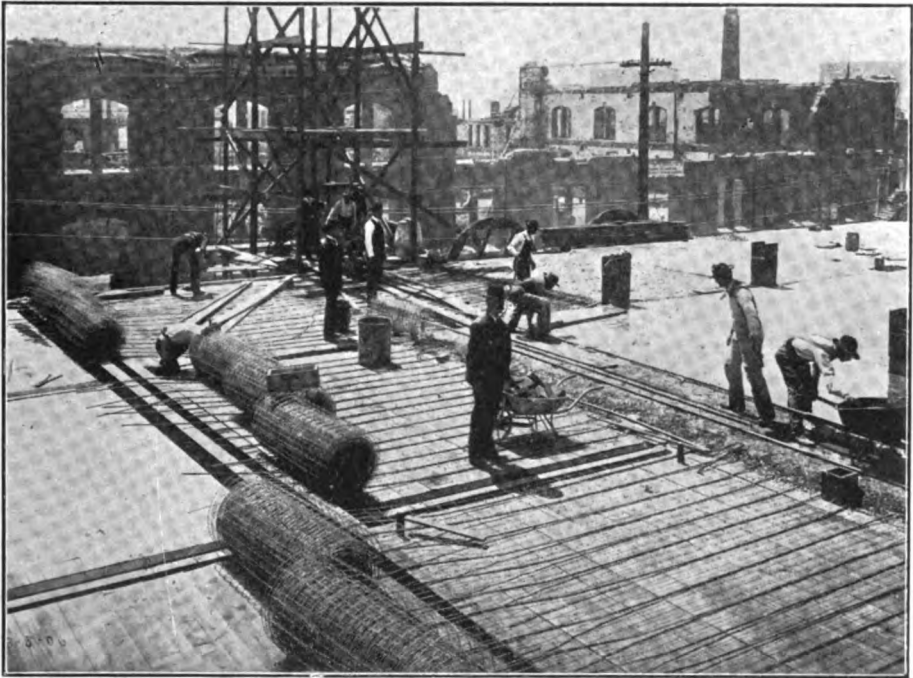
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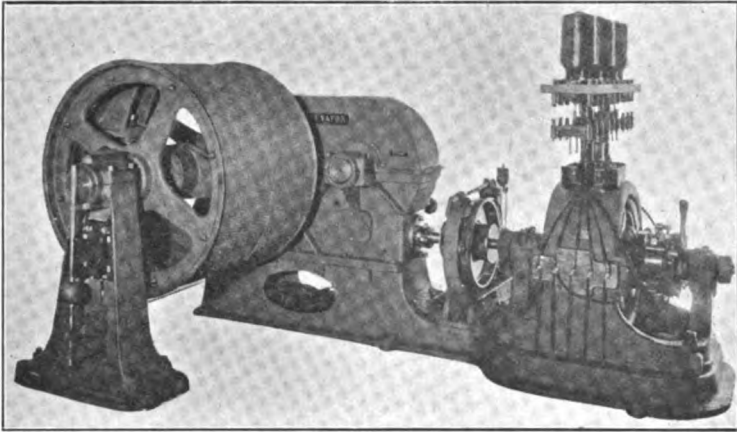
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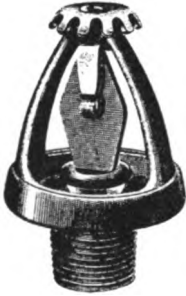


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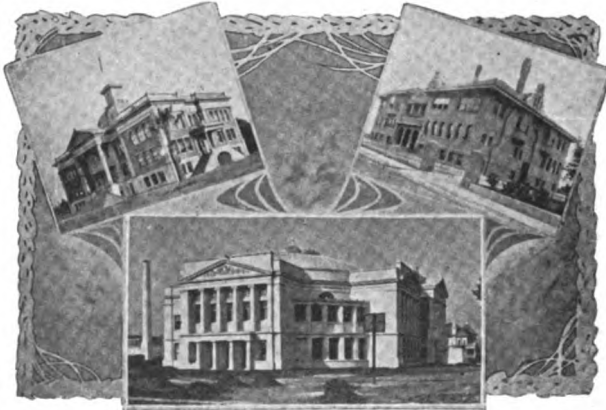
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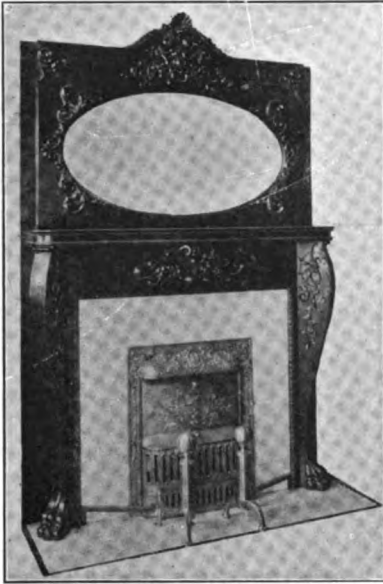
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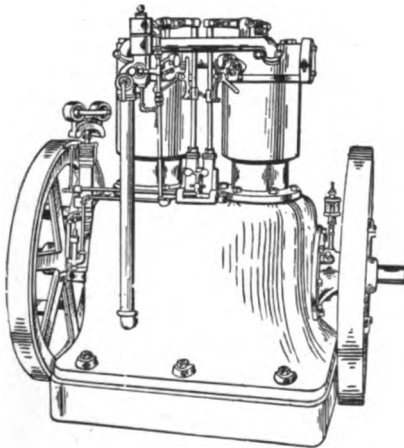
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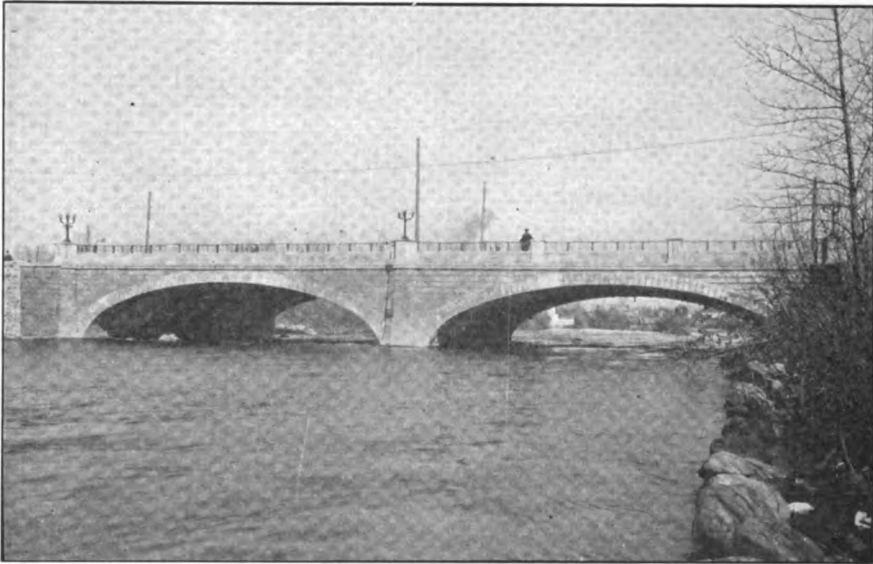
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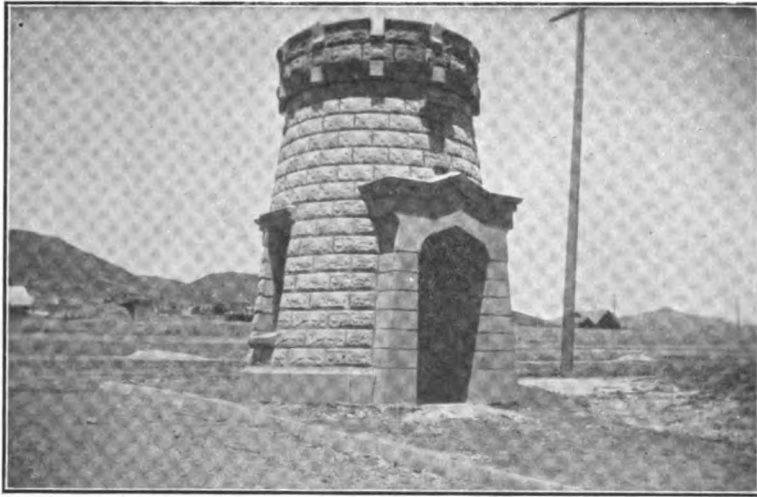
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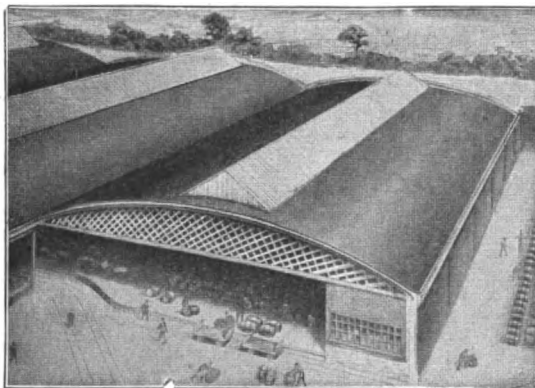
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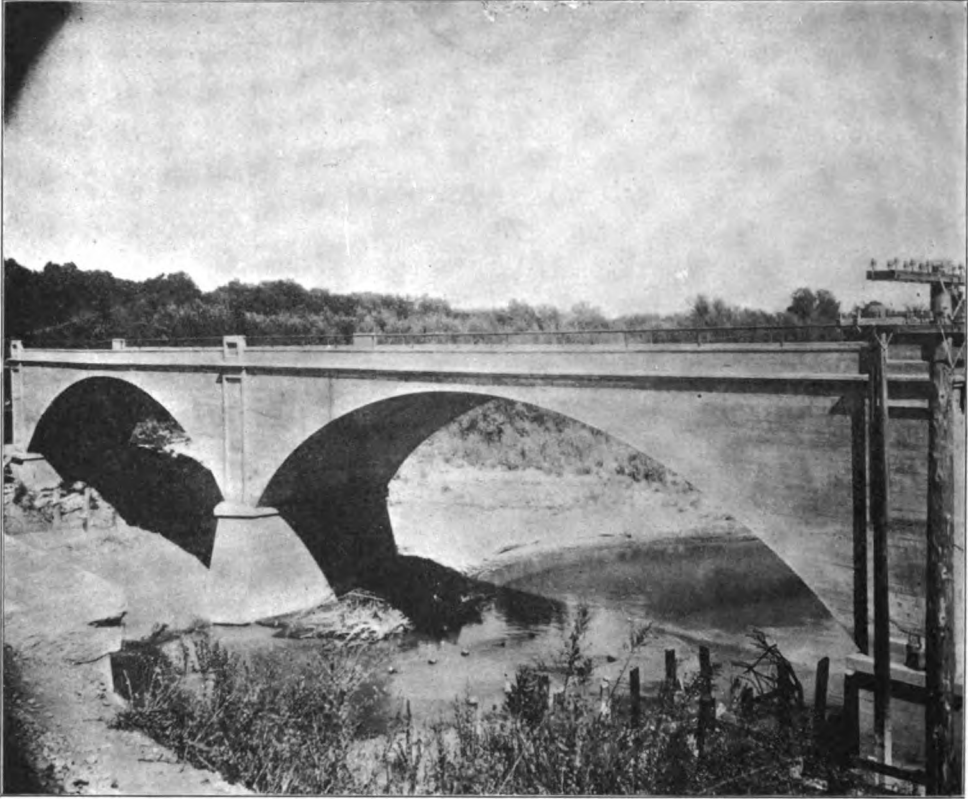
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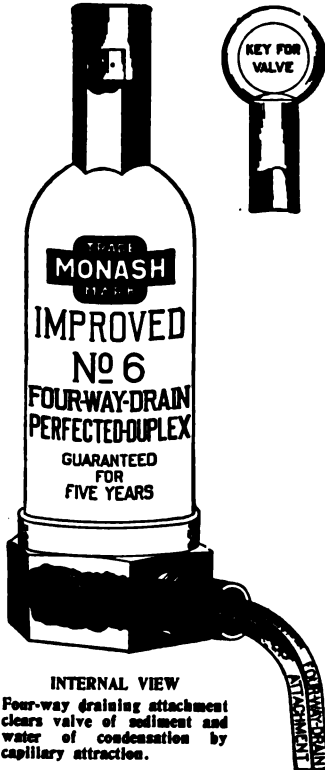


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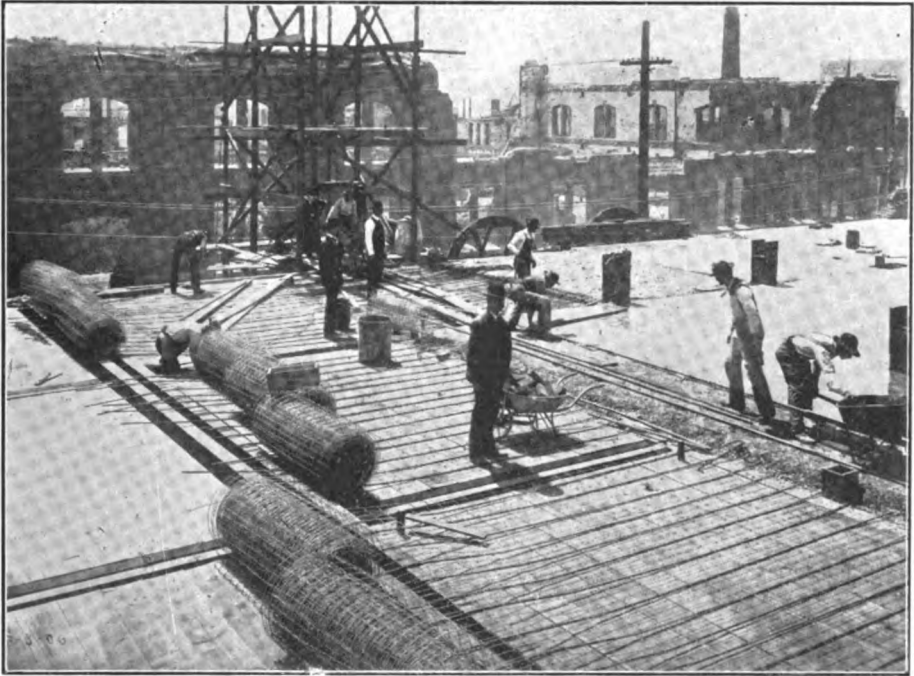
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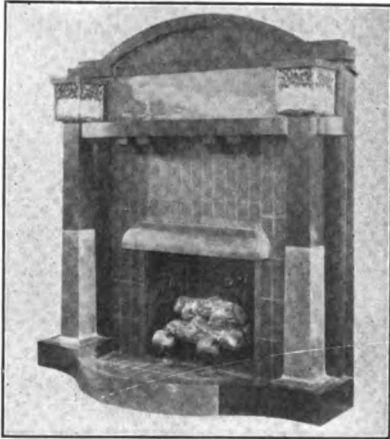
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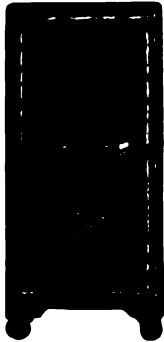
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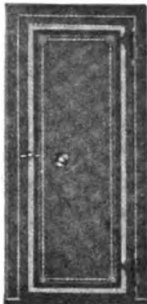
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MR. WILLIAM H. HALL. C. E.

THE
Architect and Engineer
Of California

VOL. VII.

DECEMBER, 1906.

No. 2.

Municipal Engineering—Its Relation to City Building

In this number is printed the first of a series of articles on "Municipal Engineering" by Mr. William H. Hall, C. E., formerly state engineer of California, and later supervising engineer in the United States Geological Survey service. For several years Mr. Hall was engaged in South Africa and Russia as chief on works of importance. He was one of the first, about fifteen years back, to call for recognition of the civil engineer in city building practice on this Coast as he found engineers were being recognized in the East. He has been from early times an active advocate of the use of concrete, both in engineering and building construction, and was a strenuous pioneer in attempts to introduce the use of reinforced concrete in Pacific Coast cities as he saw and studied it abroad. Immediately following the earthquake, Mr. Hall was the first professional man to publicly proclaim the unwelcome building lessons which it taught, and in the press put out a series of notable articles reviewing the technical points in a spirit of plain talk since followed by others which seem to have borne fruit in some advance parts of the present San Francisco building ordinance.

By WM. H. HALL, C. E.

WHETHER we assume that in this connection engineering includes, or is itself embraced by architecture, the fact is that the works of the architect and of the engineer in building a modern city are so closely interwoven that one cannot be written about without running into the claimed limitations of the other, on almost every important part of the subject. The day has passed when the appellative, Municipal Engineering, can be restricted to works of sewerage, water supply, street pavements, and the like, as it was limited several decades ago. The engineer now is not only the authority on all that goes to make the place on which the visible superstructure of a city rests, including even the foundations and the foundation walls, piers and columns of the buildings themselves, but his duty extends to the designing of those supporting walls or frames, floors, roofs or towers, to the heating, ventilating and drainage of buildings, and the supplying of water, light and elevator service within them. The architect designs that which gives the building its appearance, and arranges it to the special use for which intended. The engineer provides, directly or indirectly, not only the ideas, but often the plans for that which holds the well-appearing shell in shape and for all that relates to these special functions which make it usable and safe according to modern requirements. Of course, this all applies in greatest

degree to first-class buildings, and in lesser degree or not at all to buildings as they approach the lower grades of construction. But then, when we come down to such simple buildings, the architect himself may well be and often is dispensed with.

The architect has stood for all that was conservative and bound by ancient precedent in building. The engineer has represented or has himself originated or has formulated and systematized most of those innovations which have revolutionized building construction and have kept the architect busy in adapting the various models or schools of design-for-appearance to new designs for economy, commercial advantage, strength, stability and business or habitable convenience, and to the use of new materials or of materials in novel ways. It is not to be inferred, however, that the engineer has stood for only that which was good or desirable and the architect has been an obstructionist, merely. Truth to tell, the engineer's innovations have often led to sham and the architect's conservatism has often been exercised in the interest of truth and solidity, though according to old standards, in building.

There should not be any friction between architects and engineers, therefore, over what I shall in these articles write of as Municipal Engineering. But there is; and, so, it will be one of my endeavors, incidentally, to say some things which may tend to do away with such friction.

The fact is that the very modern development of the building art has been along lines which have compelled the engineer, directly or indirectly, to invade the claimed business domain of the architect, and the latter has resented the intrusion. This condition has been more or less acute, by comparison, in some Eastern cities for a number of years, but it had not attracted public attention on this coast until the earthquake of April last demonstrated the fact that San Francisco would have been safer had there been more engineering design, supervision and building practice in the city's making than to that time had been admitted. Since then conditions seem to be changing in this regard. Let the engineers and architects remember that they are jointly the conservators of public safety and of all that on which municipal pride may be founded in these matters, and that it is necessary for them to stand together in keeping within bounds the tendency towards imprudent economy, greedy commercialism and dishonest construction, which too often take hold of the owners and contractors for building and for materials.

The engineers are at a disadvantage however, in that their work is often specialized and coupled with commercial and construction interests. But this fact makes it all the more necessary for the profession as a whole, to strive to uphold the purely professional in practice as connected with all that constitutes municipal engineering as this term must be applied.

The thorough engineer is ever an inventor. His whole life is spent in "adapting the forces of nature to the use and betterment of mankind." That is what civil engineering is, as defined by our highest authorities, and that practice leads directly to origination of new ideas, formulation of new designs and arrangement of new devices in order that some one of such natural "forces" may be adapted to some new use or some additional human betterment under some novel conditions. This constitutes invention. Invention forces innovation upon the formulated practices of the past. Unfortunately, the thinker along progressive lines seldom has opportunity personally to introduce to his real beneficiaries the concrete results of his thoughts. The engineers who have worked out the technical problems and made the stock designs on which the outputs of great factories and the adaptations of such outputs are based, are generally not known beyond the managements of

their works. And yet they are, in a very high sense, engineers of important parts of the structures into which such factory outputs are incorporated. The civil engineers of a few years ago whose technical and practical ideas and practice results have been incorporated into and largely constitute high-class building practice today, are not known to building fame outside of the profession, and civil engineers of the present day who are continually originating and contributing construction ideas to the technical press or society proceedings are not known to the general public otherwise than as civil engineers in the sense of surveyors or field engineers. In this regard the civil engineer is at disadvantage with the architect, which latter professional man collects the outputs of many professional and practical brains, most of which are of engineering character, arranges these in an attractive form, following some of the very many styles of architectural design, and erects the material structure within the sight of a multitude of men, who say: "A fine appearing building. Who was the architect?" Now, this is a creditable performance, and a man or set of men who for long continue to carry it off are to be admired. If the civil engineering profession is a sufferer thereby the engineers are alone to blame for it.

The civil engineer is the progenitor of modern construction methods and planning. The term civil engineer is inclusive of all the other specialist engineers of the present day, and it is unfortunate for the entire body of engineering votaries and practitioners that the action of some of our universities with respect to special courses, has been taken as excuse for the disintegration of a noble profession. For, the specialist having to do with electricity, or machinery, or building construction, sometimes forgets himself, denies his birthright, so to speak, and assumes to interpret civil engineering as something other than that which has to do with his specialty. Thus, there are those who having specialized on some line of building construction, are prone to separate themselves from the great body of their profession, the parent body of civil engineering. And so, of late years, we have a new technical man, who is or should be a civil engineer, but who calls himself a structural engineer. However good engineers and good men these be, we cannot help thinking that they may unduly devote brain power to the technical, at the expense of the ethical part of their professional lives. Else, why do they make such a mistake? It were a matter of impossibility to pluck from the domain of civil engineering that which is called structural engineering. We but injure ourselves before the public when we attempt it.

If we must be known in close connection with that branch of civil engineering to which we have devoted particular attention, why can we not yet claim membership of the great inclusive profession, and make it known that we specialize on this, that or the other part of it? This course would be reasonable, dignified and strong. But, when in apparent eagerness to be accounted expert in something, we call ourselves specially that kind of an engineer, our attitude is not reasonable, not dignified and not strong. When we assume such position we are at a disadvantage, professionally, with the architect and before the public; and so, we are taken advantage of by the former and are misunderstood and are underrated by the latter.

Is not this tendency to cut off parts of the civil engineering profession akin to those attempts to divide up the practitioners of the law, upon which the body of the profession, including its leaders, looks down, and which gives rise to such names as "land lawyers", "criminal lawyers", and "divorce lawyers"? Observe, that sort of thing does not win in the law. The great land, criminal and divorce cases are conducted by those who simply style themselves attorneys at law, and who have not segregated themselves into

the ranks of the petty specialists of the profession. And, again, the leading and authoritative practitioners of medicine do not feature themselves as specialists on liver, kidney or bowel troubles, neither do they advertise as tape worm doctors, in order to assert their ability to treat diseases of those organs or to expel such parasitic presences from the human anatomy.

There are lots of good people in this world who stand in their own light because they do not stop to see whence the effulgence emanates. There are many good engineers who belittle themselves and their profession by just such thoughtlessness. It is not necessary for a man to be an adept in all branches of civil engineering in order to be a civil engineer. Understanding the principles and the basic rules of his profession as a whole, he may specialize in one or more of its divisions; but he should never cease to be in fact or in assertion a civil engineer. If civil engineers had been true to their profession and had entered the field of building construction as civil engineers, upholding the dignity and breadth of that calling, and had not weakened their position by dividing their body and assuming special names, they would have been much further advanced today in the estimation of the public, and that which I am maintaining must necessarily be included in municipal engineering, as a part of the civil engineering calling, would long ago have been recognized for what it is, the most important factor in the building art.

Observe, again: Architects do not class themselves as residence architects, store architects or barn architects. They do not seek notice as structural architects or as decorative architects; nor yet do they divide themselves into architects in different materials, or of the several parts of buildings. They call themselves, simply, architects, thereby maintaining the unity and dignity of an ancient and honorable profession. And yet architects have to do with the whole range of construction, including not only house designing and building, but bridge designing in special cases, and landscape work, both of which latter are certainly civil engineering works.

It comes to this, that engineers, and by this I mean the inclusive civil engineering profession, are themselves largely to blame for not having been earlier admitted to their share of city building practice. The architect, virtually, says to the engineer, and he is dead right in saying it: "If you come into this business only as a narrow specialist on some class of construction, then I will hire you as I happen to need you, as an assistant, at a subordinate's pay. It is not necessary that you meet or be known to my clientele, and I will take care that you are not. I am a structural engineer as much as you are an architect. The public looks upon the design and supervision of buildings as the architect's function. The public will employ me, and there you are. What are you going to do about it?" This was certainly the situation in California before the great earthquake and fire. The civil engineering profession as a whole is strong enough to combat it and bring about a due recognition before the public of those who seek to specialize, professionally, in building construction work. But it remains yet to be seen how far the dreadful scourge of April last has operated to shake or burn the San Francisco engineer into the place in public estimation which is his due in this regard.

In the measure of their success in this direction the engineers of California are assuming responsibility for city buildings of characters never before tested in an earthquake country. They have no right to assume for a moment that there are not going to be other very severe trials of buildings here. A bridge or viaduct is planned in the certainty that trains will run over it almost immediately it is finished. A building for this Coast should be planned and built with an equal sense that an earthquake may run under it quite as promptly.

It comes to this in building construction: If the engineer is admitted to his claimed place as a participant in the design and supervision of buildings, the architect is relieved of the greater part of the responsibility for the buildings' integrity. From the foundation up, the engineer now assumes to be the expert of all that supports, holds together and tops the structure. This claim must carry with it the major responsibility.

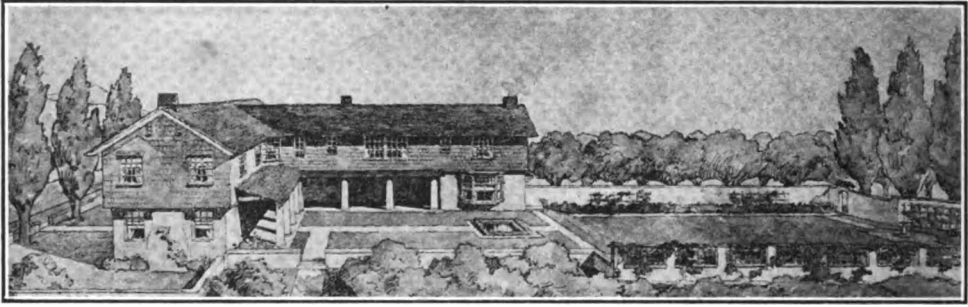
The architect's part of the result is visible—the style, proportions, details and groupings, the selection of materials and adaptation of parts, the special features and general arrangement to the intended use. These are open to view and to commendation or to criticism after the structure is finished. The engineer's part is invisible. Hid below the ground or encased in the shell and finish are the structural members—the bones, cartilages and muscles, so to speak—of the great thing we call a first-class building. If these are not all right it may tumble down some day. This constitutes the engineer's responsibility.

It is related of the older Roebling—strong, brainy man as he was—that his sense of responsibility for planning and constructing the Brooklyn bridge, a pioneer structure of its size and kind, was so great that it was directly responsible for the early break-down which ended his life. One cannot but wonder whether there are many Roeblings among those who are assuming responsibility for new classes of constructions where the ground is apt to move violently and irregularly under them. That we shall have very much in the rebuilding of San Francisco which is creditable, is seemingly assured. But will we escape having some which will be discreditable to the engineering profession? That is the vital question; for the failures, if notable, will attract far more attention and have a greater influence on the future of the city than many times the successes.

But aside from this foregoing line of responsibility for the integrity of a city's great buildings, and even in advance of it, there is another function of the municipal engineer which is of vital importance to San Francisco, not only for the future, but now. This is the designing of a fire extinguishing water supply system. This city is in special danger now of other widespread fires. We do not have to be subjected to another earthquake to make conditions favorable for such disasters; not wholesale burnings of the city at large, of course, but great fires which would constitute serious set-backs to San Francisco in her present condition. Conditions are already favorable for these in a wide and growing expanse of temporary wooden structures filled with inflammable merchandise, in a street system ripped to pieces and in many parts impassable to fire engines, in a water distribution pipe system crippled by the late quake and liable to accident at inopportune times should it be subjected to extra pressure in a great fire fight, and in a community itself demoralized by the heels-over-head rush to rebuild.

The pressing question to which I refer is one quite aside from that of provision of a permanent water supply for general purposes for the city. It is one which cannot possibly wait for solution of the greater question. It is no reflection on the present water works, nor on any contemplated water supply project to say that San Francisco needs to take action at once on a separate fire protection water supply system. What this system should be is a question for the engineering profession. No city ever confronted a more pressing or a more vital one.

Do not these foregoing reflections establish the great importance of municipal engineering to the City by the Golden Gate? a greater importance than the profession ever had, probably, to any other city. I sometimes wonder if the private owners even begin to realize it.



*Residence of Mr. Robert C. Gillis, Los Angeles
Myron Hunt and Elmer Grey, Architects*

The California Country House*

By HERBERT D. CROLY

THE country house in California is a young and tender plant, which, like many another American architectural sprig, is full of life and promise. The soil is rich, the air is kindly, and the need is great. But the promise of its future is clouded by the fact that it has as yet no sufficiently salient tendency to grow in one fruitful direction. Its energy is partly dissipated by the divided counsels which determine its growth, and Californians will do well to bear in mind that they have less excuse for miscellaneous experiments in the kind of country house they build than have their fellow countrymen in the East. So far as the East is concerned one could hardly give good reasons for asserting that a man ought to build any one kind of country house, because so much would depend upon the neighborhood in which he had happened to buy his land. The bare cold New England hill pastures call for a building differing essentially from the house which one would like to see erected on the flat sandy plains of Long Island, or in the folds of the rich highly-cultivated, and deeply wooded landscape round about Philadelphia. Moreover in the East and in the Middle West, there is at the present time no one style of country house, for which any peculiar authority can be rightfully claimed. Californians, on the other hand, have inherited and have partly accepted such a style—a style which has some authority because it is both local and appropriate; and its peculiar property consists just in the fact of its adaptability to the California countryside. The country in California with all its variety, possesses in its arable parts certain admirable and uniform characteristics which invite the building of a particular sort of house, and inasmuch as this sort of house has already been built to a certain extent upon local soil, Californians are in the fortunate position of having good reasons for remaining faithful to a simple and comparatively familiar style of country house.

It will, I am afraid, immediately occur to some of my readers that the style to which I refer is that of the Missions; but such is not the case. The Mission architecture was ecclesiastical rather than domestic; and the attempts which have hitherto been made to adopt the peculiarities of the Mission style to the designs of contemporary American houses have been almost wholly grievous in their effects. The Missions contained

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in their architecture much that was beautiful and memorable; but they also contained much that was rudimentary and in bad proportion. If one wishes to disengage the valuable remnant in Mission architecture, one should go back to the originals from which they were derived, for the local variations which the friars made upon these originals were due almost entirely to ignorance, and the necessary lack of proper tools, materials and mechanics.

The one respect in which the Mission buildings may in the end have a useful formative effect upon the design of Californian country houses, lies in the fact that it did stamp the Spanish tradition upon Californian architecture; and the Spanish tradition is only, it must be remembered, a picturesque version of what may in general be described as the Latin or Italian tradition.

This Spanish tradition has left traces of its former sway in California, which are much more useful to the modern American house-builder than are the Missions, viz., the old adobe dwellings; and it is these dwellings which constitute the most valuable and imitable local domestic style. The adobe houses, also, are only distant echoes of the highly and carefully wrought Spanish and Italian buildings from which they were derived; but even when erected in a primitive land and under bad economic conditions, they retain something of the high style of their models. They were long, low, restful structures with salient but gently sloping tiled roofs, over-hanging eaves, enclosed porches or piazzas, and bare stretches of plastered walls. Rudimentary as these buildings were and simple to the verge of attenuation, they reached, both by what they avoided, and by what they effected the essentials of good domestic architecture. They dispensed with mere mannerisms of the Mission buildings, and announced their allegiance to the admirable sources from which they were derived by their acceptable proportions, their strong lines and shadows, and their sharp emphasis of those parts of the building which most deserved it. All low buildings are necessarily and properly matters chiefly of a roof; and the roof was the feature, which was not only a little spectacular, but which, by virtue of its color, ventured also, to be a little gay.

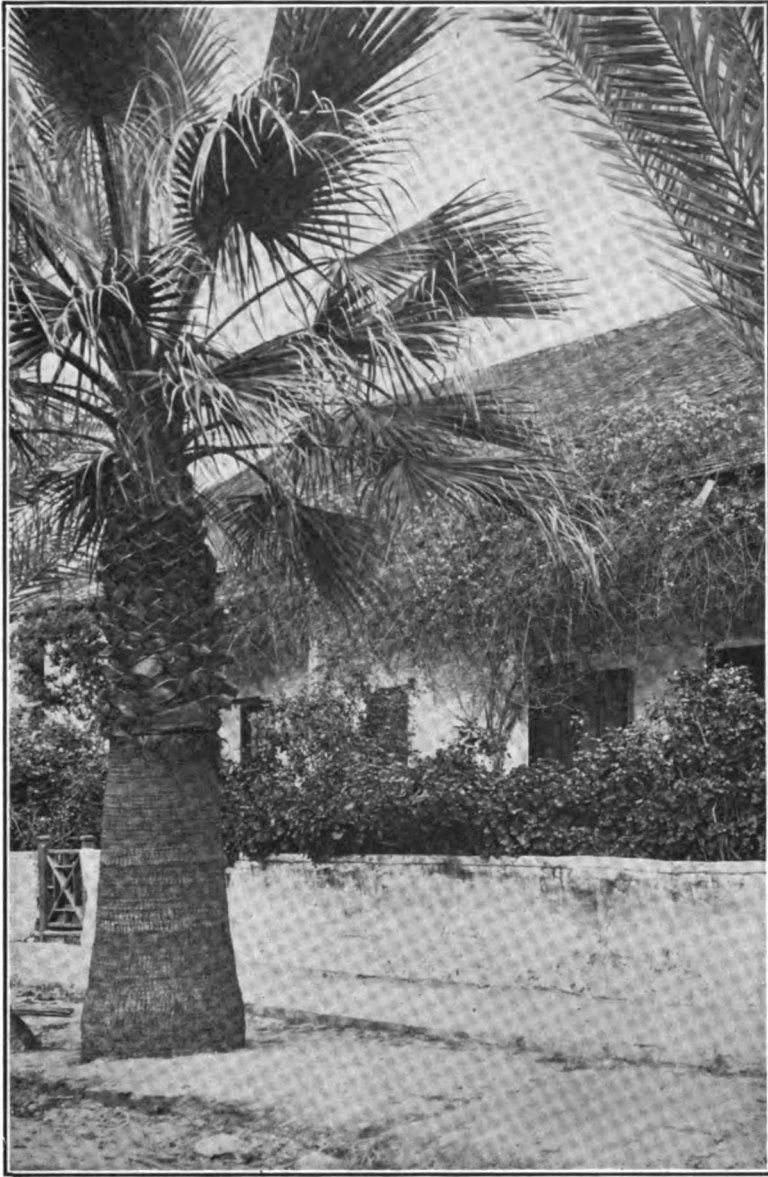
Such was the kind of houses in which the native Californian lived at the time of the American conquest; and if the style it represents should come to have more influence over the houses built by modern Californians our contemporaries would after all only be following the example of the pioneers. When immigrants from the East and the South began to take up the farming land and to build houses of their own, they fortunately copied some of the peculiarities of the adobe house. Of course they substituted wood for plaster; and of course they always insisted on the piazzas to which they were accustomed; but they retained the low lines, the restful effect and the salient roof of the native Californian house.

The new frame buildings were kept one, or most, two stories high; and the line of the piazza roof, if it was not an actual extension of the house roof, always harmonized with the lines of the latter. In this way, the piazza instead of being a useful excrescence, as it generally is on the higher houses in the East, really helped to complete what modest architectural effect it had. Another excellent characteristic of these older Californian ranch houses was the comparatively simple and honest manner in which the wood was treated. Built though they were at the time when the jig-saw was throughout the East malevolently distorting the ornamental woodwork of even the cheapest houses, they escaped by their remoteness the range of its influence; and by reason of this same remoteness there was no temptation



Pergola of the Hotel Maryland at Pasadena

to turn the carpenter into a cheap substitute for the stone-cutter. It so happened that the easiest and most economical way to build happened to make a tolerably pleasing building, and by the same happy chance, even the barns, thrown together as they were in the hastiest flimsiest way, frequently had a good curve or angle to their big roofs, and a certain symmetry in the arrangement of their fronts. One need not be surprised consequently, to find people of taste occasionally converting these old ranch buildings into eligible country houses, and the enclosed yards with



*The Priest's Home. San Gabriel Mission
An Example of the Adobe House*

which they were generally accompanied into semi-formal flower gardens—as has been done in one notable instance in the vicinity of Carmel.

Some years elapsed before many country houses were built in California for pleasure as well as for use. The country house as an architectural type implies a degree of economic maturity and social stability which California, in view of its early history was naturally slow to obtain; and even when Californians had settled down to the enjoyment of some



*The Gillispie House, Santa Barbara. An Example of Formal Landscape Treatment
Cram, Goodhue and Ferguson, Architects*

leisure and of the fruits of their prosperity, there were special reasons why a country house which involved some expense was less necessary to a San Franciscan than to a New Yorker. The climate of San Francisco, while it is pleasanter in some seasons than in others, is always mild, equable and invigorating, so that there was no season in which physical comfort demanded an escape to the country. At the same time when the San Franciscan did desire an escape to the country, he was under no similar compulsion to build a country house. The rainless summer and his proximity to the Sierra made a camp in the mountains, the pleasantest

and the cheapest way of enjoying country life; and to the majority of Californians camping was as familiar as it was enjoyable. Their early life had accustomed them to it, and even when they had a roof over their heads and plenty of money in their pockets, they returned to the open sky and a shake-down at night without that sense of awkward unfamiliarity which diminishes the pleasure of many campers in the Eastern woods. The truth is that the inhabitants of such a country as California blessed with so rare a climate, had no need to make as sharp a distinction between indoors and out of doors as do the residents of a land possessed of a wet and rigorous climate.

Californians enjoy their country more naturally and more innocently than do the inhabitants of any other state in the Union; and this attitude of theirs toward country life will undoubtedly have an important effect upon the design of their country houses. For no matter how popular and enjoyable camping might be, the country house was bound to come. Neither the inexpensive freedom of a camp in the mountains, nor the comparative acceptability of city life in the summer could prevent a civilized people from seeking some of the more elaborate and expensive, but no less valuable interests and pleasures of country life—such interests, for instance, as the building of big country houses, the raising of fine stock, the cultivation of flowers, and the enjoyment of rural sports. These are pleasures, which even a camp in the mountains cannot give; and yet they are pleasures which every intelligent and sympathetic people, possessing leisure and money enough must come to demand.

In response to this demand Californians have of late years been building country houses of all sorts and conditions. Comparatively poor people have been taking advantage of the increased accessibility of the outskirts of the larger cities to erect suburban houses in which one can detect at least an aspiration toward the country. People with somewhat more money and leisure are selecting some favored location by the seashore or in the mountains, and there building shacks or bungalows, in which the aspiration toward the country is more completely realized. And finally in the vicinity of the larger cities the rich are making country places which are intended to afford an opportunity for the most elaborate and expensive pleasures of country life. Each of these different grades of house has some interesting local traits.

The suburban house, erected in the vicinity of San Francisco and Los Angeles only too often resembles the three-story Queen Anne cottage erected in the East, which has no virtue, either practical or aesthetic, except that of being cheap; but fortunately there are many of these suburban houses which do not conform to the popular but depraved Eastern type. On the contrary, they remind one of the lines and proportions of the ranch houses which I have already described; and in this respect they perpetuate the best available tradition. They tend to be one or two-story buildings, with long low lines, and with the roof overhanging and dominating the upright members. The piazza, which was so necessary to the farmer in the interior valley is generally dropped, and an enclosed porch substituted in its place, so that the rooms of the house will receive the grateful sunshine. Thus they are frequently very respectable little buildings in spite of the flimsy way in which they are constructed; and let us trust that this sort of house will gain in popularity compared to the formless "Queen Anne" cottage with its affectation of picturesqueness and its general air of commonplace impropriety. In the East where large cellars and deep foundations are necessary even in cheap houses, the

"Queen Anne" cottage has at least the merit of being less expensive than lower and better proportioned buildings; but in California it fails to have even that humble virtue. There is no economy in cocking up in the air a house, which usually lacks anything worth the name of a cellar and foundations. On the contrary, the lower building, which fits tight upon the ground may well be cheaper to construct; and in the interest of good simple architecture, it can be as cheap and flimsy as it pleases, provided only it perpetuates the better tradition. The influence of a good tradition is in such cases all the more important, because these little houses are never really designed. They are merely duplicated by the thousands like pairs of shoes; and their only salvation hangs upon their bondage to some decent model.

The small suburban house shades off by imperceptible degrees on the one hand, into the bungalow, and on the other hand, into the larger suburban house; and these types of residence are to be distinguished from the one already described, because they are as a rule consciously intended to look pleasing. The bungalows are indeed, generally such very cheap little buildings that no architect's fee can enter into the cost of their construction; but they are none the less houses which are built as much for pleasure as for use, and the owner or his wife almost always has certain aesthetic ideas which the house must satisfy. Fortunately these ideas are for the most part good; and the bungalow usually tends to be a picturesque variation on the type of the small suburban house. If the builder goes astray, it is generally because he becomes over-conscious of the fact that he is designing a house in the country. He frequently tries to obliterate as much as he can, and more than he should, the necessary difference between the form of his house, and the form of features of the landscape; and in this way he falls into what is, from the point of view of sane architecture, a meaningless affectation of rusticity. More often, however, these little bungalows are characterized by a simple and unaffected propriety both of design and in the use of materials, which to an Eastern visitor is both novel and highly pleasing. They are worth careful attention because during the next few decades they will undoubtedly increase prodigiously in numbers. They are admirably adapted to the Californian climate; they are within the means of all but actually poor and over-worked people; and there are an inexhaustible number of charming spots, both on the sea-coast and in the hills and mountains, which are sufficiently accessible from the larger cities to invite their erection. Finally they possess in a high degree that informal and provisional character, which the majority of Californians continue to prefer, and which is the result of the comparative newness of their economic and social life.

We must turn, however, to the suburban houses which are costly enough to have been designed by architects in order to find how good (and how bad) such wooden buildings in California may be. It is unfortunately true that, on the average, houses of this class are less acceptable than their cheaper neighbors. They may not be, as a rule, any worse than the majority of summer houses erected in the East and the Middle West; but they are more disappointing, because one's eye in California is keyed up to crave and almost to expect something more appropriate and entertaining. If, however, the majority of the more expensive frame houses are unworthy, there is a minority of the elect, which constitute some kind of a compensation. These buildings must be classed among the very best attempts which have been made in this country to give a wooden frame building a characteristic form and texture. Our wooden houses have been for the most part cursed

by the fact that both owner and architect have been ashamed of their chosen material and were trying to constitute wood as in one way or another a substitute for stone; and it is peculiarly refreshing consequently to find, as we do in California, evidence of a very general desire, to use wood in some more idiomatic and appropriate way. The native Californian redwood is a timber with admirable qualities both for structural and ornamental purposes; and it is fortunate that a group of architects are coming to the front, who are prepared to do it justice. Maybeck, Mathews, Howard, Day and others in San Francisco; and Myron Hunt, Elmer Grey, Arthur Benton, and Greene & Greene in the vicinity of Los Angeles are all designing houses which are picturesque without being affected, and free and bold without in general being freakish and bizarre. Their work gives one the sense, so rare in this country, of being at once freely and vigorously imagined and carefully composed.



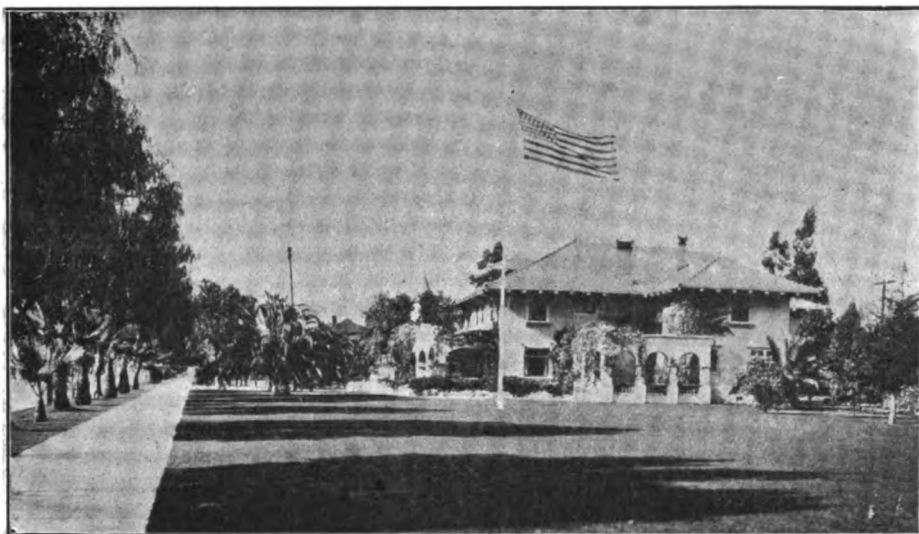
Residence of the Rev. Robert J. Burdett. Pasadena

Our countrymen, however, have given unmistakable indications that they can not be satisfied with country houses, which are either provisional and informal or suburban. As their means increase they have sought to make the country house as an architectural type more and more complete and elaborate; and this has meant the substitution of more permanent materials for wood, and the attempt to surround the house with grounds which are laid out and planted for the purpose of bringing out architectural values. All over the country, but particularly in the vicinity of New York, the richer Americans have been rearing country houses which were comparable in scale and magnificence with the historic country places of Europe; and if the attempt has not been wholly successful it is not because money has been spared. One can find certain traces of this ambition in California. In the vicinity of San Francisco, Los Angeles and Santa Barbara country houses have been built, surrounded by

*Residence of Mr. L. V. Harkness*

abundant grounds, which are intended to be something more than informal and suburban. The intention has not been as fully realized as it might, because wealth has not been accumulated in California so largely as it has in the East; but its completer realization is obviously only a question of time. Indeed one may safely prophesy that California, more than any other state in the Union, will little by little become the land of great country estates, because not only will the well-to-do Californians themselves seek more permanent and elaborate houses, but the New York and the Chicago millionaires will frequently covet a fitting residence in California—just as an English duke or a German prince has his villa on the Riviera. The Californian countryside is assuredly destined to become something more than a granary and a fruit-garden for its permanent residents, and a health resort for birds of passage. Certain favored parts of it are also manifestly destined to be an ornamental garden for Americans, both from within and without the State, who want and can afford the most elaborate and highly wrought pleasures of country life.

It is the design of these large houses in particular which needs to be influenced by a single good and appropriate style. The larger houses already erected at Burlingame and elsewhere have a great deal of interest, not so much because of their architectural design, as because of the example they afford of how much Californian vegetation can do in a short time for Californian landscape architecture; but their appearance does not betray any sufficiently definite appreciation of the fact that the nature of the Californian landscape calls for a certain kind of house. As was remarked heretofore, the designs of these larger houses are derived from sources as miscellaneous as those which are erected in the much more radically diversified climate and countryside of the East; and it is of the utmost importance now when the practice of landscape architecture is only beginning that the most appropriate style should be selected and should come to have a certain authority. Consequently, in order to justify the claim that the landscape *does* call for the one sort of house rather than another, I must briefly consider what the character is of the typical California landscape.



Mr. Frank C. Holder's Home

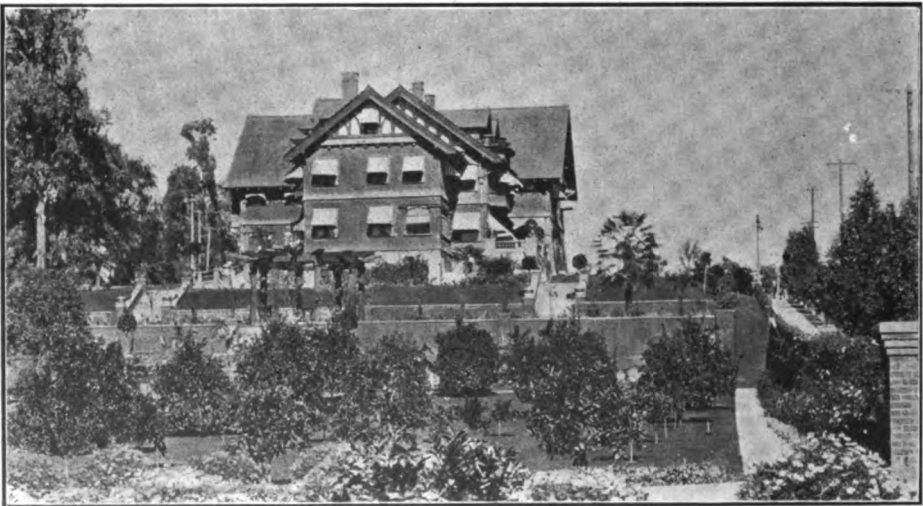
The many beguiling aspects of the Californian country have been sufficiently described and admired; but so far as I know the hillsides near the coast have never received the tribute they deserve merely as a consummate opportunity for formal landscape architecture. I limit this tribute to the hillsides near the coast, because the slopes of the Sierra and the plains of the interior valleys, whatever their other advantages, do not possess any peculiar affinity for one kind of country place. The steep wooded slopes and the far-reaching perspectives of the mountains are adapted to the temporary shelter and the primitive occupations of the camper rather than to the artificial and complicated needs of the "country gentleman," while the hot summers and the broad level stretches of the San Joaquin and Sacramento valleys, much as they benefit the farmer, will hardly tempt people, who are economically independent in their choice of a country residence. But almost all along the coast, and on both sides of the coast range, the ordinary countryside is from every point of view consummately adapted to complete human habitation. There is scarcely any need to search for peculiarly beautiful and appropriate sites, although, of course, some spots will necessarily be comelier and more convenient than others. The landscape in its most familiar characters of scale, contour, distance and vegetation appears almost to have been fashioned for the purpose of providing a fitting background for a rural architecture which has been informed by the classic spirit.

The peculiar propriety and beauty of such a landscape escapes the attention of many Americans, because admiration of the spectacular and picturesque in nature has become with us almost an aesthetic tradition. Many of the early American painters fostered it; and it has been encouraged by the fact that the peculiar impressiveness of the general American landscape as compared with that of Europe, depended upon its wildness and its grandeur—that is upon its general spectacular and picturesque qualities. Consequently when the American comes to build a country house, he has a tendency to seek the highest hill and the largest view in the chosen neighborhood.



California Home of Mr. Adolphus Busch. Pasadena

This propensity has not had a very happy effect upon American landscape architecture. The high hill and the sweeping view are all very well in their way; but they rarely provide a congruous setting for a house or a favorable opportunity for a convenient and attractive layout of the grounds and the garden. The country house needs a landscape which is smaller in scale, and in which our architectural contrivances are not made insignificant by the scale of their surroundings; and such is the character of the coast country in California. Of course it has its moments of grandeur and picturesqueness, but in its more familiar aspects this landscape is to be characterized rather as simple, sweet, quiet and distinguished. It is as far from being merely soft and



Residence of Mrs. George W. Childs

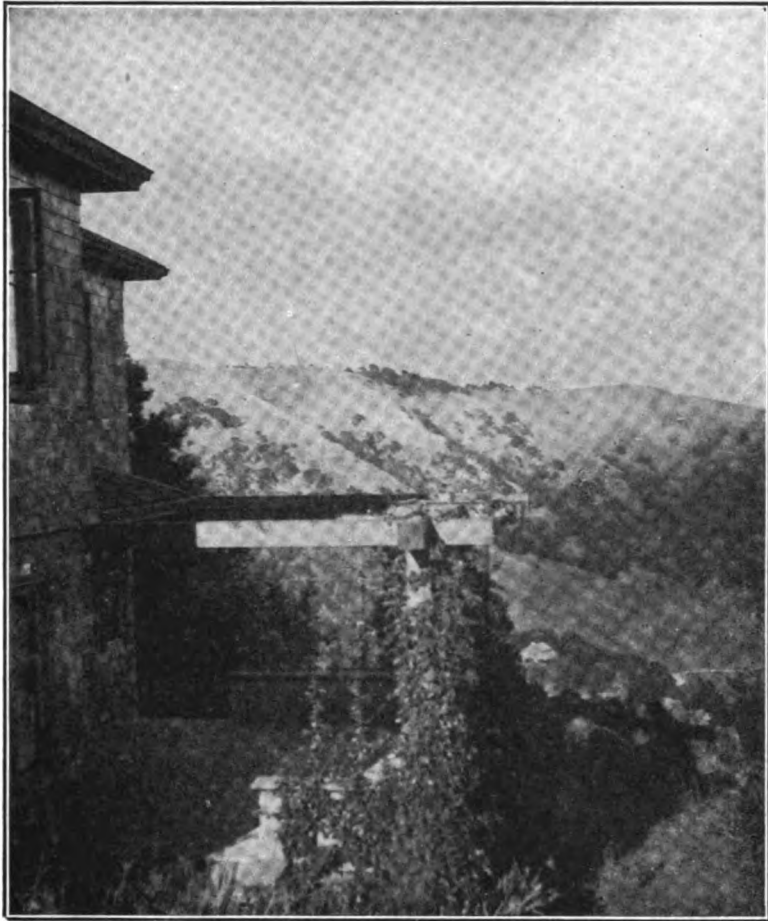
pretty on the one hand, as it is on the other from being wild and spectacular. It may consist of no more than a line of low bare hills whose deeply modeled slopes and round full contours relieve the monotony of a fertile plain. Or the whole country may be broken into a succession of hills and valleys, none of which are ragged, abrupt and precipitous, but whose whole layout is tied together by bold yet gentle lines and surfaces, and separated by a multiplicity of levels, aspects, exposures and views. There is nothing either episodic and startling or vague and miscellaneous about such a countryside. The uplands are high enough to be effective, and the lowlands broad enough to furnish perspectives and approaches. This affords in acceptable proportions both foreground and distance, privacy and space, fullness of sunshine and depth of shadow. It is a landscape which not only would not be spoiled by the stamp of intelligent human habitation but which would be as much improved by appropriate houses, properly planted, as a clipper is improved by its sails or a bush by its flower. It really needs the enhancement of value, which may be derived from the evidences of human care and interest, and it welcomes some subordination to the practical and aesthetic requirements of civilized human residence.

In case these hillsides and valleys were well wooded, one could hardly say that they actually needed the enhancement of appropriate landscape architecture. It is the fact that they are as a rule almost if not entirely bare of large vegetation which helps to give the landscape architect such an incomparable opportunity and which enables him at once to serve his client and to bestow a higher aesthetic value upon the countryside. He does not even have to destroy one value in order to create another, as he might in case the country were well-wooded. He merely has to add to the country the sense that it is not only latently human, but actually humanized by the habitation of cultivated and appreciative people; and in this task of properly settling his houses and roads upon the countryside, he can call upon resources in the way of available planting as rare and as complete as the character of the landscape itself. Not only will anything and everything grow upon these hills, provided the water supply is sufficient, but the trees and shrubs which grow most easily and which are today most familiar are generally most useful. The landscape gardener has at the outset the great advantage of being able to dispense almost entirely with deciduous plants; and in as much as out-door life is to be enjoyed both winter and summer, he should use this advantage just as far as he can. Among these available evergreens, the live-oak is easily the king. One can scarcely be too enthusiastic about this tree, which nature seems to have allowed to grow wild on the hillsides, so as to provide a perfect foliage with which to surround the houses of men. No other evergreen has anything like as high a value in immediate relation to a house and garden, unless it be its relative, the Italian ilex, and in the cooler summers of the Californian coast-country the spreading foliage of the live-oak, which allows the desirable sunlight to filter through, is both more useful and more beautiful than that of the impenetrable ilex. And if the common live-oak is precisely adapted to supply certain of the foliage which may be desirable in the immediate vicinity of a house and garden, the equally common eucalyptus serves quite as well for use along the lines of roads or in general for planting in many places at a greater distance from the house and garden, in which high masses of dark foliage may be effective. But I have no room to specify further. The many varieties of acacia, the olive, the Monterey and Italian cypress, certain peculiar, novel and

adaptable kinds of pine, the ordinary amanzunta and lupin, all of these plants and many hundreds of others, which possess an almost equally distinctive value, offer themselves for ornamental planting in relation to the California country house and garden; and if they are used discreetly, and in subordination to the architectural scheme, the roads, terraces, walls and buildings so far from marring the landscape, will merely add to it a human confirmation.

Rare and highly distinguished as the Californian countryside is, it would be a great mistake to assume that its high distinction demands a peculiarly Californian type of building. Doubtless any traditional type of residence which came to prevail would have to be modified in certain respects, in order to adapt it to the peculiarities of the climate and of the life of the inhabitants. Nevertheless Californians should never forget that the distinction of their landscape consists in its possession to an extraordinary degree of some ordinary qualities. It is a consummate example of certain characteristics in a countryside which have in the past proved to be most permanently satisfactory to people, who combined elaborate and cultivated tastes with the love of nature. The better domestic architecture whether of Italy, France or England has rarely been situated in a picturesque and rugged country. It is almost always to be found in a landscape, similar to that described above, only as a rule rather less complete and adaptable. The Californian countryside, while neither English, French nor even Italian, is something better than any of these. It is normal. It is temperate. It is well-balanced. It is classic. Like all classic and normal things, it makes its effect by a mixture of daring and discretion, and is as free from timidity on the one hand as it is on the other from excess. The architectural and horticultural embellishment which it receives should partake of the same character. It should seek effects, which are both simple and vivacious, but whose simplicity is not obtained by reticence and elimination, and whose vivacity is neither disorderly nor bizarre. Its simplicity, therefore, is precisely equivalent to a triumphant mastery of all elements, either natural or architectural, which contributes to the total effect. Its architecture should not mutilate the natural grace of the countryside in the interest of some stiff and rigid scheme; but neither should it fear to impose an appropriate architectural scheme upon the round contours of the hills. It should not try to imitate natural effects in its layout and planting nor should it seek to sear the landscape with lines which ignore and disregard such natural effects. Just as it is the part of good manners to be polite and cordial without being stiff and insincere, so it is the part of good landscape architecture to be formal and self-possessed without being unnatural and prim. In the absence of some such intimate and successful combination between the artificial, practical, and aesthetic needs of men and the artless irregularity and diversity of nature, the architecture of a country house and its grounds cannot possess any classic propriety of form.

Such being the architectural needs of the Californian landscape, it is peculiarly fortunate that California possesses historical associations with the most complete embodiment of the classic spirit in domestic architecture, viz., with the Italian villa and garden. Of course the association is not direct and the type must be modified very much in the transfer; but the allegiance and the obligation are unmistakable. The Spanish dwelling from which the adobe house was descended, is as I have said, a picturesque version of the Italian convention in the design of residence; and what the Californian landscape needs is a modification along somewhat



Pergola. Mr. Chester Bailey Fernald's Home

more picturesque lines of the Italian villa and its surrounding architectural and horticultural treatment. But in trying to describe in general what these buildings may look like, it would be a mistake either to go too much into detail or to keep any specific Italian villas too much in mind. Any general type of house, which is recommended as specially appropriate, must be capable of the widest variations, so as to suit the many different determining conditions of site, exposure, natural planting, convenient ways of approach, and possible cost. It is much more important to insist upon the essential ideas which ought to shape the design and planting of these houses than to attempt to describe very much in detail their characteristics.

The design of every country house, which is a matter of serious architectural consideration, should be approached from two points of view—the point of view of how the house will look in relation to the landscape, and how the important features of the landscape will look when seen from the house and in relation to the necessarily artificial arrangement of its grounds. In the case of the country house in California, the first of these points of view is of more than usual importance. The coast country con-



The Cochran House, Los Angeles. Myron Hunt and Elmer Grey, Architects

sists throughout of small hills and valleys, and the tops of these hills will naturally be generally chosen as the sites for dwellings. In such situations these houses will be conspicuous features in the landscape. They should be designed so that they will neither be out of place on their hills, nor merged inconspicuously into them and the surrounding trees. They should consequently be buildings which are long in proportion to their height, because a house which is cocked up in the air, does not look well on a hill, and because the live-oaks in the vicinity, are not big enough in scale to provide a proper background for a tallish building. The walls of these houses should be light in color, because a very positive color is the best means of emphasizing a building, which is both conspicuous and is surrounded by trees, and because white or light grey houses look well in the brilliant Californian sunshine. It should have a gently sloping roof, but one which is broken in outline, large in surface, gay in color, and emphatic in the shadow which is cast by its eaves. A building in the foregoing type would resemble in some respects an Italian villa; but it would have many characteristics which depended upon local conditions. It would be a more picturesque building than the Italian villa usually is, because the American taste for the picturesque is too strong to be entirely disregarded. Its walls would be pierced by many more openings, because the sunlight is grateful and necessary even in California, and because the plan of a modern American house demands a large number of rooms and consequently of windows. Then, again, the amount of ornamental detail to which one is accustomed in Italy, might well be reduced on these houses, because in our country such detail costs more than it is worth. Sculptured ornament there will be of course, but the architect should depend for his effect upon the masses and the color of his building, and the shadows it casts, and its plainness should be relieved chiefly by trees, shrubbery and vines.

When we come, however, to consider the house, not from the point of view of its place in the landscape, but as a means of introducing its inhabitants to the countryside and there amusing them, we reach a very different set of requirements. The house must not merely hold its own in the landscape without becoming an excrescence; but it must be planned in relation to its surroundings so as completely to satisfy the complicated, practical and aesthetic needs of its inhabitants. Such is the meaning and the purpose of formal landscape architecture and gardening. The formal treatment of a country place does not consist, as many people seem to imagine, in laying out straight roads and paths

irrespective almost of the nature of the ground, and then outlining or terminating them with walls and pergolas. It consists first in laying out the roads, approaches and buildings connected with the estate, so that convenience will not interfere with good looks. It consists secondly in effectively outlining and emphasizing the most beautiful landscape views, which are accessible in the immediate vicinity of the house and in shutting off those which are not beautiful. It consists finally, should a flower garden be wanted, in giving that garden a size, a layout and a frame, which is adapted to its situation and its necessary natural and architectural surroundings.

The difference between a formal and an informal treatment of a country place lies not so much in a difference of purpose as in a difference in method. An informal treatment would seek the same objects; but in doing so it would eschew so far as possible straight lines and architectural features. It has a theory that straight lines and architectural frames and features are unnatural; whereas as a matter of fact they are no more unnatural than is the house itself, or any other evidence of civilized life in the country. They are artificial; but given the proper surroundings they can be made entirely appropriate. Straight lines are necessary, because a straight line is the shortest distance between two points and because the eyes of men cannot see around a curve; and landscape architecture is necessary, because only by such means can the necessary vistas be filled, and the desirable definition and lineature given to the landscape. But all these architectural features can be and should be relieved of their rigidity by an abundance of appropriate planting. It is, by virtue of the trees, shrubs and vines that the architecture takes its place in the natural surroundings; but it only does so on condition that the planting is planned so as either to soften an architectural line or to complete an architectural effect. The average American idea of planting in the vicinity of a country house is to put a shrub which they like in the ground, wherever it will grow; but in any formal scheme the planting must be subordinated to the general effect. At one point foliage of a certain color, density and mass is required; at another point foliage that is smaller in mass and more dense in its habit of growth. And the same principle must be extended to the planting of the garden. The flower garden is not merely a place in which flowers are grown. It is a place, in which the flowers which are grown are seen to the best advantage. I suggest this idea of the house and garden which is adapted to the coast country of California, because that country manifestly demands a certain kind of architectural treatment. Such methods of treatment may or may not come to prevail; but whatever authority the architectural profession can exercise in California should be used in their favor. So rare and perfect an opportunity exists nowhere else in the United States; and it remains to be seen whether Californians will have the good sense to use it discreetly. They will have every temptation to go astray, and to disfigure the landscape with an eruption of architectural and horticultural blotches, because it is a country in which almost any kind of house is practical and almost any kind of plant will grow. Nevertheless there are at least some reasons for believing that they will come to appreciate the desirability of treating such a simple, temperate and normal landscape in a simple, temperate and normal spirit. The Californians love their country without affectation and without effort; they possess a greater potency of successful achievements in the arts than do the inhabitants of any other single section of the Union; and best of all, they have shown an unusual power of co-operating either formally or informally to accomplish some purpose which is recognized to be good. They show an active and adaptable intelligence, that is, without being arbitrary and perverse in its exercise; and they may well reach some common sensible understanding about the sort of country house best adapted to their countryside.

Competitions in San Francisco

By W. GARDEN MITCHELL, Architect

AT THE present time conditions are too unstable and hurried for architectural competition, but the time will shortly arrive when they will be the order of the day. Many attempts have been made to regulate competition in such a manner as to assure the author of the best design having his plans accepted, but so far (talking, as I can, from experience in America and England), all such attempts to this end have been mostly unsatisfactory.

Two things have to be guarded against in all competitions. Dishonesty on the part of either the "owner" or the competitor, and inability on the part of the person or persons chosen to make the awards.

Without endeavoring in this article to recite the numerous pitfalls that lie in the way of architectural competition. Let us get to the matter directly by suggesting how an architectural competition should be conducted.

First of all, the more capable architects of this or any city should get together and determine on a set of rules and conditions and agree among themselves that they will not enter a competition unless these rules and conditions are adopted. This would mean to an intending builder that he would have only the inferior members of the profession competing if he would not agree to adopt certain simple and necessary conditions to insure a fair competition. It should be the duty of say the secretary of the local Chapter of the Institute of Architects, or other league of architects, to see that whenever a competition is proposed the party instituting the competition is informed in regard to the architects' agreement, and that a copy of the conditions be presented to him, and every endeavor made to persuade him of their reasonableness with a view to having them adopted, if not in their entirety, at least as far as possible; and should modifications be necessary, then such modifications to have the approval of the Architects' Institute or League.

Now to the conditions. Let us assume a building of some importance, say a theatre or church, to cost say a half a million.

I would propose that in the first instance the owners, in conjunction with two or more architects, meet for the purpose of endeavoring to formulate a clear idea of what they require, as to the capacity of the building, and its various adjuncts; the style of architecture preferred, if any, or considered most suitable; the cost; the materials to be used, and thus collaborating, give as much information as possible as to these requirements. Then advertise a preliminary competition in which all may enter; setting forth that the drawings are to be to some stated scale and to be drawn in pencil only. The competitor to determine how many drawings he considers necessary to illustrate his design. One perspective to be allowed. Plans and sections may be batched in pencil. Elevations to be in line only. Perspectives may be shaded. No color to be used in first competition, and the scale, I should say, not to exceed $\frac{1}{8}$ inch to the foot. A competitor submitting designs not at all in accord with the stated requirements, but solving the problem in some better way, not to be disqualified, as some would think wise and just.

The object of the first competition should be largely to find out who are worthy to be considered seriously to enter the final competition, and also to help the owner to determine what he really requires and correct his instructions for the final competition.

Excess of cost should not disqualify a competitor in the preliminary competition, so long as he makes clear to the adjudicators that he is a capable and

worthy contestant, but even in this competition it should be a condition that the cost must not exceed the sum stated by say 30 per cent. Then comes the consideration of the examining body who are to award the premium. Here, again, the architects of the city should have a list of jurors who are considered capable and willing to serve in this manner. They should, I think, in most cases be limited to architects only. For although there may be many good architectural critics outside the profession, it is difficult to be assured of such being familiar with planning and also on their guard against the trickery of drawings, to be thoroughly reliable as critics.

There should be three men on such a jury and the decision of two to be accepted, or in some cases one expert may be preferable.

This to apply to the preliminary as well as the final competition.

The three jurors to be paid a substantial fee for their services, say \$400 to \$500 each for the two awards. Then it is also desirable that the (six, let us say) architects placed highest in the first competition be paid something for their services, conditional upon their entering the final competition, say \$500 each. These fees, it will be seen, raise the cost to the owner about three-quarter per cent, but it is fair to the competitors and should be the best spent money of the whole expenditure, as should be obvious to him if he would take time to think it out, for he stands to get in this manner a building worth 10 to 20 per cent, or even 50 per cent more in value.

The successful competitor should be assured of being employed to carry out the work at a stated commission; no friends or favorites to receive special consideration.

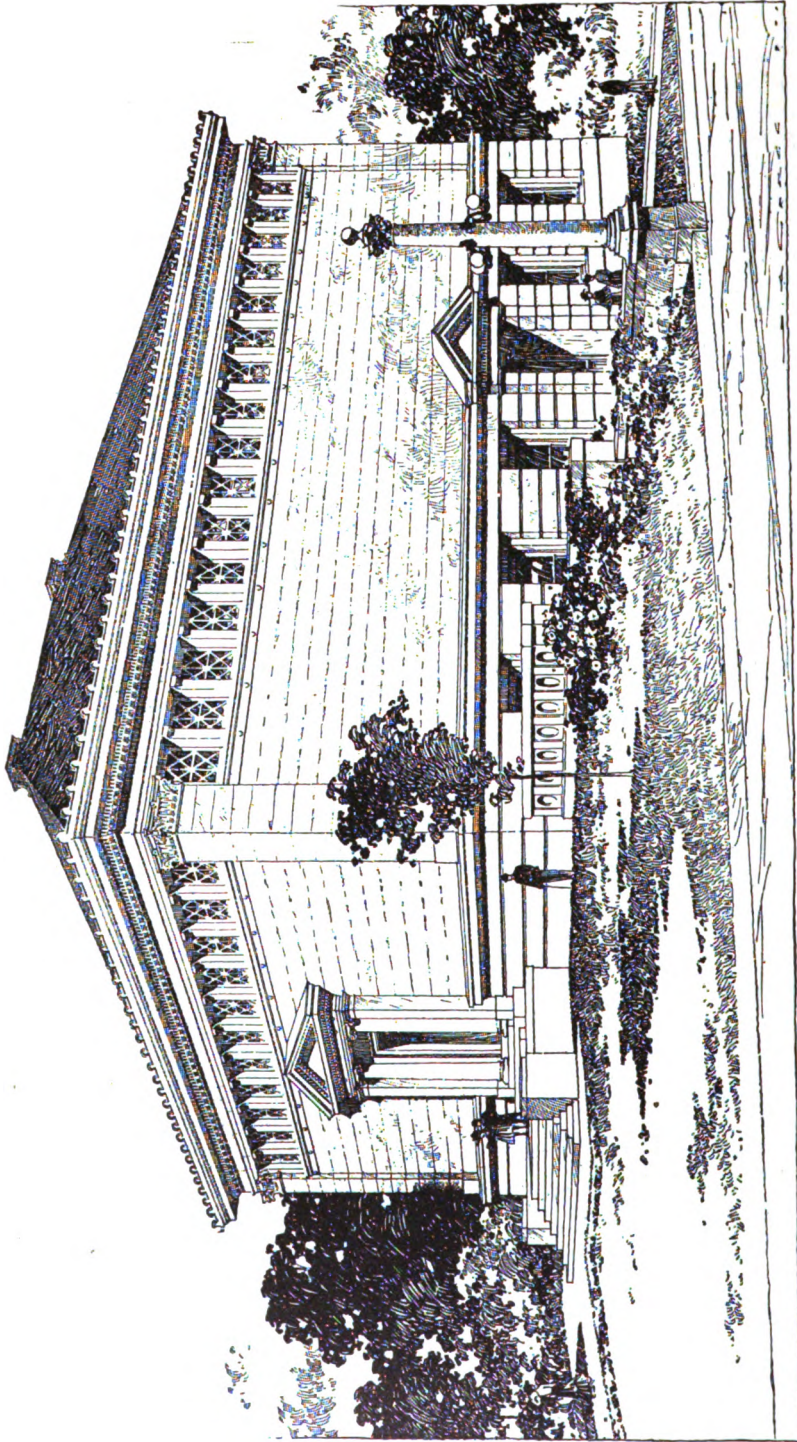
The names of the jurors should be set forth in the "conditions" and every endeavor should be made to induce these gentlemen to live up to their promise to act in this capacity. Architects are more interested in the jurors than in perhaps any other condition. Now as to the method of making the award.

The drawing having been duly marked with a number, the architects should proceed something in this manner: Writing down at the time their reason for counting out of the competition each set of drawings in turn, for example, drawings 10, 15, 22, 26, etc., not of sufficient architectural merit to receive any consideration; 14, 25, 28, etc., not good in plan and therefore not to be considered; 2, 5, 7, etc., good on plan, but unworthy in elevation; 3, 6, etc., good in plan and elevations, but excessive in cost, had to be disqualified. Nos. 18, 19, 20, everything considered, placed first in the order named.

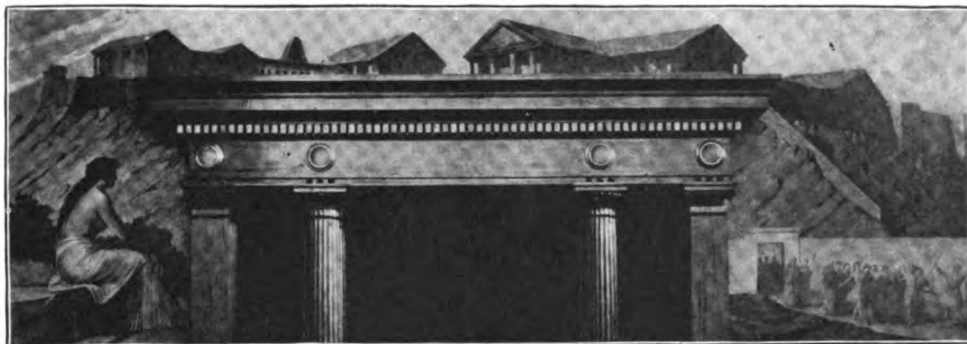
I recommend this method of procedure as I think it very unfair that a competitor should be kept in ignorance as to the reason of his failure, seeing that he gives so much of his time gratuitously to such competition. At the close of the competition a communication should be sent to each competitor informing him as to the reason of his drawing being disqualified. To receive the customary letter which usually runs in this manner: The committee begs to thank you, etc., etc., and to state that the drawings marked Ignoramus, or Genius (as the case may be), have been placed first. That is poor satisfaction. It is also a good plan to publicly exhibit the drawings. The winner never asks any questions, but if the owner wishes to get the best results he should see that he has a set of rules to be followed that will insure obvious justice.

* * *

"Look pleasant, please," said the photographer to his (more or less) fair sitter. Click! "It's all over ma'am; you may resume your natural expression."
—Cleveland Leader.



Ray Memorial Library, Franklin, Mass. Theodore H. Skinner, Architect



The Ray Memorial—An Unusual Library

By THEODORE H. SKINNER, Architect

THE architect called upon to supply plans for a library building to be built in a small town, whether by the library association, with its usually limited appropriation, or by some would-be benefactor, finds the problem not as easy of satisfactory solution as that presented by some larger and apparently more complex proposition. The building committee or the donor usually says, "We want a building, designed in some recognized style of architecture, built of some enduring material, that will look just as well one hundred years after it is finished as when first dedicated, a building looking well with only 5000 volumes on the shelves, but one capable of extension to care for perhaps 50,000 volumes, with ample reading rooms; waiting rooms; librarian's room, trustees' room, cataloguers', children's room, etc.; with possibly a lecture hall and exhibition room. We want embodied in the plans the very latest ideas on heating, ventilating and lighting, the newest wrinkles in the fittings of delivery desk, catalogue files, book stacks and cases; and all this we want for—well (say about one-quarter of what it will cost)—in short, they usually wish to embody in one small building all the good features they have seen in a lot of buildings they have been looking over, while considering their own proposition.

Sometimes, after competition, the committee selects a picture that would cost them to build a lot more money than they had to spend, and the picture is mutilated past recognition in execution. Sometimes they select an architect and say to him, "We want all this, but we know we cannot get it all for what we have in hand. You are expert, you know costs. Work at our problem with us, and tell us how much of our dream we can get; tell us what are the essentials, give them to us anyway, with such arrangement as best fits our needs, and with such proportions as may be at least dignified, and later decorated into beauty." With such a committee the architect is to blame if he does not go far and produce good results. Individual results, for different towns require varied treatments of the library problem, differently arranged interiors. A plan eminently satisfactory in one place, may be entirely unsuited to the requirements of another. Some towns are full of home-readers, others of library-readers. Some, as suburbs of large cities, are the homes of well educated people in comfortable circumstances, others are industrial or manufacturing centers peopled by laborers in mills, shops or mines, each demanding quite different library facilities to be of the most value to its constituents.



Corner of Hall. Ray Memorial Library. Theodore H. Skinner. Architect

It will be evident then from the foregoing that the first consideration in planning a library building, is "know the town" and its people. Thus only can the proportions of the whole which the various parts should occupy be determined. The rate of growth of the town and its library should be equal; knowledge of the one will determine whether the building must be planned so as to permit enlargement or not. Knowledge of the town, tells what time of day the library will be most freely patronized; whether by exchangers or readers, and whether it should be planned to give public access to the books, or whether they are to be secluded. This last point determines in a measure, regardless of the plan, the number of attendants and accommodations necessary to provide for their convenience.

The smaller the reading public, the simpler the plan of its library home should be—one compartment, in many instances, being all that is required, one side being reserved for the books, the other for readers, with an attendant's desk in the centre. From this simple arrangement with its direct control of the whole building, it is never necessary to depart in principle, even in the largest buildings, for it is always possible to keep the books on one side, and the public on another, of some central point of control, from which the director can be in easy touch with attendants on the one side and the public on the other, be the library ever so large.

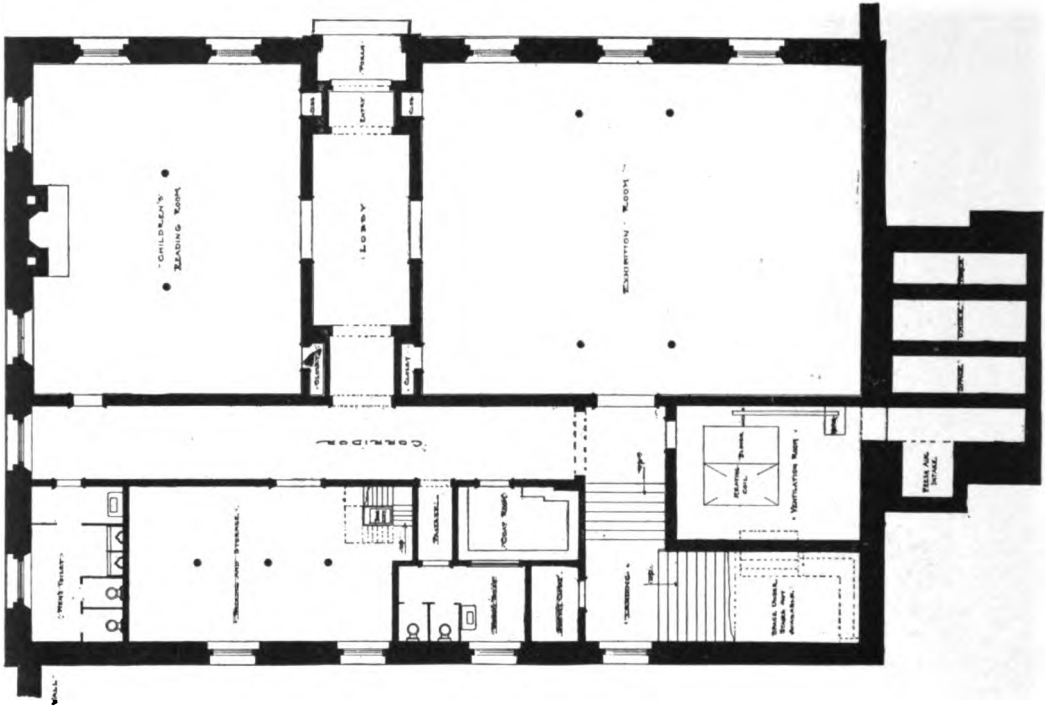
Directness and simplicity in plan make for economy in maintenance, by reducing the number of attendants, and if all parts of stacks and reading rooms are visible from the central desk, readers can be allowed access to the



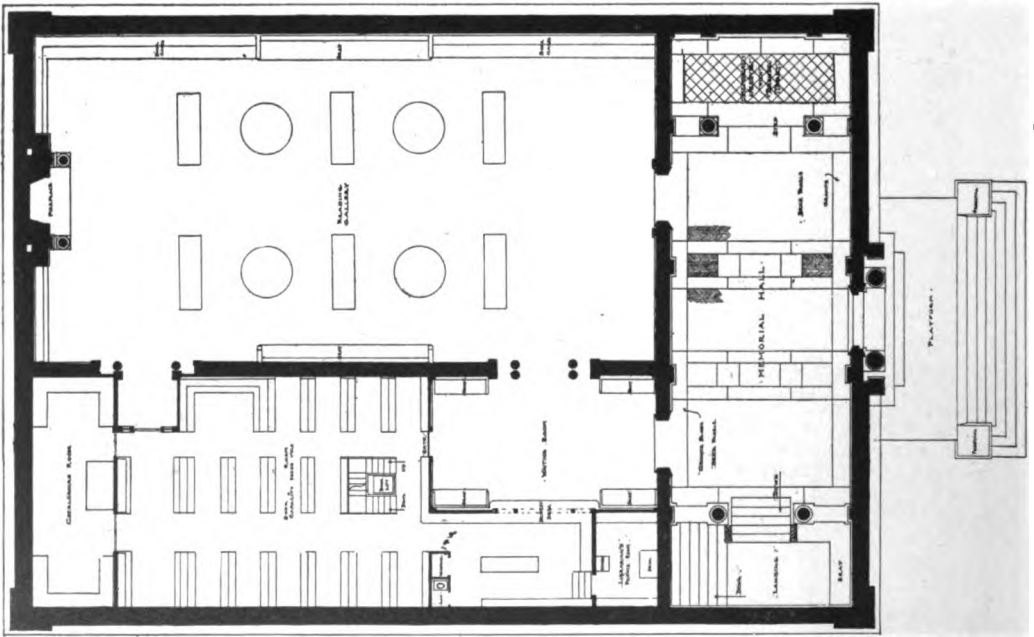
Reading Room Looking Toward the Entrance. Ray Memorial Library. Theodore H. Skinner. Architect



Reading Room. from the Entrance. Ray Memorial Library. Theodore H. Skinner. Architect



First Floor Plan, Ray Memorial Library



Second Floor Plan, Ray Memorial Library

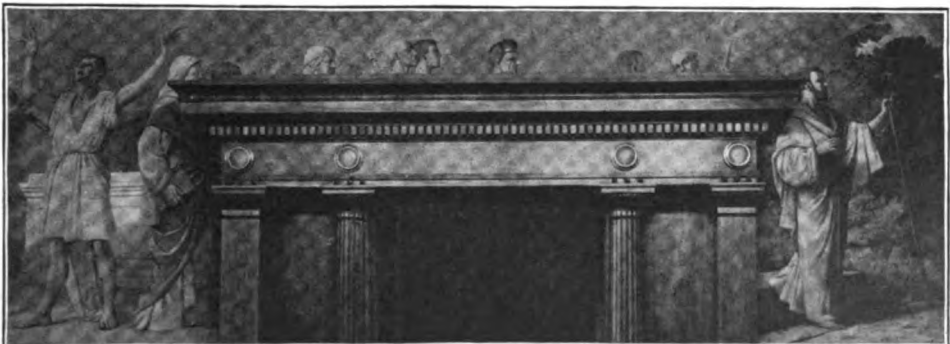
shelves and so half wait on themselves. I say half, as it is the invariable rule never to put back a book taken from the shelves.

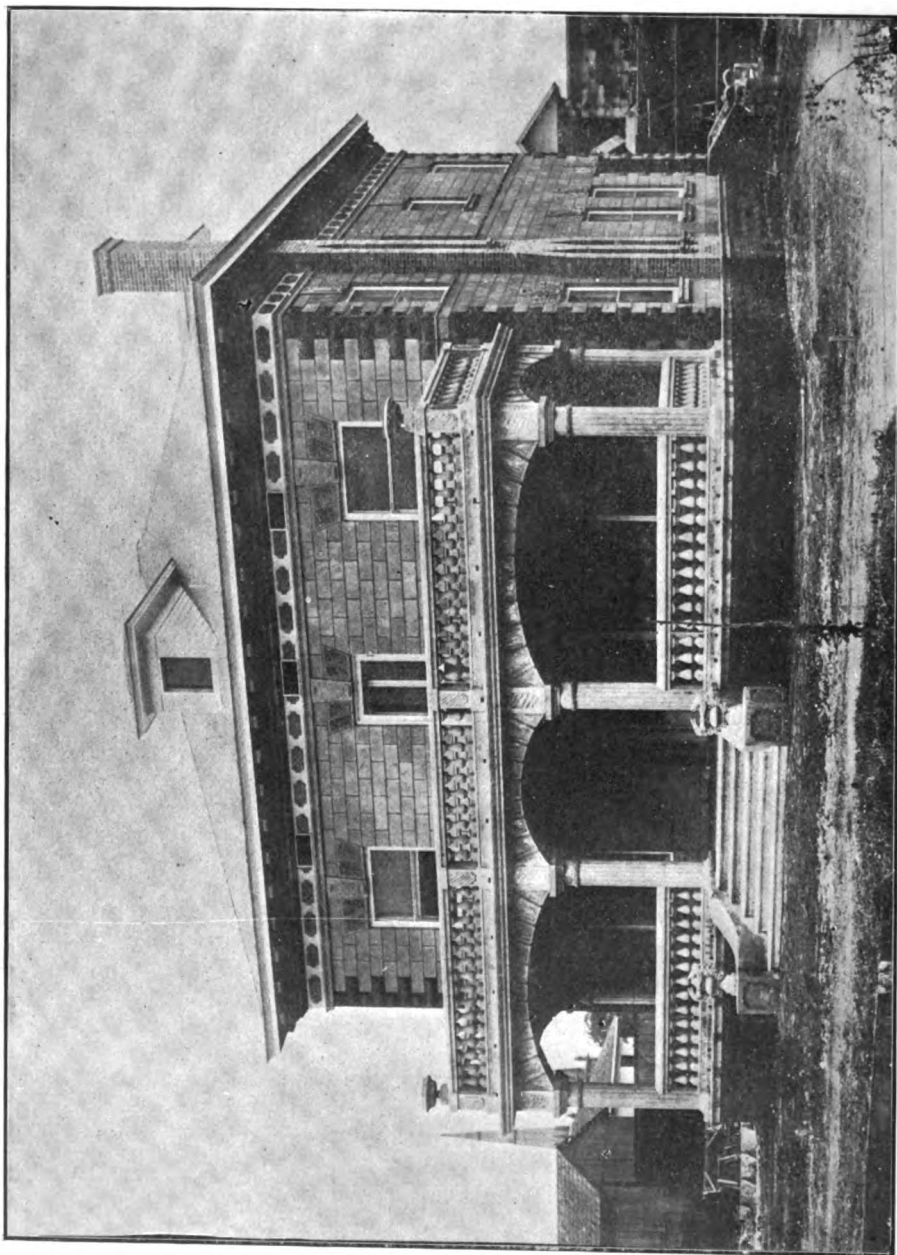
In planning the Ray Memorial for Franklin, Massachusetts, the author sought by simplicity to express the multiple purposes the building has to serve. The exterior by proportion and detail proclaims a public building; the large blank walls, interior decorations, memorial or historical; the continuous frieze of windows, a light and usable interior as well. The main floor contains only three divisions, "A" Memorial Hall; "B," Reading Gallery; "C," Book Room, so arranged that the attendant at the delivery desk in the book room can see any one entering or leaving by the main entrance in "A," or any one entering or leaving the Gallery from "A." This attendant also has control of the entrance and exit to the book stacks. "A," "B," and "C" are richly finished and furnished in marble and mahogany, and are decorated with large mural paintings. The book room "C" is arranged with storied stacks of steel and glass, dumb waiter, etc., with an ultimate capacity of about 50,000 volumes. Librarian's and cataloguer's alcoves are partitioned off from the free floor space.

The basement floor, reached from the first by a wide marble stairway, and also from the exterior on the side, through an entrance only a little less elegant than is that on Main street, is like the first floor divided into three divisions. "A," The Children's Room; "B," Lecture Hall and local history exhibition room; "C," The utilities of service. A broad corridor separating "A" from "B," also "A" and "B" from "C," leads from the side door to the foot of the stairway from Memorial Hall. The Children's Room and Lecture Hall are considered in this building, separate institutions from the library, and so are placed by themselves, removed from the control of the library attendant. They are neatly finished in natural woods and have special decorations in contemplation.

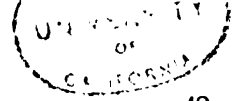
The exterior is of fine hammered granite, doors are of bronze, roof is of copper. The floors, vaults and domes of the interior are of Guastavino tile arch construction, finished with marble, tile, and monolithic floors, and rich ornamental cornices of cement plaster. Wood work is reduced to the minimum, except in the waiting room and reading gallery, where a free use of mahogany was made.

The decorations, considered by competent critics the finest in the United States, are the work of Signor Thomaso Juglaris of Turin, Italy, and Dr. H. H. Gallison, of Boston. The furniture, electric fixtures, picture frames, etc., are all special from designs made by the author. A complete system of heating and ventilating, using exhaust and pressure fans, with automatic regulation, a complete iron armored conduit electric wiring system, and the best of plumbing fixtures, serve to round out and make usable, what is in many respects an unusual building. That it is unusual is the best excuse the author has for offering this description to his readers.





*Residence of Mr. F. W. Osborn. Fresno. Built of Cement Blocks and Reinforced Concrete, by the Woswick Street Paving Company
E. Mathreuson, Architect*



A California Concrete Residence

A CONCRETE house which is in many respects a pioneer in fireproof residence construction on the Pacific Coast, has just been completed in Fresno, Cal., for Mr. F. W. Osborn, vice-president of the Worswick Street Paving Company of that city. The structure shows the possibilities of good cement block construction and it also demonstrates that concrete can be used as satisfactorily and advantageously for residence work as business edifices. The house was designed by E. Mathewson, a Fresno architect, and is a two-story structure with basement and commodious attic, the latter well lighted and ventilated with dormer windows. Every part of the house from foundation to roof is cement, reinforced concrete being used in conjunction with the concrete blocks. For two reasons this form of building is likely to be popular in California. The first is that the hollow wall makes the building cool in summer and warm in winter, dead air being a poor conductor. The second reason is that of the fire resistance of concrete. In a residence district it may be said to be absolutely fireproof. In durability and strength, as well as in fire resistance, concrete is superior to stone, brick or any other material.

While these things had been known, the chief point of interest in the Osborn home is the demonstration that all these advantages can be combined with an artistic effect in exterior decoration that few had imagined was possible. The cornice, brackets and mouldings were all cast in cement and the angles and corners are sharp and distinct. The front porch is a striking feature of the house, with its massive cement columns and arches. The upper floor is of reinforced construction and as solid as the rock of Gibraltar. The steps are of artificial marble—a surface of marble chips set on a concrete base. It takes a high polish, is more durable than marble and less expensive, and is being extensively used in San Francisco and other places.

Two colors of cement blocks are used—buff and red sandstone—and the combination is a pleasing one. When the plans for the house were drawn they called for a wooden porch, cornice and brick chimneys, but Mr. Osborn desired to make his new home as near fireproof as possible, so he had concrete substituted for wood wherever practical. The blocks were manufactured on the Hercules machine.

The owner's one regret now is that he did not make all the floors of concrete, and roof the house with concrete shingles. These two features, he declares, will positively be embodied in the next concrete block house that his company builds. An excellent feature of the Osborn home is that all the chimneys are built on the outside of the house and do not protrude through the roof, as is usually the case in residence construction. This is most noticeable to the visitor upon reaching the attic. Looking about him he discovers that the usual chimney obstructions are missing, and he naturally inquires: "Where are your chimneys?" The chimneys, by the way, are also of concrete, being an excellent imitation of buff pressed brick. The attic forms one big room and has twelve small ventilators in addition to three large dormer windows. The owner calculates that there will be sufficient draught to keep the second floor of the house comfortably cool even in the hottest periods.

There is no special style in the architecture of the house, although it is exceedingly attractive and is probably the best example California has at the present time of the possibilities of concrete block construction. The house is about 42x48 feet, and contains nine rooms and a bath. It was built at a cost of \$14,000. The floors are supported by concrete beams reinforced with cor-

rugated bars. Where partitions occur in the second story they are carried by reinforced concrete girders.

The interior decorations of the house are very elaborate. Most of the woodwork is in fleemish oak. The ceilings are frescoed, while the latest frieze effects lend additional beauty to the living room, parlor, library and hall. In the dining room a panel ceiling and beam effect make a pleasing combination, with an orange colored frieze having clusters of grapes as the decoration. The parlor is decorated in Empire style, while the hall has the panel ceiling in fleemish oak and an Oriental marine frieze.

One of the features of the house is the bath room, large and light and having a shower bath in addition to a commodious porcelain tub. The floor is of solid concrete, while the walls are of concrete tile.

* * *

A House Without a Chimney

Will the Twentieth Century see the passing of that cumbrous destroyer of artistic symmetry in dwelling houses—a chimney? Will it become a useless feature in the homes of the future? Stranger things have come to pass, yet we, accustomed to the methods in vogue for centuries, may have given the matter no thought. So used have we become to the employment of coal or wood for heating and cooking that an eventual release from the annoyance of smoke, ashes and dust has never occurred to us. Yet the problem of doing away with this form of fuel has been solved and a house without a chimney has made its appearance, says the Architects' and Builders' Journal. Electricity has made the departure from the ordinary possible. When Mr. H. W. Hillman, a prominent official in the General Electric Company's works at Schenectady, N. Y., commissioned an architect to draw plans for his handsome suburban residence, without chimney or flues, he rather astonished that gentleman until it was explained that electricity, which was to be used exclusively, rendered those adjuncts superfluous. The house was built and it has the unique distinction of being the only residence in America without a chimney. Electricity furnishes the light, supplies heat in ornamental radiators, does the cooking and operates numerous other devices of utility and comfort. It illustrates the advance made in the utilization of this comparatively unknown element. With new inventions which will lessen the cost of generation and appliances to enlarge the scope of its adaptability, electricity is destined to become a commodity of general use as a domestic as well as an industrial agent. Before the present century runs the half of its circle, chimneyless houses may, nay, will be, no novelty.—*Domestic Engineering*.

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Brick-Makers' Convention

Secretary Theodore A. Randall, of the National Brick Manufacturers' Association, has issued the official call for the twenty-first national convention, to be held in St. Louis on February 4th to 16th. The call directs the attention of members of the association to what is announced as the best meeting the body has ever held. The invitation for the convention was issued by the United Clay Workers, of St. Louis and vicinity, who have planned a very interesting and profitable assembly. The American Ceramic Society will hold its annual meeting coincident with the gathering of the brickmakers, and the convention of the National Paving Brick Manufacturers will also be held at the same time. The morning sessions of the main convention will be devoted to business, while the afternoons will be given over to the inspection of clay plants and such other sight seeing.

Terra Cotta and Brick

The Bixby Hotel Disaster as Viewed by a Brick Man

By JOSEPH SIMONS, Los Angeles

ACTING upon the request of the Architect and Engineer, I take pleasure in submitting an article, from the standpoint of one interested in the clay industry, on the failure of the Bixby Hotel, Long Beach. It would be useless to try to disguise the fact that I am interested in clay products for everybody knows my life has been devoted very largely to that industry. My experience in building construction in the past twenty-five years coupled with the experience of those that have given their entire life to masonry construction should make me competent to at least criticise some parts of faulty designs and material.

"Reinforced Concrete"—a new name applied to an old thing, is to-day at its height. A few years ago our papers were filled with glowing articles telling how the meat problem had been solved, how the meat packers trust would soon be destroyed, and the only thing necessary to accomplish this would be for the meat user to purchase a pair of Belgian hares, buy a bale of alfalfa, feed the rabbits and eat the meat. In our community with some, it partook of the form of mild insanity. Choice bucks sold as high as \$500 and does at about half that money, but at last it vanished.

I might mention another insane idea that has come over the people of late where they prophesied the literal destruction of the entire medical profession. Drug shops were to be driven from the streets, spiders were to spin their webs from bottle to bottle, doctors and surgeons were to be ignored and remembered only as an antiquity of the past, dislocated limbs were to be set, broken bones mended, cancers and tumors were to be cured, all by faith; it being true that in some instances where only imaginary disease lurked, the patient was benefited; and we find some at the present time still clinging to their original fanatical ideas.

Later on the minds of the people craved for another great and world famed idea, and they found it in a supposedly new kind of building material—reinforced concrete. Many able books and papers were written, many original and seemingly plausible ideas were advanced, many young, and some older and more experienced engineers and architects were carried off their feet by the tidal wave and are today firm believers in the theory that something can be made out of nothing—that to insert a few iron bars that are not even tied or welded together in a concrete column or girder is a mysterious

wonder. They take up one of the numerous books that furnish formulas for such work and study with amazement, selecting as their guide in many cases the formula that prescribes the least iron and the least concrete to carry a stated load and start out and proclaim to the building public that they can erect a building at least 30 per cent cheaper than can be built of any of the old and tried forms of construction, not knowing that the formula they use for reinforced concrete is based solely on an assumption. A small cube of concrete that is made in a laboratory is tested and found to give marvelous results. Two inches of steel in length is placed under a testing machine and shows that it stands more than 60,000 pounds per square inch. The short bars are also tested for tensile. They assume still further that the adhesion of concrete to steel is from 50 to 100 pounds per square inch, not knowing that this seemingly grip of concrete to the bar is at the expense of the concrete column that they contemplated loading to at least 500 pounds per square inch; that the rods that are used in the girder are being held in place by the construction of the cement that surrounds them. They fail to look up Uncle Sam's Watertown Arsenal tests that are accompanied with engravings showing plainly that bars inserted in concrete columns or girders cause them to crack, as the steel does not contract with cement. And when one looks over the ruins of what was once a reinforced concrete building and fails to see a single rod or bar that sheared or broke that had been simply pulled out clear and clean as if they were the roots of some little tree or plant that was growing in the soft earth or sandy loam, one needs but little technical knowledge to say that the theory was a fallacy; that something cannot be made out of nothing; that if concrete, the same as any other material, is loaded almost to its carrying point, it only needs a slight vibration to destroy it.

After viewing the wreck and examining the concrete and steel, any fair minded man with experience will say that the concrete was good, the steel was good, and the design was wholly in the bounds of reinforced concrete engineering practice. It is my opinion that one of the direct causes of the collapse was due to the uneven shrinkage of the concrete beams and girders. Cement must shrink to harden, and it being impossible to protect the outer walls from heat and dry winds they necessarily shrunk in advance of the necessary columns and girders in the center of the structure, and when an undue and unnatural strain comes on this brittle material, there is only one result. Pages will be written trying to explain, brains will be wrecked trying to devise some excuse, the form of constructing columns and girders will be criticised, the manner in which the iron was placed in the girder will also be commented upon. Some, no doubt, will produce the lame excuse that because a few tiles were used for a filler and in curtain walls that it was due to this material that the building fell. It will be claimed that if the floors had been built of solid concrete construction they would have stood. One small porch floor at the south that was only a few feet from the ground that received only a few flying bits of broken concrete with the exception of having the twisted bars pulled out of it and a large chunk broken from it remains in fair condition; but, on the other hand, there remains 1000 times the area of this floor that is built on the Kahn system that is in perfect condition. I do not claim that a fairly good building cannot be erected of this material if constructed on the right principal and given plenty of time to shrink and dry, but to try to erect a building where loads are transmitted to the columns by the girders the same as a class "A" steel construction, unless the same is built very low at least four times as strong as the formula we find in the book, looks to me like folly.

Concrete vs. Burnt Clay

By URIAH CUMMINGS*

IN THE Architect and Engineer of California for September, there appears an article by W. F. Barnes, which contains so much concerning Portland cement that is based on an apparent misconception of the nature of that article, as to call for comment.

We quote, "Is Portland cement some new irreducible mineral, or is it our familiar lime-rock and our familiar clay, crushed, pulverized, mixed and roasted sufficiently to expel the chemically retained water? Could not this roasting or burning proceed until from the lime-rock we have pure lime? Could not the same clay be burnt into an altogether different product? How then, in reason, can the mixing of these two half-burnt materials—either of which would be absolutely destroyed for the purpose in hand by a further application of heat—produce a fire-proof material?"

It is not often that one meets with so amusing a case as this. We were mistaken in thinking the limit had been reached when a few years ago a division engineer on the New York, New Haven & Hartford Railroad told the writer in a burst of confidence that "his road was using Mr. Rosendale's cement almost exclusively, but now that they had found a mine down in Portland, Maine, where all they had to do was to dig the cement out all ready-made, just shovel it into barrels; it looked as though Mr. Rosendale would have to quit. But, he supposed the latter had become rich enough to quit anyway. At all events this Portland, Maine, cement was giving old Daddy Rosendale a hard run on their road."

Mr. Barnes' idea that if you burn Portland cement long enough you would get pure lime, is certainly an amusing, if not an instructive proposition.

If Mr. Barnes would study the chemistry of Portland cement, he might avoid falling into so grievous a blunder as to write as he does about "these two half-burnt materials." He would know that limestone and clay, finely ground and intimately mixed together in certain fixed proportions, and subjected to a white heat, would become chemically combined: that after the expulsion of the carbon dioxide, the lime becoming thereby caustic, would attack and disassociate the silicate of alumina, or clay, and itself enter into a new chemical combination in the form of a silicate of lime and alumina.

It is among the silicates that we find the materials which are known to possess fire-resisting qualities to a greater or less degree. Among these we may name:

Silicate of alumina—clay.

Silicate of lime.—some hydraulic cements.

Silicate of lime and alumina.—Portland cement.

Silicate of lime, magnesia and alumina.—most of the natural cements.

Silicate of lime and magnesia.—actinolite and tremolite.

Silicate of magnesia.—asbestos.

Some of our clays, i. e., silicate of alumina, will withstand a high heat, but many will not.

Those silicates which contain the caustic bases, lime and magnesia, will withstand a higher heat than will the aluminous silicates.

Silicate of magnesia, i. e., asbestos, withstands a higher degree of heat than the other silicates named, although the silicate of lime and magnesia, as in actinolite and tremolite, will endure an untold amount of heat without seeming to be in the least disturbed.

*Mr. Cummings is the author of "American Cements." His headquarters are at Akron, N. Y.

Portland cement,—a silicate of lime and alumina, seems to retain all the heat resisting qualities that are due to the clay, or silicate of alumina side of its nature, which is enhanced by the lime which enters into its combination through the agency of heat.

In brief, the lime and clay in a chemical combination as in a Portland cement, will endure a higher heat than will either of those products taken singly.

A concrete made from good Portland cement and clean sand, when thoroughly mixed together and allowed time to harden, will bear a change from a white heat to sudden immersion without subsequent disintegration.

Take a bar of burnt clay, say two inches square and twelve inches long, and place one end in a blacksmith's forge and bring the bar to a white heat, and it will be found that the entire length of the bar has become highly heated.

A similar bar made of Portland concrete, with one end brought to a white heat, the other end will be found cool, and the bar may be handled by the cool end as well as though it had not been placed in the forge.

* * *

American Institute of Architects

THE next convention of the American Institute of Architects, to be held in Washington, D. C., January 7th, 8th and 9th, 1907, will commemorate the fiftieth anniversary of the Institute, founded in 1857. It is proposed to make this a notable meeting. A bronze tablet containing the names of the founders of the Institute will be unveiled in The Octagon, commemorating the occasion. During this meeting the Institute will inaugurate the custom of presenting a gold medal for distinguished merit in architecture. The first medal will be presented to Sir Aston Webb, the architect of the Victoria Memorial, who received the gold medal of the Royal Institute of British Architects and knighthood during the past year. This meeting will also be the occasion of a formal banquet, at which will gather those distinguished in the fine arts, prominent government officials, representatives of educational institutions, and men of literary fame. As ceremonial and social events will occupy the time of this meeting, no formal papers will be read, but the routine business and commemorative exercises will occupy the time of the delegates.

* * *

Trying to avoid work is often the hardest kind.

* * *

Never borrow trouble, but always be ready to lend it.

* * *

Some people climb to the top for the purpose of looking down on their neighbors.

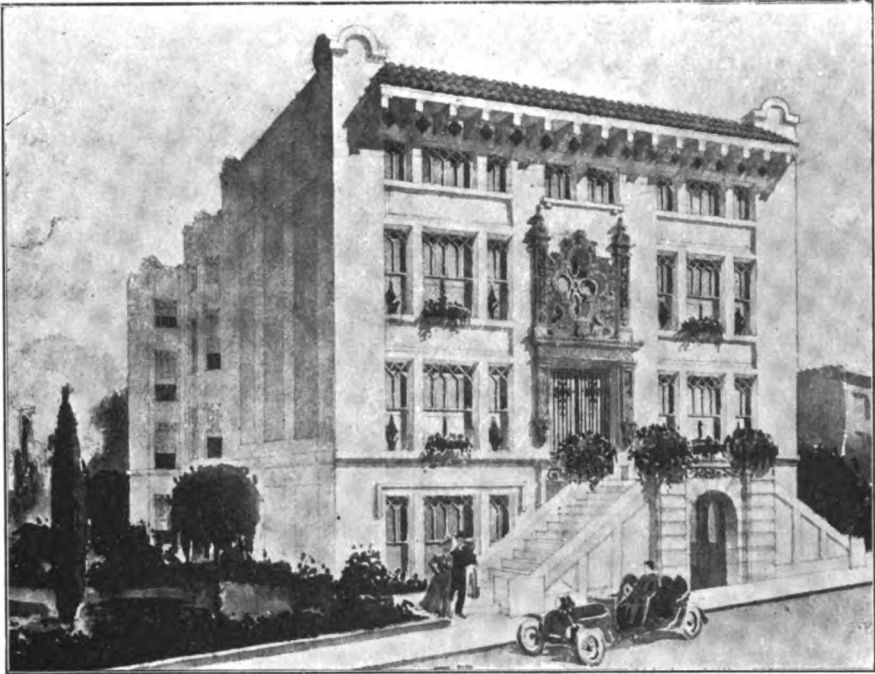
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Many a man's idea of hospitality is to bring other men home and have his wife cook for them.

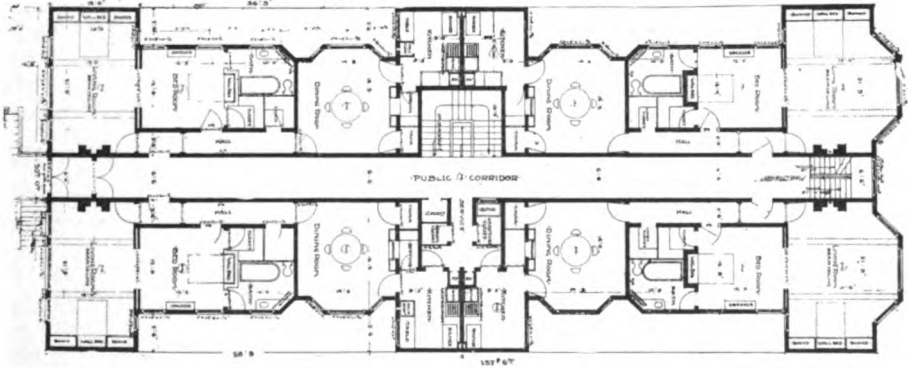
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And some people are so industrious that when they haven't anything to do they proceed to do somebody.

Apartment House for Nob Hill

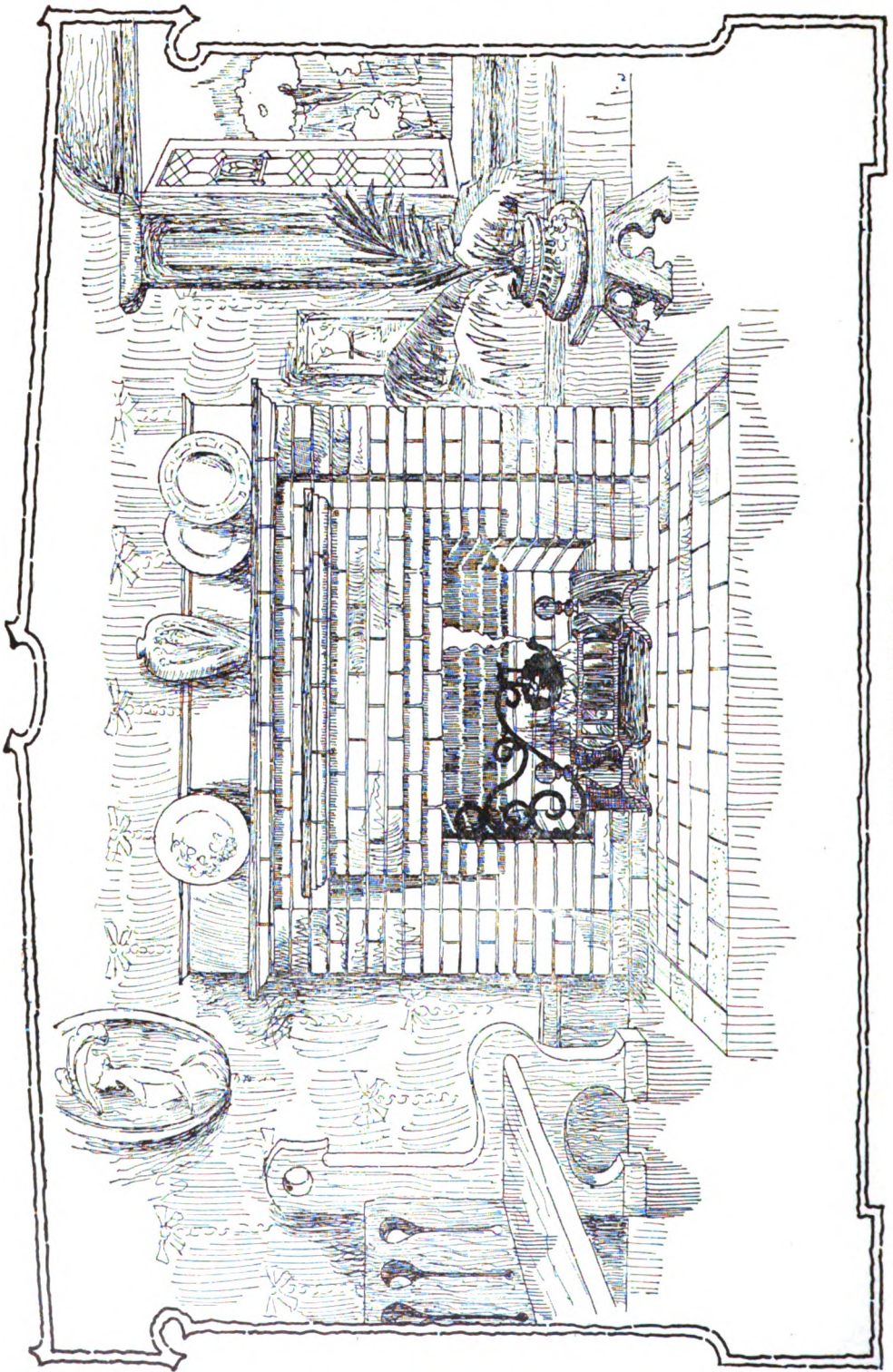


The Lewis Apartment House. Kenneth McDonald, Jr., Architect



Floor Plan of the Lewis Apartment House

The Lewis Apartment House which will be the first new building to be erected upon the aristocratic Nob Hill, in San Francisco will present when completed, a very charming adaptation of the Spanish Renaissance style of architecture. The color scheme of the exterior will be a warm cream tone to the rough cast plaster surface with the deep sienna color of the main entrance and will have the real Spanish tile emphasized by green Gruby tile inlaid under the cornice. The interior will be carried out in antique oak finish with dull white wax surface, all furniture, mantels, wall beds and woodwork being designed by the architect in the Spanish Mission style to harmonized one with the other.



Design for a Pressed Brick Mantel

Cement and Concrete

A Plea for Good Cement Tests

By IRVING C. ALLEN

IN THE rebuilding of San Francisco a fundamental and important factor, if not the most important factor, is that all construction material be of good quality. The use of poor and unsound material, of unknown, though to all outward appearances of good quality, is certain sooner or later to develop defects. The one way to be sure that good stone, good steel, good brick and good cement be used, is that it be thoroughly and scientifically tested.

This is especially true of cement, for cements vary greatly in cementing properties, those qualities which give it value as a building material, and because, unlike most other materials of common use, the qualities of cement are not at all discernible excepting by scientific tests.

Under the term "cement" there appears in the market inferior grades which should not be used in any structure whatever. The use of cement in concrete foundations and especially in reinforced concrete walls and floors will be one of the largest factors in the reconstruction of the city. The stability of reinforced concrete buildings depends not only upon the tensile strength of the reinforcing steel used, but also depends directly upon the tensile strength and durability of the cement.

In San Francisco cements are used from Germany, England, Japan and from many different factories in the United States. No two of these cements are alike in cementing properties. Even cements of the same brand vary in quality from time to time. Cements vary over a wider range in fineness, specific gravity, time of setting, in the quantity of sand they can advantageously incorporate, in hardness, porosity, friability, in tensile and compressive strength, in permanency and durability.

The United States Government fully appreciates these facts and all materials used in government buildings are scientifically tested, and none but those found sound are accepted.

Types of sound and unsound construction are shown in the Ferry Building on the one hand and in the San Francisco City Hall on the other. If the City Hall had been subjected to as rigid an inspection during its construction as the former it would probably be intact today. The great importance of cement inspection cannot be too strongly or too frequently brought to the attention of the builders of San Francisco, and for the information of those builders who are not themselves engineers, but who wish to understand something of the essential points of inquiry as to the cementing properties of any cement, there here follows a brief outline for cement testing.

Cements, broadly speaking, are classed as "Natural Cement," and "Portland Cement." Natural cement is made from burning masses of natural rock, and approach but approximately in cementing properties to the more carefully prepared Portland cement. Natural cements vary greatly in composition and quality, but all are of comparatively low value and are but little used at a distance from the place of their manufacture, and for our purpose are not further considered.

Portland cement is made from carefully selected material and is burned at a much higher heat than natural cement. The raw burned product, in small "klinkers," is of a bluish gray color and very hard. These klinkers are powdered and form the Portland cement of commerce.

On the *fineness* of this powder depends largely the strength and soundness of the cement after setting, and as the larger particles are practically inert, the strength, and particularly the tensile strength, soundness and permanency when mixed with sand increases with the fineness. A cement of the highest quality and finely powdered under certain unfavorable circumstances may deteriorate and become granular and even lumpy. Cement, by weathering or hydration, as is frequently the case during long sea voyages or after standing a considerable time in improperly closed storehouses, begins to set en masse, and grains and even lumps are formed. These grains are inert and the deterioration of the cement is proportional to the degree of hydration, and is determined by proper screening.

As Portland cement is a definite product, whose percentages of lime, silicia, alumina and iron oxid vary only between narrow limits, *chemical analysis* renders valuable service in the detection of adulterations with inert materials, such as slag and ground limestone, or determines the percentage of objectionable ingredients, as magnesia and sulphuric anhydrid, but is not of itself conclusive as to the soundness or unsoundness of a cement.

The *specific gravity* of a Portland cement, though of little importance to the construction engineer, assists the expert in at once pointing to a faulty cement. It is lowered by under-burning or by adulteration, or by hydration. The specific gravity of a Portland cement rarely falls below 3.10, while that of a natural cement or slag cement, or a Portland cement adulterated with slag, will rarely rise above 3.00.

A certain minimum *time of initial and final set* is of importance to the workmen and is usually determined and reported by the expert.

The *tensile strength*, formerly not considered of much importance in itself, as a cement was rarely subjected to a direct tensile force, has become of paramount importance. High grade cement is today recognized as the best adapted binding material for stone and brick. The tensile strength is indicative and in a measure proportional to the compressive strength. The three points of most general interest, however, are

(1) The decrease in tensile strength with increase in the percentage of sand;

(2) The variation in strength due to the differences in the character of the sand used, and

(3) The increase in strength with the increase in age.

The *compressive strength* of a cement or concrete is a matter of direct practical importance when used in foundations and walls carrying a heavy load.

For a given age *the ratio of compressive to tensile strength* of a Portland cement is practically fixed; this ratio increasing with the age and also with increasing proportions of sand. In practical use, after one year the average Portland cement mortar will have a compressive strength about ten times as great as its tensile strength.

As it is highly essential to determine at once those qualities of a cement which tend to destroy its strength and durability, and as these tests are of necessity made in a very short time, what is known as accelerated tests for *constancy of volume* are made and a faulty cement is revealed by cracking, checking, swelling, distortion or disintegration, and gives a fair idea of the durability and permanency of a cement.

The above outline, of necessity brief, is given with a view to pointing out the more essential points of inquiry which should be made by every one using cement as a building material. These tests are made according to definite specifications of the United States Reclamation Service, American Society of Civil Engineers, Imperial Governments of Germany, of Great Britain and of others, and when so made and the information thereby obtained honestly used, will insure a stability and durability of structure not otherwise attainable. The time to find out what you are paying for is before the material has gone into the building, not after the injury has been done by allowing inferior or worthless cements—cements that for any reason lack the qualities that are absolutely essential to give good, durable, and lasting concrete—concrete that grows in strength with the year and that will endure after other forms of construction have returned to dust.

* * *

Uniformity of Design and the Proper Placing of Reinforcement

By S. A. JUBB, C. E.*

REINFORCED concrete may be looked upon by many as a fad or passing fancy: exploited, as it is, by the many enthusiasts with a patented bar or an exceptional brand of cement, and their beautiful booklets would lead one to believe that there were no limits to its uses. That it is not a new thing is known by all who have followed the engineering journals for the past ten years, and, judging by the millions of dollars of reinforced concrete structures already erected and being erected throughout the United States, ranging from the light skeleton structures, office buildings many stories in height to immense warehouses and factories carrying loads up to 1000 pounds per square foot for use of machine shops and factories running drop hammers and all kinds of heavy machinery, it is very evident that reinforced concrete has passed the experimental stage.

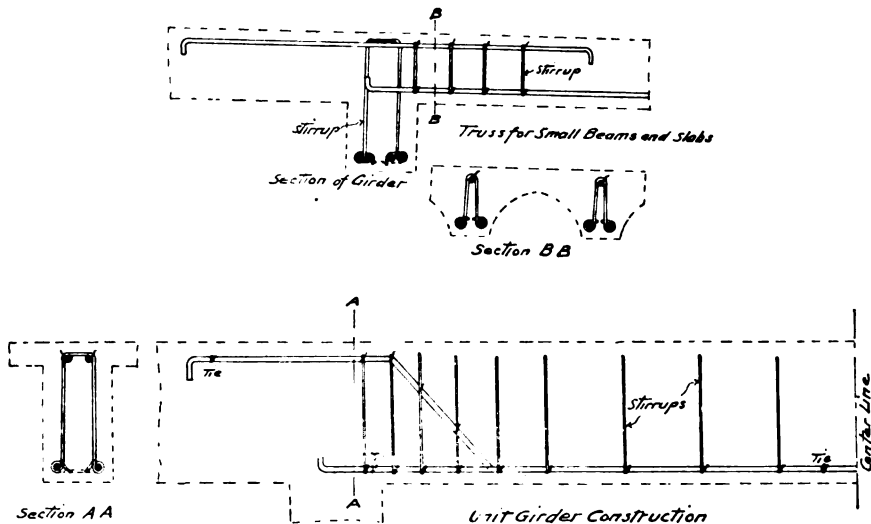
Uniformity of design is possible from the fact that as much is known about the principal elements of reinforced concrete as of any other building material, and it can be designed within as close limits, taking for example the principal factors of its make-up, Portland cement and steel. Portland cement is now manufactured by many concerns who will guarantee its quality; and, when protected by the tests as all should be, the results are very uniform. The style and design of the steel reinforcement for concrete work is not in any sense as well established as to economy of design and construction as is the preparation of and the mixing of the concrete elements. There are many patented types of reinforcement and bars of more or less value; but when we have at hand a material the qualities of which are so well known as are those of medium steel, why take chances with questionable combinations? The manufacture of structural steel has reached such a state of perfection today that with the standard specifications and the usual mill inspection its quality is beyond question. With these two standard materials

*Mr. Jubb is a civil engineer with an office at No. 2117 California street, San Francisco.

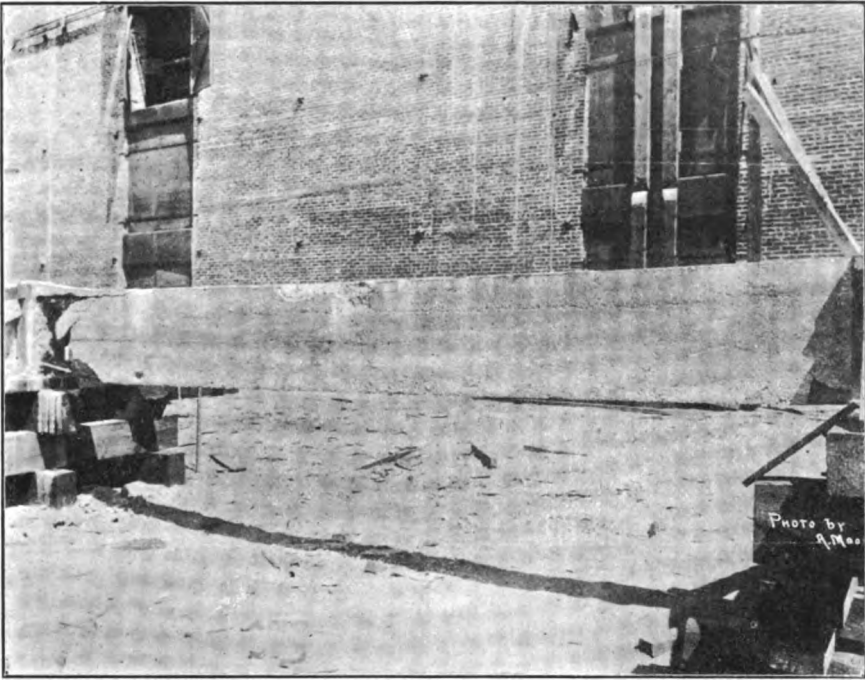
of known qualities it would seem to be but a simple matter to obtain a uniformity in the method of combining them.

Much has been written on the design of reinforced concrete beams and slabs, and the writer does not propose to add to the great amount already written on that subject, believing that there is a much more important point which requires attention; i. e., the fabrication and placing of the reinforcement.

Of what value are the hours of study by skilled designers if the results are to be destroyed by some laborer to whom the final carrying out of the work is left? Of what value is the elaborate formula and the determination of the location of the centers of gravity of the areas of steel and concrete in the sections to fractions of inches when the placing of the steel can be and often is varied inches, through the ignorance of the men who finally place it. The writer does not wish to belittle the designer, for skill as well as a thorough knowledge of the design is necessary for the proper determination of the reinforcement and each beam should be as carefully analyzed as are complicated plate girders. Regular strain sheets should be prepared and preserved for record and all elements carefully tested. The designers' work is only partially completed when it is left as 90 per cent of the work is today, with a mere statement on the plans that so many rods are required here and so many there, leaving it entirely with the foreman to guess when and how they are to be placed. The true engineer will design a product the result of his calculations which, like the built up section, can go in but one place and that the right place. It should not be possible for a rod to be omitted or displaced during the work. The reinforcement should be so designed and fabricated as to leave nothing to the erector but to carry out the plans and place the various members as is so well exemplified on all steel buildings and is just as easy of accomplishment on the concrete building. Only yesterday the writer visited a concrete building, in the construction of which he is interested, and upon pointing out to the man in charge of the placing of the steel that more rods were in a given place than were called for upon the drawings, he replied, "Guess that is so, and I will have to steal



Showing Mr. Jubb's Idea of Unit Girder Construction



Full Size Test for End Anchorage and Shear

some from some other place to make up." This might not result seriously, but would most surely, if rods were taken from an important beam or girder. Reinforced concrete construction requires close, continuous, and intelligent supervision.

The writer submits a design which was evolved after a careful study of all known tests of reinforced concrete, all the different types and methods used and all the practical as well as theoretical requirements for such a standard of reinforcement, and has been used with success on many large and important structures. This type of reinforcement may be seen in use on the new eight story office building now being erected at the corner of California and Drumm streets, San Francisco. This design avoids all patents and can be modified to meet practically all cases. This type of unit girder construction has many advantages which cannot be enumerated in this brief article and ensures very positive and exact location of the steel in the concrete in its theoretical position as called for by the stressed diagrams for each case. Its construction is completed easily in a shop where the reinforcement is systematically assembled and fastened so thoroughly together that it forms an independent truss so rigid that it can be handled, and transported and will resist the ramming of the concrete around it without becoming displaced or distorted. Its use will also save time and systematize operations to a valuable degree. With such or a similar design using economical sizes of medium steel rods there would be no object in furnishing the design for the privilege of supplying the material. The architect would do as is now done with a steel frame building; that is, turn the plan over to the engineer with a request for a design and list of reinforcing material which can be obtained from numerous firms who stand ready to

guarantee its quality. The matter of cost for such a design is, naturally, the next question to arise. The writer was connected with an analysis of several hundred tests designed to ascertain the relative advantages of the several bars now on the market, and the type of reinforcement here described invariably supported more load per dollar cost than any others.

The placing of the steel is very important and should be watched by inspectors who know the real meaning of reinforced concrete. The writer has, within a short time, visited nearly all of the reinforced concrete jobs in this city and vicinity, and on no job did he see even a satisfactory attempt being made to properly separate the reinforcement from the forms. The slab rods especially, were allowed to lie flat on the forms, an occasional attempt being made to lift them—but they immediately settled back or were trodden down by the men working the concrete. The whole success of reinforced concrete as a fire resisting material depends upon the reinforcement being properly covered with concrete; and this point, if not watched with great care, will lead to bad results. The necessary covering of concrete may be injured by fire but when the concrete is of sufficient thickness, the steel will be protected, and the injured part can be replaced by mortar and put in as good condition as ever.

Much has been said about the strength of connections. The writer does not consider there are connections in a properly designed and constructed reinforced concrete building. The photograph shows a beam tested to destruction. There was no pulling out of the bottom rods from the concrete at the support such as would have been the case if the anchorage were the weaker part. Among several other important points demonstrated in this test was that the failure occurred by vertical shear and at a much less load than the longitudinal steel would carry theoretically, which is allowed its full value by many designers. That this beam was well balanced in design is shown by the fact that the three principal types of failure appeared simultaneously. First, tension cracks near the center of the beam, and at almost the same time, crushing of the concrete took place on the top at the center; and before more load could be placed, the failure shown in the photograph took place. The writer believes beyond question, that the type of reinforcement shown, or a modification of it, will give perfect connection and security at all joints; also that the ends of the beam rods should be hooked or extended into the other members or walls. The mere landing of the end of the rod in the adjoining member for the length of from 8 to 12 feet as is often the case is not good practice—I refer now to where continuity is not possible. When a concrete building is properly designed and erected, there is less chance for a weakness to appear than there is in a steel structure, and from its monolithic nature the strength of the members are very much increased.

* * *

Mrs. Grouch—Why, Guy, dear, what on earth makes you walk so unsteadily?

Mr. Grouch—Been to the roller rink, m'dear, 'n' can't lose the motion.—Philadelphia Press.

* * *

Tommy Twaddles—Oh, I don't want to go to school.

Pa Twaddles—But don't you want a good education?

Tommy Twaddles (ingratiatingly)—No, pa; I'd rather grow up to be just like you.—Tit-Bits.

Fire Protection

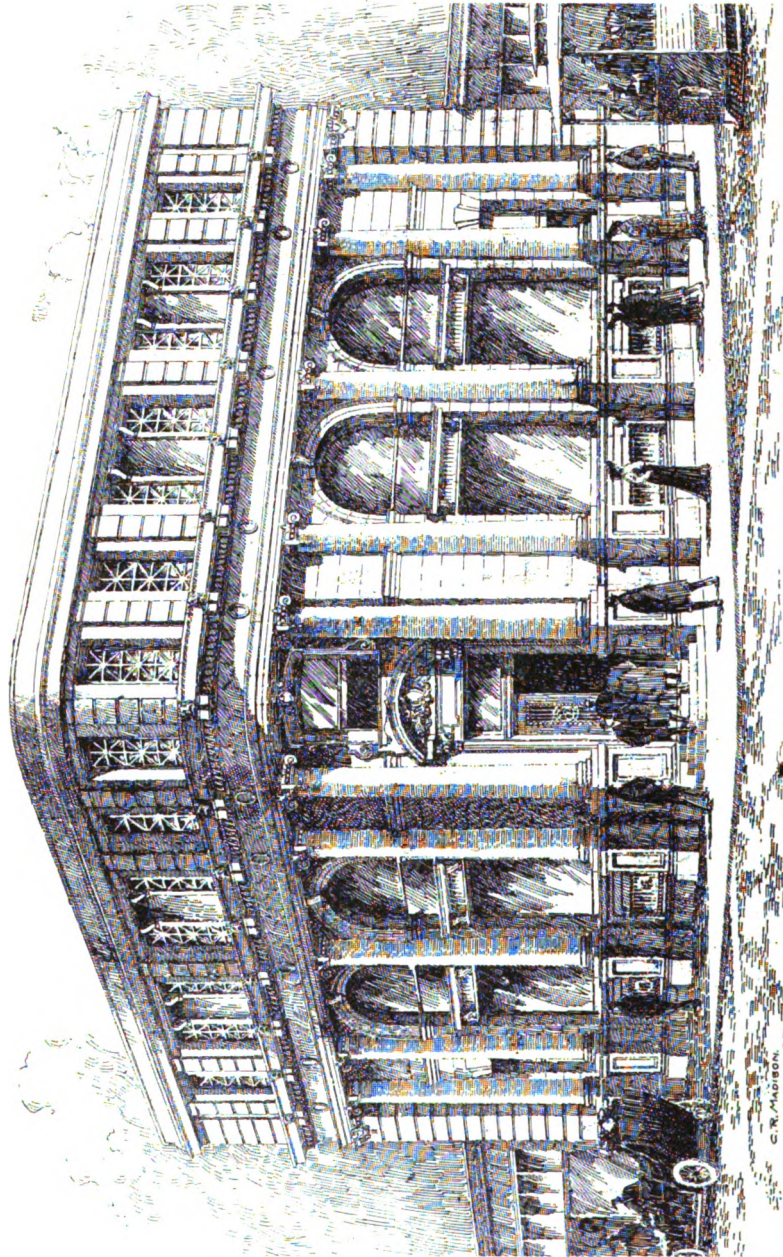
Installation of Sprinkler Systems

By J. A. LOEB, in Building Management

A SPRINKLER equipment properly installed in a well constructed plant is a declaration of independence. In the first place, the gamble as to probabilities of the risk burning down is reduced to a minimum of speculation, if not to a "sure thing" in favor of the negative. Buildings properly equipped do not, generally speaking, burn down or even result in severe losses unless an explosion or the breakage of a water main cripples the sources of supply. Secondly, the insurance companies, realizing these conditions, are eager for "sprinklered business" and offer many concessions in order to secure it. "Sprinklered" rates average more than 50 per cent less than rates on ordinary business; often the reduction in premiums exceeds 90 per cent of the rate before equipment. Thirdly, owing to the remote likelihood of a severe fire, the necessity of carrying insurance at all is under many conditions debatable. With a well built building, not too hazardously occupied and thoroughly equipped, the insurance is a second anchor against a very unlikely ill wind rather than the main-stay for expected and dangerously normal conditions.

It has been said that every fire has developed from a stage where the blaze might have been extinguished with a cupful of water. The sprinkler equipment is designed to furnish that cupful of water at the incipient stage.

The sprinkler equipment in its fullest sense consists of a system of pipes leading from the sources of water supply to a series of outlets inside and outside the risk to be protected. When the outlets are designed to protect the interior of the building against fire originating within they are fitted with automatic sprinkler heads. The heads consist of four main parts; a base which screws onto a distributing pipe, a valve seat held in place against water pressure inside the pipe by a strut which is secured in position by solder which will melt at a predetermined temperature; a deflector opposite the valve seat is arranged to distribute the issuing water over the desired area. The action of the head is simply produced by the melting of the solder at a temperature corresponding to the danger point of the space to be protected, say at 155 degrees F. The breaking of the struts loosens the valve, which is thrown out of its seat by the pressure of water in the pipe. The water is dashed against the deflector and is thereby distributed over the ceiling above and the floor below within a radius of ten feet, more or less.



Portuguese-American Bank Building, San Francisco
C. A. Meussdorffer, Architect

Cotton Bros., Contractors

Apart from other considerations, the chief factor in determining the spacing of heads is the construction of the ceiling. A smooth ceiling offers less resistance to the distribution of water than any other form of construction and consequently the largest area may be allotted to this kind of building. This maximum area is about 100 square feet per head, depending more or less on the economical arrangement of piping. Under no circumstances may heads be separated in any direction by more than 12 feet (and 10 feet is a more common practice). If the heads are 12 feet distant along the line of pipe, the lines will be required to be suspended at a distance of 8 feet from each other. Or if the pipes are 10 feet apart, the heads may be spaced 10 feet on line.

A very common variant from this type of ceiling is one in which the smooth ceiling is attached to the lower surface of beams which pass above the main girders. The ceiling then becomes a series of "bays" separated by girders, the bays offering a smooth ceiling; but the distribution will be somewhat obstructed by the lower girders. Under such circumstances the economy of distribution is largely affected by the distances between girders. The width of bays is measured from center to center of girders and one line of pipe is considered sufficient in bays up to 12 feet in width. Under such an arrangement a bay between 8 feet and 12 feet in width would produce the greatest economy, as each head would receive practically the maximum allowance of area. With narrower bays, however, the economy is diminished. So for 7-foot bays the maximum area is 84 square feet and for 6-foot bays only 72 square feet. For bays of greater width than 12 feet two or more lines of sprinklers are required. And here is again an opportunity for arranging either for an economical or a wasteful distribution. From the same causes as in a single pipe bay, a two-pipe bay offers economy when the width is between 16 feet and 24 feet. It is wasteful when the width is between 12 feet and 16 feet.

A further variation occurs when the ceiling is divided into panels by having a system of cross girders with the lines of girders at right angles to each other and all dropping below the ceiling arch. For the greatest economy in this construction similar rules to those above quoted may be formulated. The individual panels should have areas so arranged that the number of sprinklers will be one one-hundredths of the square feet enclosed. This would indicate an economical arrangement after the following fashion: In smooth panels neither line of girders should be less than 8 feet on centers. If one line is spaced 8 feet apart, the intersecting one should be 12 feet on centers. For square panels 10 feet by 10 feet is the most economical condition, allowing one head to the panel. Bays of 9 feet by 11 feet or similar combinations are nearly as economical. Of course multiples of either dimension may be used with equal propriety as 16x12 feet, which would give two heads to 192 square feet. Panels 20x20 feet would require four heads. An arrangement like 15x15 feet, which would also require four heads, is therefore to be considered a wasteful distribution.

In manufacturing or wholesale warehousing buildings the usual type of construction is not characterized by smooth ceilings even in bays or panels, but rather by the so-called joisted construction, the manager will know how to dispose his stock so as to utilize the available space without encroaching upon the reserved portion below the ceiling.

In some instances underwriters have permitted the heads to be reversed, the pipes being in that case embedded in the ceiling. This is done sometimes in fire proof stores where the presence of pipe would destroy the architectural effect. It is never done where there is any danger of freezing or where a "dry system" is used.

All fixed equipment such as shelving, bins, tables, etc., forms an obstruction to the spreading of water and must therefore be provided for. Shelving is most frequently met with in poorly managed plants and is a catchall for materials, which would have been sold or removed if it had been with other stock on the place provided for it. Most shelving is erected with an idea of economizing space, but rarely does so and is often expensive, unnecessary and cumbersome.

In a building equipped with sprinklers shelving is especially to be avoided. If it is absolutely necessary the shelves should be made as narrow and as accessible to sprinklers as possible. The floor of the shelf should be slatted with large spaces between the boards. Under such conditions it may be possible to avoid the necessity of putting one or more lines of sprinklers under the shelf. Where the shelves are wide and tightly floored, sprinklers will be required below; and in this case the advantage of additional storage space will frequently be lost on account of the necessity of leaving two feet of headroom below the shelf. A table is permitted to pass without sprinklers beneath unless it is of considerable width. The usual requirement calls for heads to be located beneath any table over 5½ feet wide. Such tables are most frequently met with in cutting rooms of wholesale clothing houses, etc. If possible to arrange it, the table should not be rigidly fastened in place; and it is often possible to avoid the necessity of sprinklers below the table by leaving a loose board 10 inches to 12 inches wide running lengthwise through the center, which is removed at night.

Clothes cabinets, telephone boxes and similar enclosures, when they cover more than 4 or 5 square feet, may be required to have a sprinkler on the inside. In order to avoid this it has become customary to have a muslin or canvas top. Partitions are not in themselves objectionable even when of combustible materials. The chief objection to their erection lies in the necessity of placing them so that both sides will be protected or in placing the heads to suit the partition. This usually produces a less advantageous arrangement of heads than would otherwise obtain. A partition, the upper portion of which is made of wire fence netting, is not considered an obstruction. In some cases slatted partitions have been acceptable without additional provision. Hollow partitions are exceedingly objectionable unless entirely fire proof.

The most harmful features of construction, aiding in the unchecked spread of fire, are those involving large concealed spaces into which it is impracticable to erect sprinklers. Under this heading come false floors and ceilings and sheathed walls. The false ceiling of combustible construction is most frequently met with under roofs of refrigerating or warehousing plants and is in effect a sort of attic or cockloft which in the course of years becomes a receptacle of inflammable rubbish. False floors sometimes are also used for insulating purposes, but sometimes are intended to raise an old floor to a higher level in order to facilitate trucking from an old building to a later one which has higher floor levels. Whatever the occasion that makes such a concealed space necessary, no sprinklered building can be considered well equipped unless heads are introduced into this space. For that reason they should, if possible, be erected at the time the building is constructed and the concealed space should be of sufficient height to be accessible to workmen. If it is absolutely necessary to have the space very low it is then advisable to provide numerous fire stops within it by tile walls, brick nogging or a similar method so as to prevent a great spread of fire.

Failure of the Bixby Hotel

Official Reports of the Special Committee from the San Francisco Cement Workers' Union

By T. E. KEOUGH

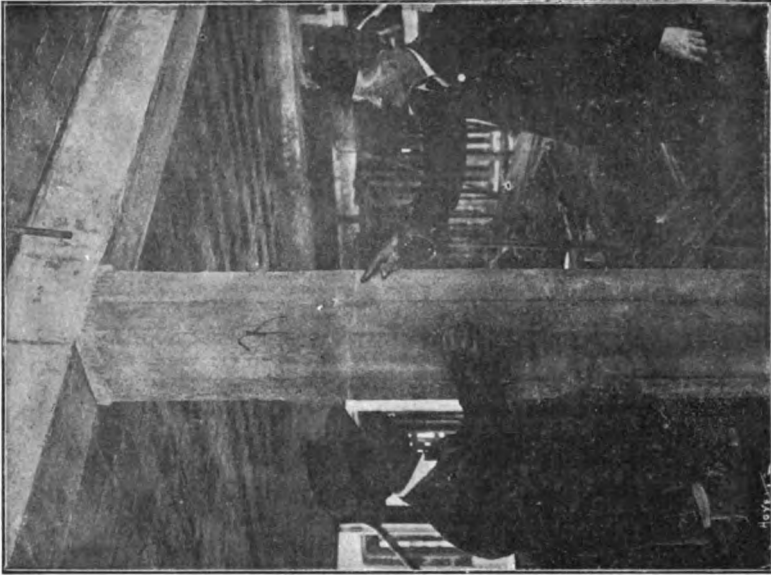
IN accordance with instructions from this Union on November 14th, I went to Long Beach, Los Angeles county, Cal., on November 16th.

There I met Architects H. A. Schulze and Wm. Koenig, and with the full knowledge and consent of the architects and owners of the building, I at once began an investigation to obtain all the information possible as to the cause responsible for the collapse of a so-called reinforced concrete building known as the Hotel Bixby, in the wreck of which ten workmen lost their lives, at about 9:30 a. m. on the ninth of November last.

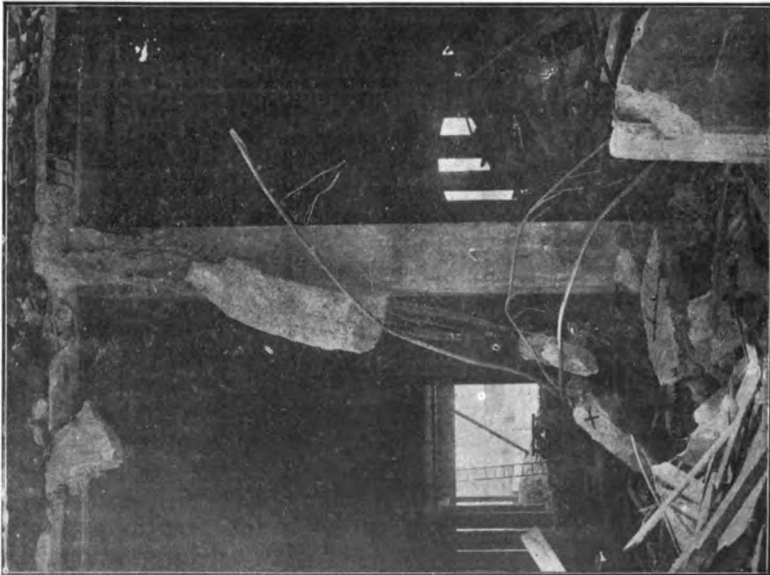
In presenting this report I will not presume to discuss the technical details of reinforced concrete construction after so many well-known architects and engineers have expressed their opinions on the subject, as it refers to this particular case.

But when such expert(?) authorities on building construction as the committee of five from the Bricklayers and Masons' International Union attempt to deceive the public as to the true cause of this disaster by publishing their conclusions as discussed from their *so-called* unprejudiced standpoint, and which appeared in the San Francisco papers of November 22d, a plain statement of facts should be brought forth, backed up by the best evidence. In the majority of reports on the subject there has been an evident desire on the part of the writers to shield someone from the responsibility of their criminal neglect, carelessness, or inexperience with the material they were using. This I shall not do, but will call a shovel a shovel, as I am more than convinced that this accident, with its terrible loss of life, would not have occurred had the men employed on this work any intelligent knowledge of the application of reinforcement in concrete construction.

This disaster, without its loss of life, instead of being an injury to the cause of reinforced concrete construction, should be regarded by our members as a valuable object lesson, which they may well study to prevent a similar disaster. Notwithstanding the recommendation of the committee of the Bricklayers and Masons' International Union, that the contractor is a practical and conscientious reinforced concrete contractor, the fact still remains from information obtained on that point, that his previous experience was confined to the building of concrete foundations for cheap cottages. His foreman, who had full charge of the work, is a carpenter, with a reputation for dare-devil recklessness not tending to promote the best results in reinforced concrete work. The concrete forms on the work were of a very flimsy character and of inferior material. They were made by carpenters (seven of those killed being of that trade), without the supervision of a competent concrete worker. The concrete was mixed by machine and placed by the most inferior labor to be found, the men were paid twenty-five cents per hour and worked from nine to fourteen hours a day, this same cheap labor being trusted with the placing of the reinforcement. They also placed all hollow tile in floors, curtain walls and partitions. Notwithstanding the solicitude of the Bricklayers and Masons' International Union for the reputation of hollow tile as a structural material of great strength and their interest in their fellow tradesmen, not one of their craft was em-



Showing Break in Column. Bixby Hotel



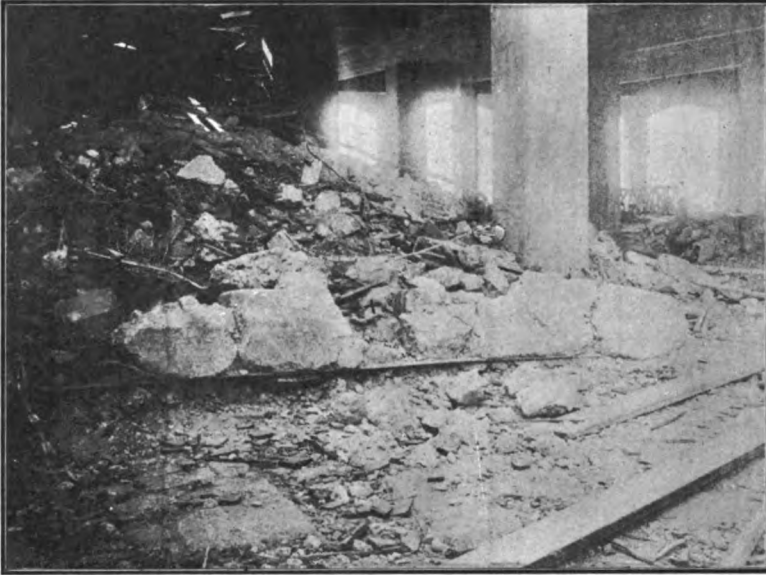
Showing Wreck of First Floor Girders Bix by Hotel.

ployed on the job, where so much *hollow tile* was used, nor was there one experienced cement worker ever employed on the work, which fact ought to be a source of great satisfaction to the members of this organization. The statement of the contractor, supported by the testimony of his foreman at the inquest, was that they were standing together on the roof at the time the collapse occurred, when the foreman exclaimed: "My God, something is breaking underneath," and which evidently had great weight with the Bricklayers and Masons' International Union committee in arriving at their unprejudiced, logical(?) conclusion, by which they attempt to prove that the failure was due to the basement columns crumbling or spalling under the imposed load, while the foreman sticks to his statement that the disaster was caused by the settling or sinking of a part of the foundation. With these theories in mind, I could not understand why a building 232 feet long by 176 feet wide, covering an area of over 26,000 feet, could collapse, and only a small portion, or about one-ninth of its area, be destroyed without some other reason.

I made a careful inspection of the foundation and basement columns, but found absolutely no evidence of the foundation having settled or been displaced in the slightest degree. Upon examining the basement columns, six of these having been destroyed, I found the parts of those still in place had broken off almost square, showing that they had been pushed or forced to one side by the great weight which had fallen upon them, instead of being crushed under the imposed load. In the basement some of the round tapering columns of the first floor, 19 feet long, 26 inches base, 22 inches at the top, showing their total original length, of which the Bricklayers and Masons' International Union have a photograph, revealing the upper end only with four $\frac{1}{4}$ square rods exposed by which they work to illustrate their idea of a reinforced concrete column *that was not reinforced*, as is clearly proven by a photograph of the same column which plainly shows that there was no continuity of reinforcement between the basement and upper floor columns or that it was attached in any way to the beam under it, simply resting on the first floor.

The Bricklayers and Masons' International Union have another splendid photograph of one of the basement columns which is still in its original position and supporting at least one-half of the load it was designed to carry. This column has a small fracture or crack in it directly opposite the point of impact, clearly showing the result of the collapse, but which in no way enlightens us as to the cause. There is another photograph which shows very conclusively that if this same column had been built of brick instead of concrete (and not even properly reinforced) that there would have been nothing left to photograph.

This ended my investigation of the theories expressed by the bricklayers, the contractor and his foreman. Finding the workmanship and materials employed in the construction of the foundation, basement and first floor above the average, I proceeded to the upper floors, and on the second floor found several columns for which the forms had been filled but one-half of their length when the work was stopped for a week or more for want of material (so I was informed by the superintendent). This fact is mentioned to show the reckless manner in which the work was continued from this floor to the roof. On the third floor was found a column ten inches square, which it was evident was not in the same condition as when the form was removed. I called the foreman's attention and asked how this occurred, and he told me that when the column was stripped a bad flaw was found, and he had patched it up. I inquired how he had accomplished this.



Showing Condition of Spandrel Beam after the Collapse. Bixby Hotel

He described how he had supported the beam on two pieces of three by six inches and lifted the weight off with jack screws. He then removed a part of the column and replaced the form, cutting away a portion of the beam in order to refill the column form. I naturally inquired *if this to me* remarkable feat had been performed in any other portion of the building and was informed that he had done it several times. To confirm this statement I interviewed several workmen who had been employed on the building, and there was abundant evidence of its truth.

I also received information of which the contractor or his foreman *make no mention*, that one column on the fourth floor, when stripped, was found to be so defective that it was necessary to remove it entirely. The beam above being shored up with two pieces of two by four, which had been wedged up as tight as possible to take off the strain. Before replacing this support of the fifth floor columns and roof beams, the work above was continued to the extent of placing about twenty-two cubic yards of wet concrete, weighing about 90,000 pounds, on the roof directly over the spot where these two by four props were supporting a roof area 38 feet 8 inches by 36 feet: equal in area to 1192 square feet, or more than one third of the total area destroyed.

It does not require any great knowledge or experience in the building trades to realize just what happened when Mr. Foreman exclaimed, "My God, something is breaking underneath." When this immense load of wet concrete on the roof was imposed on the two by four props on the fourth floor they buckled up and allowed the great weight to drop with terrible force, causing the outer walls to spread because of the omission of transverse beams or continuous reinforcement from wall to wall. The result can be plainly seen.

Believing this to be the information you desired, namely, the *real* cause of this lamentable disaster,

I respectfully submit this my report,
(Signed) T. E. KEOUGH.

Says Bixby Hotel Construction was not True Reinforced Concrete

By HENRY A. SCHULZE, Architect.*

COMPLYING with your request to visit the Hotel Bixby at Long Beach, California, in course of construction, and to report through you to the organization which you have the honor to represent, upon the collapse of a portion of the structure, which occurred between the hours of nine and ten o'clock of the morning of the ninth of November last, and to express an opinion, if possible, upon the causes responsible for the fatality, particular attention to be given in the investigation to the methods of construction, the quality of materials and the character of the workmanship employed, to this end I beg respectfully to report:

On November 17th and 18th last, accompanied by an assistant, I carefully inspected the collapsed portion of the building, made measurements and calculations of such parts as seemed necessary, incidentally giving attention to the undamaged portion to the extent that this might furnish additional evidence for the purposes of the investigation.

I looked at and studied the drawings for the building and interviewed the architect of the building, who gave me such information in the premises as I desired. The original drawings by the architect for the reinforced concrete construction (except the several floor columns) were not followed, but were superseded by an entirely different and patented system of reinforcement submitted by the patentee through the contractor and adopted by the owner, the special merit claimed in the substitution being that the patented system lessened the dead load of construction to about eighty-five (85) per cent of the system advocated by the original drawings. It would seem that this substitution was not made on the part of the owner for the purpose of saving, for the contractor was to be paid a considerable increase on his original contract price for the change; therefore the attraction to the owner must have been other than financial, though it would seem to have been ill-advised, in that the system adopted was devoid entirely (except at the roof, and that only partially, and first floor levels) of lateral stiffening girders at columns and of brace brackets or haunches between columns and beams at all levels, the absence of which no doubt added materially to the large extent of the damage and the fatalities to life and limb accompanying the destruction. In the original drawings each floor was tied transversely and longitudinally by beams from column to column and braced with haunches from columns to beams.

A careful inspection of the premises in the basement fails to reveal any settlement of the foundations or similar cause for the collapse. I would state that it was not possible for me to uncover the piers or pier footings under ground, but I am convinced the accident was not caused by any yielding at these points.

The concrete was of a very good character and no adverse criticism could be justly made against it.

The character of the workmanship was fairly good in the basement and first story, becoming inferior by degrees as the building grew upward, until there was a very marked degeneration of quality in the top story.

* Mr. Schulze's report was made at the request of Messrs. Fisher and Keough, committee from the Cement Workers' Union of San Francisco, appointed to investigate and ascertain the causes which led to the collapse of the Bixby Hotel, Long Beach.

The construction as employed in this building can be hardly dignified by the name of reinforced concrete. It is only partly so, being more or less of a mixture to the disadvantage of the reinforced material, which is effective only to the degree it is intelligently employed, the part reinforced being but indifferently done. In the building under consideration the larger portion of the roof (except the portion which collapsed) was of wood construction covered with terra cotta roofing tiles; all floors, except the first, were constructed over large spans with light reinforced concrete joists spaced about eighteen (18) inches on centers, covered with a two (2) inch concrete floor slab, *not* reinforced, and filled in between the joists with hollow terra cotta building blocks, which from the very nature of things could not be or become an integral part of the construction.

The reinforcement of columns, where done at all or where in evidence, was done in a very indifferent and reprehensible manner, columns which are broken, even the largest of them (except in one case) show but four (4) half ($\frac{1}{2}$) inch round rods and these placed without axial continuity, not straight in their length nor with regard to distance from the outside surface of the column, one such support in the basement measuring twenty-one (21) inches square (and there were a number of them) showed the rods placed within the column from the surface at one (1) inch, three (3) inches, four (4) inches, and six (6) inches, when they should all have been the same distance at about one and one-half ($1\frac{1}{2}$) inches, and yet I was informed that the reinforcement was depended on to take its proportion of the load, this column was under and in the wrecked portion. Some columns which according to the schedule should have had eight (8) reinforcing rods, broke with a perfectly true level cleavage at a joint in the work, revealing not a single rod in the column. During the progress of the work materials for the concrete ran out, and it was over a week that the work was entirely stopped. The column forms had been partly filled and when the work was resumed the juncture on the old work was made with a little neat cement and then proceeded with in the usual way. There are a number such. Portions of columns when stripped, in several instances, showed bad materials or bad workmanship. These sections were cut out and filled with new materials, one defective entire concrete column, at least, was removed bodily by shoring up the beams over it, and casting a new one in the place of the old. To one familiar with reinforced concrete the recklessness of these procedures must be evident. The winding of the reinforcement of the columns, according to the specifications was to be done with three-sixteenths (3-16) inch wire, spaced not more than sixteen (16) inches apart, wound all round the outside and crossed diagonally in both directions; in point of fact wire but one-quarter the size specified was used, spaced twenty-four (24) inches apart and crossed diagonally in one direction only.

The reinforcement of the beams, where in evidence in the wreck, was in the same indifferent manner. The drawing of a typical floor beam shows and calls for three bars in the reinforcement; with but few exceptions in the beams in the work, where broken, there have been but two such bars placed. The reinforcement was indifferently held in place with the same result as in the case of the columns, so that in the finished beam the reinforcement was in any place save in the right place. There are many places throughout the building where the beams have sagged materially, either the forms were too light, or the stripping was prematurely undertaken.

The lumber forms and supports for this work are of the most daring and reckless character. A very poor quality of lumber was used; many of the uprights are full of large and dangerous knots; they are of very light

section, two by four being principally used, spaced five feet on centers; in numbers of instances they are not long enough to reach and are then very poorly spliced out; they are invariably wedged and shimmed up in the same wanton way; as the cost of the labor and lumber for forming in reinforced concrete work bears a very large proportion to the entire cost of the reinforced concrete, these forms were removed as soon as might be to be again used in other sections or floors of the building, this being in perfect accord with the skimping evident in the balance of this work.

The partitions where set in the several stories are formed of hollow terra cotta tiles; they are placed in the work with mortar in the horizontal joints only, none in the vertical joints. Many courses in the tiles are brought to a level by shimming with irregular pieces of tile; in some instances the tile have already crushed. This statement is made, not as bearing on the accident, but simply to emphasize the wanton recklessness manifested in the constructive work of the building up to the present.

It is impossible for me to say how the accident occurred with the evidence at my disposal in the time I was on the scene. For the purpose of this report I take it to be immaterial whether the collapse occurred through the skimping in the forms, their premature removal, the indifference or inefficiency of the reinforcement, the removal of sections of the columns, or the entire removal of a column when cast (the supports being indifferent during the operation of removal), insufficiently reinforced columns or other imperfection in the constructive design, any one of which was very possible with the sails trimmed as close to the wind as they were here in any condition of overloading or shock. However, I am convinced that the accident started in the upper floor, that one of these various adverse conditions caused the accident, the others being contributory, but reinforced concrete as such, intelligently applied, with due regard to constructive mechanics, will have no guilty part in similar calamities.



A Good Example of the Bungalow. Home of Dr. F. F. Roland, Pasadena

Interior Decoration



The Decoration of a Hotel

By C. WALTER TOZER.

THE decoration of hotels has become an art in itself and is a matter that is occupying the attention of the foremost decorators throughout the country. The hotel work that is being done nowadays is destined to lend an important educational influence. Never before in the history of decorative work has the subject of the decoration of hotels absorbed so much care and attention. This is no doubt due to the fact that the hotels now being erected are on very much more elaborate plans than formerly, and the increasing number compels each to strive for the newest and best treatments. The influence is very helpful to the decorative trade in general. The man who spends a few weeks traveling around and staying at the modern hotels comes home impressed with the coziness of their delightful sun parlors, sitting-rooms, libraries, and even the bedrooms charmingly done. It all helps, whether city man or village man; he returns to his home saturated with the delights of good decorative environment.

The decoration of the hotel must be a little theatrical, a little grandiose, and it must not so much appeal to all tastes as overlook and override them. This is especially true in America, but then we Americans are great travelers, and even the European hotels must furnish elegance as well as comfort to hold patronage of Americans.

New York is naturally the hotel city of America, and the number of elegant hotels of medium size is enormous, and constantly increasing. The immense and record-breaking establishments, such as the Waldorf-Astoria, St. Regis, New Astor, the Belmont and the new Knickerbocker cannot by any means hold all the patrons of hotels, and there are medium sized hotels that combine elegant furnishings and decorations.

The new Hotel Belmont is of especial interest from a decorative standpoint, because it is one of the most remarkable hotel structures in this country, and an excellent example of modern decorative art.

It cost \$7,000,000; it is twenty-eight stories high, with five stories below the street level; has 1006 rooms, and is 200 by 105 feet, and 368 feet high. 1200 employees are needed; two ship loads of coal are dumped into the bins adjoining the boilers at a time; the foundations of the first floor are sixty feet below the pavements; sixteen elevators, ten dumbwaiters, 1152 telephones, seventy tons of ice per day is the capacity of the ice plant; all the clocks in the hotel are tickless and operate from one central clock; 5000 linen sheets, 4000 pictures, 6600 lace curtains, 5000 mahogany doors—these are statistics that give ideas.

The furnishing has been carried out in the French period styles, beginning with the period of Francis I, to whose art enthusiasm the French Renaissance owes its stimulus.

We are impressed upon entering the lobby with the simplicity as well as the richness and the consistency of the undertaking. Enormous rugs cover the marble floors; the walls are resplendent in fluted pillars, with wainscotings and trims of Italian marble, with sculptured caryatides and atlantides, and heroic busts supporting the beams of the ceilings, the work of Mrs. Harry Payne Whitney (formerly Miss Gertrude Vanderbilt), who modeled them in her Newport studio.

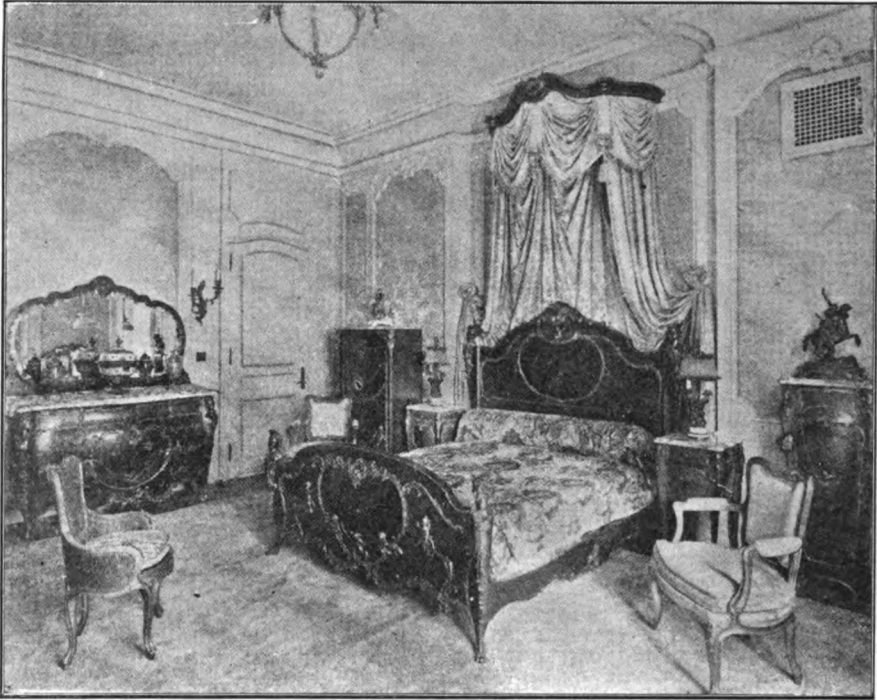
The furniture is late Louis XIV in style and beautifully upholstered and elaborately carved in Italian walnut, showing the same comprehension and feeling of material and tool that was possessed by the carvers of that age.

The roof of the palm garden is a series of arches exquisitely decorated, the walls hung in hand-painted silks. The exquisite mural and ceiling decorations in dining and palm rooms are by M. Picard, the famous French decorative artist, whose work of a similar nature in Hotel de Ville, Paris, and elsewhere is greatly admired. The ladies' reception room is Louis XVI, light tones of ecru, fawn and gold, with rose hangings, pearl-gray and rose carpets and walnut furniture. Small restaurants extend along the corridors and windows of the main floor, quietly toned in pale greens with touches of rose and gold. The fabric work is beautiful, including Russian lace panels. On the floor of the main restaurant is one rug 100 feet long, and in this room the chandeliers are silver and crystal.

The restaurant on the cafe floor is beam-ceilinged and wainscoted in chestnut, with red tile flooring. Throughout the house the rooms are furnished in mahogany, except in the private suites, where walnut is much used. The scheme of decoration involves the employment of figured damasks where the walls are plain, and plain silk reps where the walls are figured. Armures are also used, as are French tapestries.

The mezzanine floor is homelike and restful—green rugs, comfortable lounging chairs, richly carved tables, Louis XIV, XV, and XVI, styles prevail above the lobby floor, and close attention has been given to the color effects. Purple, yellow, two-toned yellows, tones of brown are conspicuous examples, entire rooms being done in these harmonies of analogy; rich red carpets, red draperies and two-toned walls with white ceilings, or brown carpet with a lighter tone for the upholsterings, light tones for the wall-paper and ecru for the ceiling.

The more expensive suites, including the bridal and state suites, are on the parlor floor. They consist of salon, bedroom, private dining-room and maid's rooms, to which any number of rooms may be added at pleasure. These suites are decorated in Louis XVI style, and the doors are of rich red ma-



THE BEDROOM OF THE STATE SUITE. ST. REGIS HOTEL

This room contains the famous "ten-thousand-dollar bed," which, with all the other pieces of furniture, is of marvelously matched tulip wood. The furnishings, hand-made lace curtains and magnificent Louis XIV bedspread represent a sum of money equal to the income of an ordinarily prosperous man

hogany. The bathrooms are of royal magnificence in marble and cut glass, and all the doors close on air cushions to make them noiseless. The rooms are so arranged that a man may have a single room and bath out of a suite, or a visiting prince can have apartments a block long, with a private kitchen.

In every room at least one of the doors has a full length mirror.

Sixty dollar mattresses, seven hundred-dollar beds, four hundred-dollar dressers, three hundred-dollar dressing tables, a sideboard of Circassian walnut, \$600; an extension table, \$365—these vulgar prices are more eloquent of the character of these rooms than anything else we can say.

The hotel is full of surprises. Each floor is a hotel in itself, with kitchens and ovens independent of the hotel proper. The banquet-room has a gold ceiling and friezes; the walls are resplendent in dove-color marbles inlaid with gold.

From the slightly newer Hotel Belmont we turn to the Hotel St. Regis. Upon first entering the St. Regis, one is impressed by the sense of restfulness, and the place might seem almost plain as compared with some of the gorgeous hotels in the city. But in examining details, one finds every piece of metal, electrolier, elevator grille, counter railing, balustrade, or whatever it may be, a separate, individual work of art. Around the walls runs a light brown dado of shaded Istrian marble, surmounted by panels and carved pilasters of warm Caen stone. The window sills are verd-antique from the Alps. The corridor leading from the lobby to the restaurants is lined with veined gray marble. In the main dining-room and the ladies' dining-room adjoining, decorative sumptuousness reaches its climax. The walls are pictorial compositions of Rubia,



Main Dining Room. Belmont Hotel

Breche, Violette, and Pavanozzo marble, the veining in framed panels, giving the effect of delicate etchings. Carved ornamentation is heaped in almost barbaric profusion upon the domed ceiling and the arched doorways, its richness emphasized by a lavish display of dull gilding. The massive opulence of these apartments sets off the gay brightness of the neighboring palm room, where the creamy Caen stone above the Istrian marble dado on one side is reflected in a line of great mirrors on the other. Overhead Mr. and Mrs. Robert Van Vorst Sewell have illustrated the story of Cupid and Psyche in a series of dainty lunettes. In the connecting cafe, paneled throughout in quartered English oak, are hung three of a series of four notable sixteenth century Flemish tapestries, picturing incidents in the life of Solomon. A fourth is in the white ball-room above. The ball-room is truly dazzling. The walls are lined from floor to cornice with polished white Vermont statuary marble. The wall spaces are divided into panels, separated by pilasters of marble crowned with capitals of bronze. Yellow and white Venetian damask hangings relieve the hardness of the stone.

The state suite is a most gorgeous conception. The Louis XVI salon, is treated with carved woodwork of an exquisite French gray, ivory-white in the high lights, and the walls paneled in cherry brocade. The lace curtains in this room cost \$1500 a pair.

Of the two bedrooms in the suite one has been immortalized by the famous ten thousand-dollar bed—a creation of narrow strips of tulip wood, joined together with a cunning worthy of Japan, into a composition of delicately

melting shades. All the furniture of the room is of the same wood, in Louis XV designs. Panels of a delicate electric blue brocaded tapestry share the walls with elaborately wrought woodwork of French gray and ivory white. The other bedroom, with similar wall decorations, except that the brocade on the walls is of old rose, is furnished in Circassian walnut of Louis XV models—a modest set, as befits its secondary importance, costing only a humble \$8000. Between these two rooms is a bath-room about the size of an ordinary parlor, floored and paneled in marble, and containing a bath-tub cut from a solid block of the same material. All the bath fittings in this room are silver-plated.

There is less costly distinction in the regular suites for ordinary patrons, but not less luxury. Every suite has its bath-room, with porcelain bath and silver-plated plumbing, and its linen specially made in Belfast. Every private parlor is paneled in silk brocade, and carpeted with a rug, woven to its measure in a single piece of special design.

Another magnificent hotel of medium size that combines elegant furnishings and decorations, is the Gregorian.

The rotunda combines the effects of Venetian balconies, Corinthian pillars, Grecian stucco ceilings, marble and Italian friezes, and off this are a smoking room in purple, and the ladies' parlor.

The ladies' parlor is done in Louis XV style in tones of pink, buff and gold, and opens into a mahogany library. The draperies are silk moire, embroidered and damask fills the wall panels.

The dining-room is probably the best room in the house. It is a splendid adaptation of the Tudor style, with mezzanine balconies and wainscots of Flemish oak. The severity is removed by the use of stained glass windows, a stained skylight, and the use of heavy Roman ceiling decorations, and lustre chandeliers. All these, with the many white linen tablecloths, give anything but gloom.

A palm court, notable particularly for its very tall Grecian pillars and pilasters, which contrast their white against mahogany, is used for the lunch room.

The living rooms on the upper floors fall away strikingly from the elegance manifested on the ground floor—a very New Yorkesque trait—but what is lost in showiness is replaced by good taste and solid comfort. A real attempt has been made to keep the rooms harmoniously subservient to the rules of the styles, or at most, to avoid any seriously bad treatments. All the furniture and wall decorations are of good quality, and there is everywhere evidence of successful attempts to provide more than mere hotel effects. The taste is far better than the average displayed in American homes.

The Hotel Algonquin also affords examples of fine decoration. One of the most effective dining-room treatments is the Italian room of this hotel. It is located to the left of the main dinning-room and is decorated to represent a Neapolitan garden.

About two feet below the ceiling there is a series of lattices to which cling a quantity of wistaria, with blossoms in profusion hanging below. At the ends of the lattices may also be seen a quantity of oak leaves as from some overhanging tree. Above the lattices lights are arranged to give the effect of the stars and moon gleaming in the soft Italian sky. The entire east wall is taken up with a canvas by the famous painter, Frank D. L. Dodge, showing the city and bay of Naples by night, a series of hidden lights in addition to the moonlight effect from the ceiling giving the picture a most entrancing appearance. In the west and north walls, mirrors are set between plaster pillars, their



The Dining Room. St. Regis Hotel

lower edges resting on a wainscot of stucco, wherein at intervals are set a number of decorative panels in relief. At one end is placed a fountain, the waters continually playing under a soft green light, and at the South end doors open into the cafe. The furniture of the dining-room is of mahogany, rich, yet simple, and all the tables are covered with a piece of plate glass, a novelty that preserves the top of the table from dirt and scratches for an indefinite period.

The floor is covered with a rich green carpet that harmonizes perfectly with the other details of the room.

The cafe is also worthy of attention. A large part of the wall is of stucco with handsome relief decorations at intervals. The buffet is of wood, finished in white, elaborately trimmed with brass scroll work on doors and columns. The floor is of concrete, in the center of which is imbedded a circular design in brass, several feet in diameter. The furniture is of weathered oak, heavily upholstered in dark red leather.

The walls are set off by a series of medallions, showing Indian heads, placed in the center of the otherwise blank panels and by numbers of heads and relief designs in plaster placed on the wainscot at short distances. The wistaria in the ceilings is one of the unique details of both rooms.

We will soon have three of our own magnificent hotels ready to be decorated the St. Francis, the Fairmont, and the Palace—and it is to be hoped their decorations will be distinctive and beautiful. There are a number of treatments that could be used in hotel work in San Francisco, that would make our hotels as unique as any of those of New York.

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Regular meetings, the second Friday in January,
April, July and October.

New Palace Hotel

Trowbridge & Livingstone, of New York, the builders of the famous St. Regis of that city, are making good progress on the plans for the new Palace Hotel for San Francisco. In fact, the architects have a corps of draftsmen at work on the Coast now, and while the preliminary floor plans and street elevations have been completed, they have not yet been finally approved. Some changes have been made and others doubtless will be made as ideas of convenience or beauty may suggest.

The new building will be ten stories in height and will cover the entire block bounded by Market, New Montgomery, Jessie and Annie streets. Unlike the former hotel, there will be no bay windows, but the four exterior facades will be plain surfaced, ornamented with rich plinth courses and cornices in terra cotta that will make up a very attractive exterior. The main entrance, which will be in the center on Market street, will be a beautiful piece of architecture. There will be another spacious entrance on the New Montgomery-street side. At the ninth floor there will be a broad porch or balcony extending around all four sides of the building, which will serve as a promenade for guests, and from which views of the city can be obtained in all directions. The building will be of steel

construction, supported with brackets of ornamental design. The interior courtyard will not be glass-covered at the roof, as before. The beautiful palm garden which for years was the admiration of all visitors will be a chief feature of the new hotel. It will be on the ground floor, as before, but will be a little more spacious in floor area. Its covering will be a great steel frame dome, rising from the level of the second floor at the sides and ends. This will be set with art glass, with jeweled panels and crystal pendants sparkling with incandescent lights. The interior walls of this courtyard will be of white glazed brick, and the lighting will be so arranged that the beauty of the art glass in the great dome will be as attractive at night as in the daytime. A feature of the palm garden will be a magnificent pipe organ.

The Phelan Building

Plans for the new Phelan building, which is to adorn the corner of Market and O'Farrell streets, have been approved. William Curlett is the architect.

The building will have a frontage of 328 feet on Market street and 296 feet on O'Farrell, covering an area of 28,000 square feet. The height will be ten stories, but the construction will be of such strength that additional stories can be built at some later time if desired.

Mahoney Brothers are the contractors. It was this same firm of builders that put up the old Phelan building twenty-five years ago.

The cost of the new structure will be approximately \$2,000,000. It will be a class A building, containing every modern appliance for the convenience and safety of the tenants. Eight rapid-running elevators will be installed, and the appointments throughout will be equal to those in high-class office buildings of the most recent construction.

Competition for Hotel

In order to secure the handsomest design possible for the new hotel which the

bankers of Oakland intend to erect on Fourteenth and Harrison streets, it has been decided to inaugurate a competition in which all the great architects of the world will be asked to compete. As an incentive to spur the competitors on to work a cash prize of \$25,000 is to be offered the successful architect.

Architect Walter J. Mathews, the designer of the Union Savings Bank building and the Athenian Club buildings, has been appointed supervising architect, and he will, with other local architects, act on a board of judges to decide the contest.

Death of Willis W. Polk

Willis W. Polk, father of Willis Polk, the well known architect, died very suddenly on Thursday afternoon at San Mateo, where he had been visiting relatives. Although past 68 years of age, he had been in fairly good health and his death was very sudden, being caused possibly by heart failure. He had partaken heartily of a Thanksgiving dinner surrounded by friends and members of his family but a few hours prior to his death.

The deceased was a native of Kentucky, but had been a resident of San Francisco for many years and was at one time engaged in the architectural profession in San Francisco. He is survived by three sons and a daughter, William C., Willis, Dan and Miss Daisy Polk.

Architects for School Buildings

The San Francisco Board of Supervisors has adopted a resolution appointing the following named architects to prepare plans for school buildings to be constructed under the bond issue:

McKinley School, A. Macrea; Bay View, Stone & Smith; new school on Grattan and Shrader streets, A. M. Edelman; Madison School, M. J. Lyon; Park School, A. F. Hiede; Sutro School, F. D. Voorhees; Golden Gate, Salfield & Kohlberg; new school, York and Twenty-third streets, Banks & Copeland; Winfield Scott, O. Haupt; new school, Lipard and Berkshire streets, Havens & Toepke; West End, A. M. Edelman; Oceanside and new school, Connecticut and Army streets, O'Brien & Werner; Polytechnic, D. D. Kearns; Sunnyside, Stone & Smith; Bergerot, Emil Lemme; South End, William Mooser; Sheridan, F. D. Voorhees; Marshall, M. J. Lyon; Spring Valley, William Curlett; Jean Parker, Stone & Smith; Garfield, D. D. Kearns; Panhandle School, Cole and Grove streets, Salfield & Kohlberg.

The plans of the schoolhouses are to be completed in thirty days.

Southern California Chapter, A. I. A.

At the annual meeting of the Southern California Chapter, A. I. A., the following officers were elected: President, Myron Hunt; vice-president, C. H. Brown; secretary, Fernand Parmentier; treasurer, August Wackerbath. These officers, together with A. F. Rosenheim, Octavius Morgan and J. Lee Burton, constitute the board of directors. The following standing committees were appointed: Membership, S. P. Hunt, A. B. Benton, T. Walsh; entertainment, F. D. Hudson, F. L. Roehrig; press, J. P. Krempel, A. F. Rosenheim and F. Parmentier.

Los Angeles Architectural Club

The Los Angeles Architectural Club has issued a neat pamphlet containing the names of its officers and committees; also a calendar of the various meetings to be held during 1906-1907, when subjects of interest to the profession will be discussed and papers read. On October 30th W. L. B. Jenney delivered a lecture on modern steel structures. On November 27th Arthur B. Benton discussed Spanish Renaissance. On January 8th, Theo. A. Eisen will take for his subject "Steel Construction." On February 12th "A History of Architecture" will be given by R. Mackay Fripp, and on March 12th Harrison Albright will read a paper on "Reinforced Concrete Construction."

N. W. Mohr, Architect

N. W. Mohr, architect at 1707 Geary street, is not associated with E. Mathewson at 622 Golden Gate avenue, as stated in the October Architect and Engineer. The name was unintentionally confused with that of Mr. Mohr's brother, O. H. Mohr. Mr. N. H. Mohr is a registered architect. E. Mathewson has returned to Fresno, where the popular architect has his hands full attending to his constantly growing business in that section.

Statue of "Grief"

Kuhne Beveridge (Mrs. Branson), an American sculptor, has completed at Brussels the cast of the statue of "Grief" ordered by the city of San Francisco to commemorate the victims of the earthquake. She will soon begin work on a second statue to represent the resurrection of the city of San Francisco—Exchange.

New Court House at Santa Rosa

The Board of Supervisors of Santa Rosa have adopted plans for the new Court House, for which bonds in the sum of \$280,000 were carried by a heavy majority at the recent election. The plans adopted are by Architect J. W. Dolliver of San Francisco, and call for a building estimated at the exact amount of the bond issue.

It will have a frontage of 226 feet on Courthouse square, from Hinton to Exchange avenue, and a depth of 116 feet. The proposed plan calls for a steel constructed building, to be filled with reinforced concrete and faced with Colusa sandstone.

Five plans were submitted for the consideration of the Board, but only two were voted on before the selection was made.

Army Supply Post

Architects Rankin, Kellogg & Crane, of 1012 Walnut street, Philadelphia, Pa., are preparing plans and specifications for the \$1,500,000 Army Supply Post at Fort Mason, San Francisco. The plans include a main office building, officers' quarters, power plant, and store-houses.

High School for San Jose

Stone & Smith, architects in the Midway building, San Francisco, have submitted plans for a High School building in San Jose to replace the structure demolished by the earthquake. While the plans have not been formally accepted it is thought probable that the Board of Education will eventually adopt them, as they seem to fill all the requirements. The plans call for a pressed brick and stone building of three stories with a modern heating and ventilating system and other features. The estimated cost is \$200,000.

To Add More Stories

The Lichtensteins, who are building a large hotel on Market street at the junction of California, from plans by Architect Rousseau, have decided to add two more stories, making eight stories altogether. The original plans called for reinforced concrete walls and heavy wooden beams, but the new plans call for complete reinforced construction throughout.

New School at Napa

Plans have just been completed by Architect L. M. Turton of Napa for a

new primary school building which will cost \$40,000. The building will be a two-story structure containing eight rooms, six on the first floor and two on the second, and will be finished in old mission style.

Board Authorizes School

The San Francisco School Board has authorized the erection of the South End School at Bacon and Girard streets at a cost of \$81,000 to be paid from the bond issue. William Mooser was appointed consulting architect at a salary of 3½ per cent of the total cost.

To Restore Mills Building

As previously stated in this magazine, Mr. D. O. Mills has decided to restore the Mills Building on Montgomery street without further delay. To this end he has sent here J. M. Robinson of New York who will take charge of the work. The building will be stripped of its brick and terra cotta and practically rebuilt. There will be no changes in the architectural lines of the building, nor will the height of the structure be increased. D. H. Burnham and John Galen Howard were the architects of the old building.

Bids Are Rejected

All the bids received for the erection of State Farm buildings in connection with the University of California, have been rejected. An appropriation of only \$35,000 is available and the lowest bid received was for \$39,000. The plans will be revised and new bids called for.

Pottery Works a Nuisance

Alleging that the fumes from the pottery works of N. Clark & Son in West Alameda ruin his plants, F. W. Vowinkel, an Alameda nurseryman, whose property is in the vicinity of the pottery works, has begun suit for injunction and \$5000 damages. If he wins his case, and secures a permanent injunction, it will close a plant worth approximately \$1,000,000, which has been running in Alameda for about a quarter of a century. The Clark plant has long been a source of much annoyance to the people of Alameda, and there will be general rejoicing if the courts decide that the works must go.

BUILDING REPORTS

Office Building—Sutter and Kearny streets, San Francisco.

Architects—Armitage & Rowell, 1427 Post street, San Francisco.

Owner—Davis Estate Company.

Cost—\$150,000.

Plans are being prepared for a handsome eight-story class A building, having a steel frame, concrete curtain walls, with the front of the building faced with white enamel tile. There will be two elevators.

Two-story and basement warehouse—Second and Folsom streets, San Francisco.

Architects—Armitage & Rowell, 1427 Post street, San Francisco.

Owner—Davis Estate Company.

Cost—\$125,000.

The building will have a floor space of 37,600 square feet and will have a sixteen-foot basement. Heavy wooden beams, floors and girders will be used and the exterior will be of brick and stone. The building is to be used as a wine warehouse.

Five-story building—Sutter, near Jones street, San Francisco.

Architect—Houghton Sawyer.

Owner F. M. Green.

Cost—\$100,000.

This building will be a handsome class A structure, the steel work for which bids are now being taken. The building will have concrete walls and the front will be faced with caen stone.

Three-story and basement building—Northwest corner of Sacramento and Dupont streets, San Francisco.

Architect—A. A. Cantin, Monadnock Building.

Owner—Lowry Estate.

Cost—\$40,000.

The building will be faced with red pressed brick and will have galvanized iron and sheet metal cornice and ornaments. An elevator will be installed.

Apartment house—Powell and Filbert streets, San Francisco.

Architect—William Knowles, Atlas building.

Owner—George Hind.

Cost—\$25,000.

It will be a frame building, three stories high and will contain stores and fifteen apartments, with a bath for each apartment. A heating system—either gas, petroleum or steam will be installed.

Bank and office building—Salinas.

Architects—Schumacher & Binder, Theater building, San Jose.

Owner—Bank of Salinas.

Cost—\$50,000.

The building will be 50 by 130 feet and will be fire proof, having a steel frame with reinforced concrete floors and walls. The front of the building which will be two stories high will be faced with pressed brick, stone and terra cotta. There will be three stores and banking room on the ground floor and 20 offices above. Mosaic floors and marble wainscoting will be features of the banking room. There will be two large vaults.

Telephone Building—Forty-fifth street and Telegraph avenue, Oakland.

Architect—C. W. Dickey, Oakland.

Owner—Pacific States Telephone and Telegraph Co.

Cost—\$40,000.

This building will be a Class A structure and fire-proof. It will have brick walls with stucco exterior. The doors will be of metal and wired glass windows will be used.

Tourist Hotel—San Mateo.

Architect—Lewis H. Hobart, of New York City.

Owner—Corporation headed by Capt. John Barneson, president; Paul Pinckney, secretary, and Jas. H. Doolittle, manager.

Cost—\$200,000.

The architect has been instructed to proceed with the plans at once. The new hotel will be called "The Peninsula," and will contain 150 rooms. It will be built on the same lines as the famous Del Monte Hotel at Monterey.

Flats—Devisadero and McAllister streets, San Francisco.

Architect—Julius Kraft.

Owner—William Wilson Company.

Cost—\$40,000.

It will be a frame structure, three stories and will contain 10 apartments of five rooms each and three stores. For the same company the foundations have been started for a brick hotel of 100 rooms on East street, near Mission.

Wholesale building—North side of Sacramento street, near Battery.

Architects—Wright, Rushforth & Cahill.

Owners—N. A. Dorn and wife.

Cost—\$50,000.

The building will be four stories, of brick and mill construction. The first floor will be of stone.

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OF CALIFORNIA**

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The Architect and Engineer takes pleasure in announcing the inauguration of two important departments ANNOUNCEMENT beginning with the new year. In each case men proficient in their profession have been engaged to assume the editorship of the department selected for them. That our readers may become enlightened upon all matters of a legal nature, particularly state and municipal building laws, etc., Mr. T. C. Kieruff has consented to take charge of a legal department and any perplexing questions having to do with matters of law will be cheerfully answered by Mr. Kieruff through the medium of this magazine. Mr. Kieruff is a prominent member of the San Francisco bar and his extensive practice and wide experience makes him an invaluable addition to our editorial board.

It is with extreme pleasure that we announce the name of Mr. F. W. Fitzpatrick as a member of the Architect and Engineer staff of workers. Everybody knows Mr. Fitzpatrick than whom there is no higher authority on fire-proof construction. He is the organizer and executive officer of the International Society of State and Municipal Building Commissioners and Inspectors, and as a consulting architect he has been engaged upon most important and conspicuous public and private work from the Atlantic to the Pacific and from Maine to the Gulf of Mexico. He has been a practicing architect for twenty-three years and his indefatigable labors to improve building conditions, to standardize building laws and to minimize fire risks in the cities are too well known to call for further eulogy here. By the arrangement made with Mr. Fitzpatrick architects or owners of buildings may have their plans and specifications, for all classes of construction, examined absolutely free of charge, he having

agreed to write to such parties who avail themselves of this privilege a criticism of their plans and specifications with suggestions for the more perfect and perhaps less costly fire-proofing of the work under contemplation if, in his judgement, such plans or specifications challenge criticism or require modification. This privilege is also available to all subscribers planning to alter and improve old buildings.

It is suggested that greater advantage may be derived from this consultation with Mr. Fitzpatrick if rough studies of plans and drafts of specifications are sent him first; his suggestions may then be incorporated in the finished plans, etc., without necessitating the trouble and expense of changing the latter.

It is also suggested that parties desiring this consultation write Mr. Fitzpatrick before sending sketches or plans; this will allow him to make a date when they had best be forwarded. It will be readily understood that busy as he always is, if plans are sent in without previous notice they will naturally have to be set aside until the more provident architects and owners who have made dates are served.

There is positively no charge attached to this service other than the postage or expressage on plans to and from Mr. Fitzpatrick's address, "Argyle" Piney Branch Road, Washington, D. C. It is an expense undertaken by The Architect and Engineer on behalf of its subscribers, and solely for the public good, but it must be understood that the publishers' contract with Mr. Fitzpatrick is exclusively for advice, etc., in regard to fire prevention—in the most liberal interpretation of the term, however—and if advice is desired in matters of design, ventilation, sanitation, etc., then arrangements must, of course, be made directly with him.

We again call attention to the absolute necessity for proper design and execution of reinforced concrete buildings. Architects not thoroughly familiar with this type of construction, make a serious mistake when they assume that outside advice is not necessary in the preparation of their plans and specifications. Unless an architect has made a thorough study of concrete construction he had better not trust too much to his own wisdom. Better far would it be for him if he placed his drawings in the hands of a competent engineer to work out, than to undertake the task himself and make a failure of it. The recent partial failure of a meagrely and imperfectly reinforced concrete and terra cotta form of construction in Southern California should be a warning that competent engineering assistance is an absolute necessity to safety. Had a competent engineer been called to assist in designing the Long Beach hostelry, it is assumed that the building would not have collapsed, for no thoroughly competent engineer, it seems to us, would have eliminated in his design the use of transverse girders, thereby placing the entire dependence for the horizontal transverse forces upon a thin slab construction. The partial collapse of the Bixby Hotel was not a failure, in any sense, of reinforced concrete construction, and only the opponent of reinforced concrete would dignify the columns of the hotel by classifying them as examples of that type of construction.

Puzzled

I know some terms of carpentry,

Yet this—what meaneth it?

They tell me he who takes a brace

Must no more touch a bit.—Ex.

The Publisher's Corner

From Foundation to Furnishings

The firm of Schasty & Vollmer, whose advertisement appears in this issue, having recently become permanently established in business in San Francisco, are prepared to undertake contracts for the construction of any class or character of building as well as to furnish, decorate and equip these to the point of readiness for occupancy.

The plan upon which they operate, and the broad scope their undertaking covers, has brought them exceptional success from the beginning of their enterprise.

Since their arrival in San Francisco, they have been appointed general contractors for the completion of the interior of the Fairmont Hotel; their contract covering full supervision of the interior, structural, decorative, equipment and furnishing part of this, the most important hotel project of the past decade.

Their appointment as Pacific Coast Agents for some of the largest producers of furnishings, decorative and equipment products enables them to offer direct service from the maker to consumer at wholesale prices.

Their close working relations with dealers and manufacturers of building and construction materials and their knowledge of the application of these to the end of harmonizing economy in construction and equipment with artistic and practicable result should encourage our readers to become better acquainted with their facilities and qualifications by sending for their booklet entitled "From Foundation to Furnishings."

Modern Office Building

Architect John C. Pelton has made plans for a large steel Class A building, six stories high with basement, to be erected at Second and Natoma streets, San Francisco. The building will be faced with Roman stone. The floors will be of reinforced concrete. The interior finish will be unusually elaborate. The cost will be more than \$150,000. Barker,

Knickerbocker & Bostwick are the owners. Wire plate-glass windows, mosaic tile floors, marble wainscoting and bronze stairways will make the building as near fireproof as it can be made. It will also have a compressed-air cleaning plant and steam heat.

Apartment House

The Enterprise Real Estate Company has bought the site of the old Abbottsford Hotel on Broadway, near Larkin street, and will erect thereon an apartment house to cost \$100,000. No plans have been drawn yet.

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for Ore, Coal, Water,
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Boyle-Luey Co.	68	Keuffel & Esser Co.	89	San Francisco Cornice Co.	107
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Haskins, Arthur R.	12	Pacific Portland Cement Co.	1st Cover		

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Union Brick Bonds.
Best's Keene's Cement

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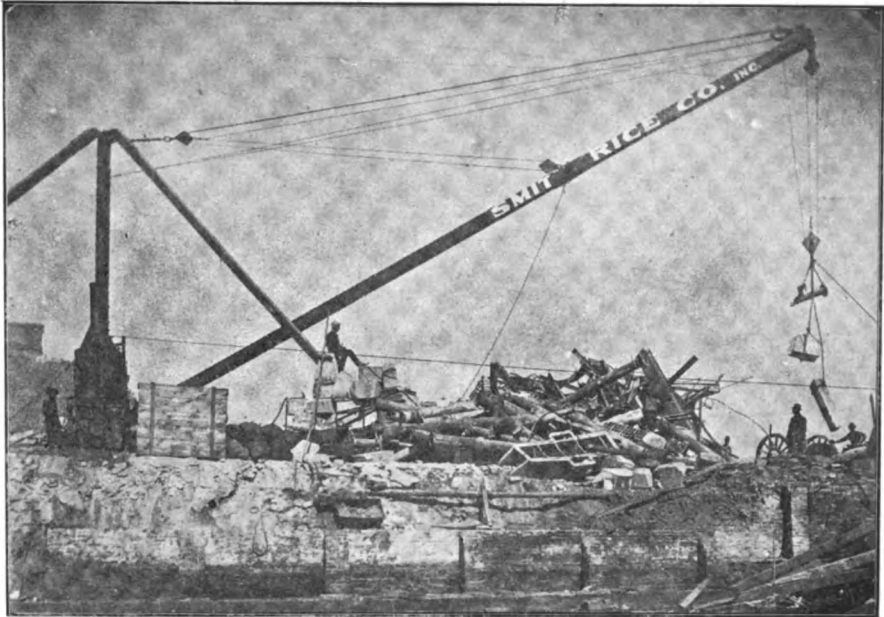
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MPGR. OF

**FINE ANTIQUE AND MISSION
FURNITURE**

1270 FIGUEROA STREET
CORNER PICO LOS ANGELES, CAL.

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How the Debris is Being Cleared in San Francisco

The above picture gives a very fair idea of how the debris is being removed from the San Francisco ruins. The Smith-Rice Company are among the foremost contractors to participate in the wrecking and clearing work that has been going on since April. The company has excellent facilities for this class of work and wherever there are spur tracks at hand quick progress is made in getting a lot that is strewn with twisted steel, broken stone and powdered brick, clear of obstruction and ready for building. In addition to wrecking walls and removing debris the company is prepared to erect buildings of all classes.

Two Class A Buildings

Florence Blythe Moore will build a Class A six-story store and office structure at the southeast corner of Market and Second streets, at an outlay of \$300,000. The materials will be steel, concrete and brick. Mahoney Brothers are the builders, and Bliss & Faville the architects. The Italian Bank is to erect a four-story Class A building at Montgomery and Sacramento streets, to cost \$120,000. Mahoney Brothers will build it, and Howard & Galloway are the architects.

KEUFFEL & ESSER CO. OF NEW YORK

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...Builders' and Surveying Instruments...

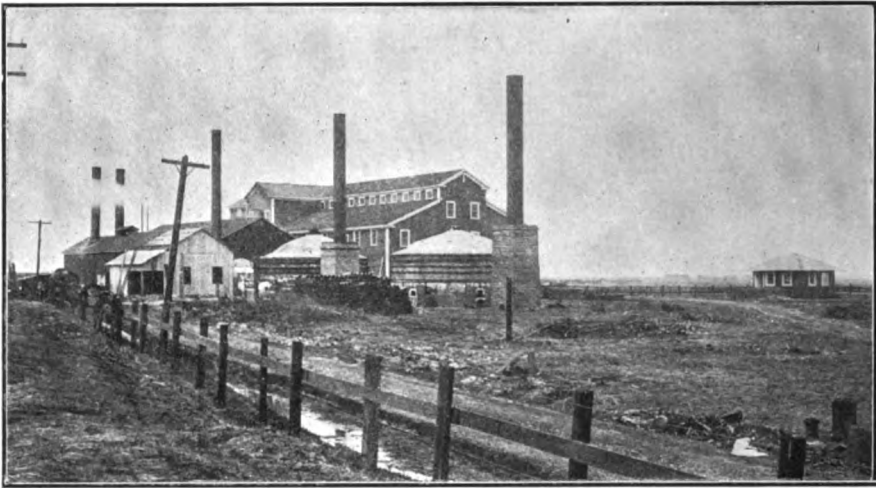


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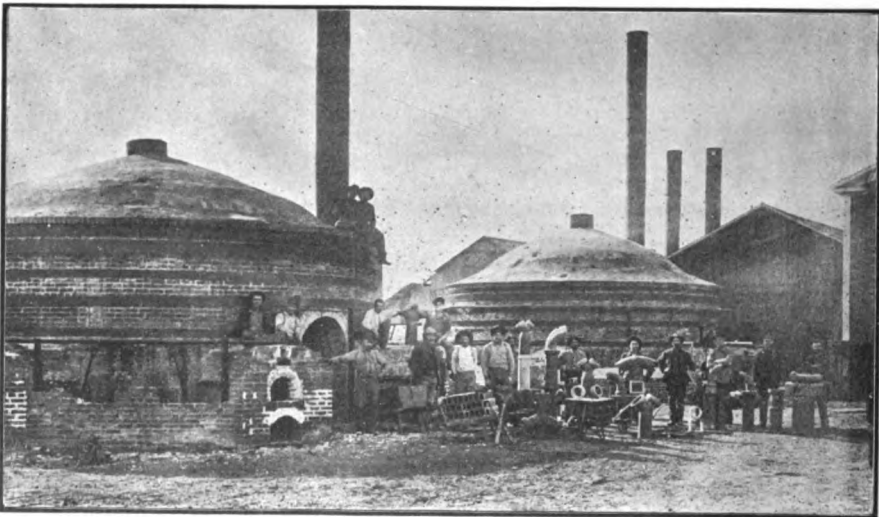
Big Brick Plant in Operation

California Brick and Clay Company's New Plant at Antioch.

So brisk has been the demand for material that the California Brick and Clay Manufacturing Company has found it necessary to proceed with substantial additions to its new plant at Antioch. A building 300 feet long by 75 feet wide is under way, and work on additional kilns is to be started at once.

The plant is in full operation and in addition to sewer pipe, flue linings and patent chimney pipe, the company is turning out an excellent grade of hollow brick for fire proofing, etc. Permanent offices have been established in the Monadnock building and Mr. John G. Treanor, than whom there is no more experienced man on the Coast, is the general manager.

The company is in a position to handle immediate orders promptly, and it has excellent facilities for shipping in carload lots or in smaller quantities, via the Southern Pacific, Santa Fe or by boat. W. F. Barnes is president of the company.



Another View of the California Brick and Clay Company's Big Plant at Antioch.

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SCHASTEY & VOLLMER



**GENERAL CONTRACTORS
BUILDING CONSTRUCTION
INTERIOR DECORATIONS
HOTEL EQUIPMENT**



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318 Monadnock Bldg., San Francisco, Cal.

Telephone Temporary 1667

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WANTED—Position in architect's office. Have just finished course in drafting. Jas. M. Spencer, 419 Gless Street, Los Angeles.

W. W. BREITE, C. E.

Structural Engineer

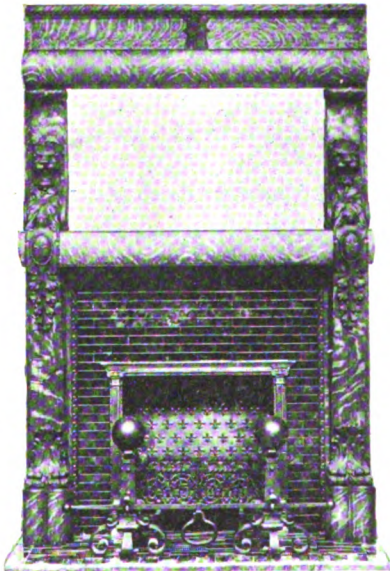
Designs and Details of

All Classes of Metallic Structures

Now Permanently Located at

Rooms 401-403-405 Jefferson Square Building

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Fixtures & Art Goods

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Phone Oak 121

OAKLAND - - - CAL.



The "Elk" Syphon Jet Closet

This closet is made with an enameled cast iron tank, enameled inside and outside, making the tank indestructible. It is ornamental in design and the manufacturers guarantee the closet to work properly and noiselessly. It is made by the Louis Lipp Company of Cincinnati and represented on the Coast by the A. D. Dennison Company of 534 Polk street, San Francisco.

M. C. COUCHOT, C.E.

Consulting, Designing, Constructing
Reinforced Concrete

Kahn System

(See full page advertisement)

Steel Construction

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Permanently located at

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All Steel Waterproof Doors
(Licensee under Priddle Patent)

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and Lathing*



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That CANNOT Wear Out

"ELK" "EAGLE"

SYPHON JET

WASH DOWN

The tanks are made of cast iron, heavily enameled inside and outside like a bath tub.

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CINCINNATI, OHIO

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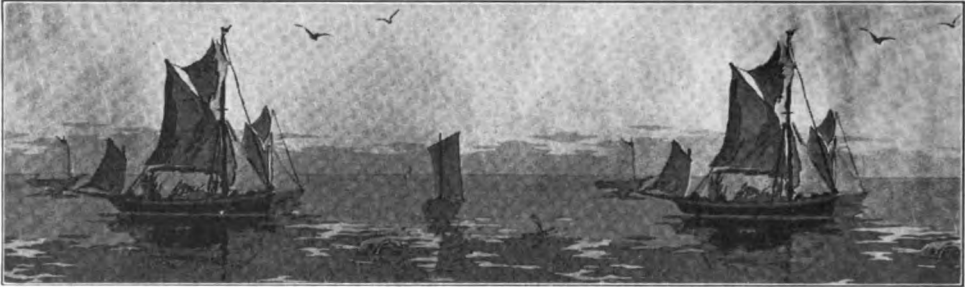
534-536 Polk St., San Francisco. Cal.

THE HEWITT Machinery Company

Atlas engines and boilers, Blaisdell Air Compressors, Jeffrey "Badger" Rock Drills, Shaw Eclipse Air Hammer Rock Drills and Drill Sharpeners, Chalmers and Williams General Mill and Mining Machinery, Stamp Mills, Frue Vanners, Ore Feeders, Kilbourne and Jacobs Ore Cars, Skips and Cages, Electric Hoists, Steam Hoists, Air Drill Hose, Couplings, Small Power Hammers, Forged Pipe Flanges, Boiler Hangers, Lugs, Wood Working Machinery.

303 Monadnock Building. San Francisco.

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Wears Longer

THAN ANY OTHER ROOFING because it is composed of a practically imperishable material.

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THAN ANY OTHER ROOFING because it possesses highest fire-resisting properties and is wind, moisture and weather-proof.

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THAN ANY OTHER ROOFING because it is the "cheapest per year roofing" on the market; coating or painting not being necessary to preserve it.

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Yates Best Paints

HAVE PROVEN

THE

MOST DURABLE

YATES & CO.

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PAINTS, OILS, ETC.

OFFICE: Fifth and Berry Streets
 SAN FRANCISCO



Detail of Ornamental Concrete Stone for Reinforced Concrete Buildings. by O. S. Sarsi.

A FEW OF MY SPECIALTIES

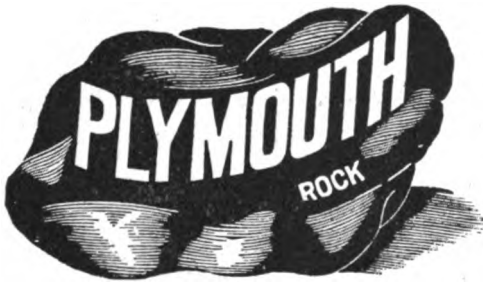
- ¶ Ornamental Concrete. ¶ Cementing for Reinforced Concrete and Brick Buildings. ¶ High Class Ornamental Plaster Work. ¶ Scagliola Work for Columns, Wainscoting, Etc. ¶ Artificial Caen and Sand Stone for Interior Decoration.

¶ I have the best collection of Mantel Pieces in the United States which I reproduce in caen or sand stone. They will be a revelation to you. Come and see them.

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PLASTER**

and Plaster Paris are the purest (99.2% pure gypsum), strongest and will go further than any plaster on earth. We have the only *genuine* **Wood Fibre** plaster on this Market. No sand. Absolutely fire and earthquake proof. The Government Supervising Architect at Washington recommends our goods on Federal Buildings.

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The State Electrical Company of Oakland has sent out the following circular letter to architects:

"Realizing the opportunity a thoroughly competent electrical engineer has in relieving an architect of the troubles and worries pertaining to electrical installation, I write to ask permission to assist on any electrical work you have, and assure you it would give me pleasure to help in creating lighting effects which would be desirable from an economical and artistic point of view.

"There are very few engineers who have specialized in illuminating engineering, and after twenty years' experience in this class of work in New York, Chicago, Philadelphia, etc., I am confident I can help you on suggestions which the average engineer is not aware of, and I am prepared to furnish an estimate for the complete lighting installation. As we are sole agents for the Enos Fixtures, you will appreciate the double advantage we have, and trust you will let me know of any lighting subject you desire suggestions and estimates for. Harry Bailey, Mgr."

**Steam, Power and Centrifugal
PUMPING MACHINERY
AIR COMPRESSORS
FEED WATER HEATERS
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**Manufacturers of Hard Wall Finishing
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SPECIFICATIONS FOR EMPIRE HARD WALL PLASTER

Metal lath three-coat work:

First or scratch coat—One part Empire hard wall plaster fibred, two parts sharp clean sand (fresh water sand preferable). Thoroughly mixed and applied within two hours after mixing.

Second or browning coat—One part Empire hard wall plaster, two parts clean sharp sand floated up even with grounds.

White or putty coat—One part Empire finishing plaster, three parts line putty gaged with hard wall plaster.

Sand finish—One part Empire hard wall plaster, two parts clean sharp sand.

Wood lath, two-coat work—One part Empire hard wall plaster fibred, two parts clean sharp sand (fresh-water sand preferable), mixed thoroughly and applied within two hours after mixing.

White coat and sand finish same as for metal lath.

Finishing coat should be applied within 48 hours after first coat is put on.

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Oakland { **ADAMS' WHARF**
Warehouse { Phone Oakland 6321

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AND IMITATION CAEN STONE

Specialist in Imitation Granite

KNICKMANN & NOCENTI

Contractors for the New Fairmont Hotel

HIGHEST GRADE WORK FOR WAINSCOT COLUMNS,
PILASTERS, PANELS, BALUSTRADES, MANTELS, ETC.

**525, 527, 529, 531 WEST TWENTY-SIXTH STREET
NEW YORK CITY**

American System of Concrete Reinforcing

The Pacific Concrete Machinery Company, dealers in concrete reinforcements and cement workers' specialties, have taken the contract for supplying the American system of reinforcing for the Western Meat Company's big building at Sixth and Townsend streets, San Francisco. The building is to be of reinforced concrete, two stories, and will cover about 50,000 square feet. The American system consists of wire fabric and bars of high carbon steel, and is considered one of the best as well as the most economical reinforcing on the market.

The Pacific Concrete Company has also

taken the contract for equipping the upper five floors and roof of the Latham building with the American system. The offices of the Pacific Company are in the Atlas Building, 604 Mission street.

Hoyt Bros. Branch Out

Hoyt Brothers, the well-known Santa Rosa contractors, have taken several good jobs in San Francisco and are prepared to figure on other work at short notice. The firm will be pleased to receive plans from architects desiring bids on their work anywhere in the State. After the first of the year Hoyt Bros. will have an office in San Francisco, due notice of which we will give you later.

CEMENT "GILLINGHAM" BRAND



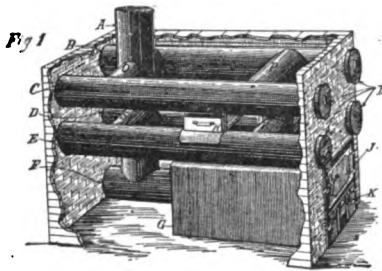
One of the most popular and best Portland Cements on the market due to arrive per steamship "Suverie" from London, England, on or about December 25, 1906. In quantities to suit buyers ex-steamship or f. o. b. cars at special prices if orders are sent before arrival to



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**214 CALIFORNIA ST.
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Temporary
2350**



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"BUILT SQUARE"

Especially Adapted for Dwelling Houses,
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Clean, Reliable, Simple, Economical

Architects and Builders Investigate This.
Write for booklet entitled, "A Square
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**Cement
Structural Steel
Pig Iron
Coke, Etc.**

G. W. McNEAR

210 BATTERY STREET

San Francisco, Cal.

Will Use the Kahn Bar

M. C. Couchot, C. E., is supplying Kahn system reinforcement for the following new reinforced concrete buildings, which are going up in San Francisco: Three-story warehouse, covering lot 137½ feet square, on the east side of Sansome street, at the corner of Vallejo, for the Bemis Bros. Bag Co., cost \$75,000; six-story and basement stores and lofts, 40 by 160 feet on Mission street, near Fourth, for Emilie K. Latham; architect, Edward Bowles; contractors, Cook & Young; three-story wholesale store at 311 East street, with provision for two more floors later, for Wellman, Peck & Co., 160x137½ feet;

cost \$60,000; Julius Kraft, architect; thickness of wall, 8 inches; Keatinge & Sons, contractors; six-story building at Sansome and Clay streets, architects, Chas. Paff Company; contractors, Co-operative Stone Company; First National Bank Building, Oakland, L. B. Dutton, architect; Thompson-Starrett Co., contractors.

T. V. Galassi Mosaic Co.

T. V. GALASSI, Pres. & Mgr.

Importers, Manufacturers, Dealers and Contractors

Marble Steps and Wainscot
Terrazzo Steps and Wainscot
Terrazzo and Mosaic Floors
Venetian Mosaic Tile Floors
Marble and Mosaic Mantels
Cement Tile Floors
Roman, Venetian, Glass, Pearl and Ceramic Mosaic Decorations.

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SAN FRANCISCO, CAL



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PINE and
CEDAR
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*Large
Stock on
Hand*

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Mouldings
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House
Finish
Tanks, Etc

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Manufacturers
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Friezes, Carved Panels, Capitals, Etc. . . .

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Putting Roofing Industry on High Plane

From the Metal Worker.

We congratulate the tin roofers of the United States; we congratulate the architects and the public; we unequivocally record our approval and hearty commendation of the courageous stand now occupied by the manufacturers of terne plates upon the insistence that the tin plate business shall stand upon the rock foundation of "the square deal." The Metal Worker takes pride in reciting that this industry which, since the enactment of the McKinley bill, has come to be regarded as a monument to the skill, energy and sagacity of American ingenuity, is among the first, without coercion, to catch up the war cry of the twentieth century and in its refrain announce to the world that the proper conduct of business demands a high moral standard.

The sale of roofing plate is to be revolutionized. For decades, for a century or more, this article of commerce has been sold by private marks, by twisted, thread-worn meaningless appellations, such as "Old Style," "Old Method," "Redipped." In early days, no doubt, these terms meant something, but in the scramble for business through these long years they have become hopelessly confused, and the buyer of roof-

(Continued on page 129.)

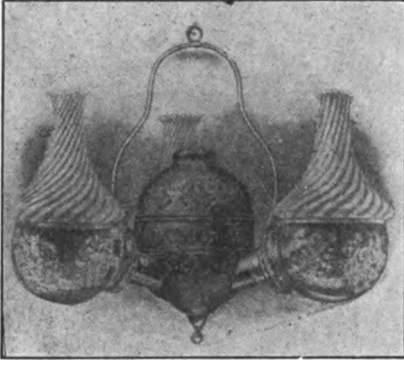


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PACIFIC COAST AGENTS FOR THE

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SELF CLEANING ABSOLUTE SAFETY GREATEST ECONOMY

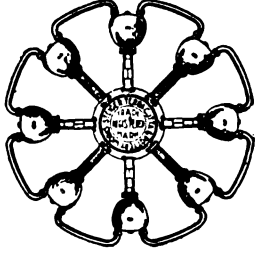
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Manufacturers: Architectural Terra Cotta; Semi-dry Pressed Brick; Vitrified Salt Glazed Sewer Pipe; Hollow Tile Fire-Proofing; Terra Cotta Chimney Pipe; Electric Conduit Tile, Drain Tile : : : : : Brick Mantels; Tile Mantels; Urns and Vases : : : : : Laundry Tubs; Kitchen Sinks; Flush Tanks : : : : : Acid Jars; Acid Pipes; Acid Brick; Fire Clay; Modeling Clay; Fire Brick Dust : **Fire Brick; Fire Tile**

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WILL PROVE BEST TO DRIVE

**Brick Cleaning Machines, Swing Saws, Saw Tables
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WORKS AT
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TESTS made upon the floor construction of the Bixby Hotel show remarkable strength and excellent design. In these floors and beams only the **KAHN SYSTEM** was used. This building is now being added to and the great success of the use of the **KAHN TRUSSED BAR**, as shown by these tests, especially as compared with the twisted bar or plain bar reinforcement, have led the architects to specify the Kahn System exclusively in these additions. The architects, Messrs. Austin & Brown, have expressed themselves as being so well **PLEASED** with the Kahn System of reinforced concrete, that in the future they will use it in preference to any other system.



TONS of sacks filled with sand were placed on the floors of the Bixby Hotel, causing a super-imposed load of 240 pounds per square foot. This load is six times the load for which these floors were designed, and is equivalent to the weight of three tiers of heavy men packed together as closely as possible, and one tier on top of another.

Trussed Concrete Steel Company

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HEBER & THAYER

Agents

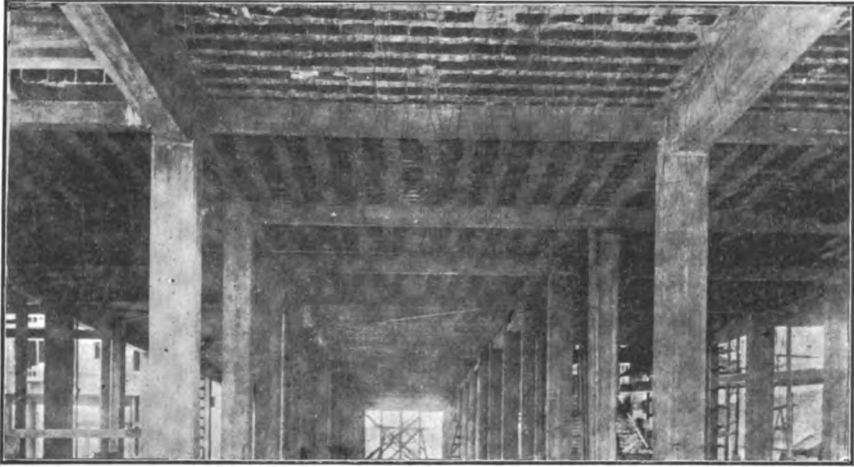
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MAURICE COUCHOT

Agent

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CEILING construction under the load shown on preceding page. The clear span of these ceilings is 17 feet 8 inches. Note that the concrete joists spanning between the girders carry all the load, thus making it a true reinforced concrete construction. The rows of hollow tile are merely used to fill the spaces between the joists, which would ordinarily be vacant and unattractive in appearance. As far as strength is concerned, all of these tiles may be removed without any injury to the construction.

THE KAHN SYSTEM

Of REINFORCED CONCRETE is the HIGHEST TYPE OF CONCRETE CONSTRUCTION, not the cheapest but the MOST ECONOMICAL. It aims first for SUPERIORITY IN RESULTS, and second for economy in price.

In this locality the following structures are now being erected in accordance with the Kahn System of reinforced concrete:

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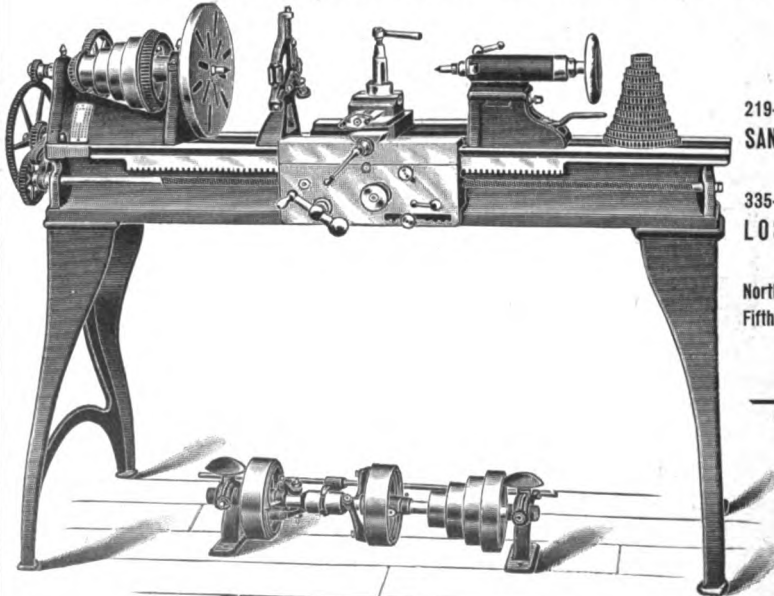
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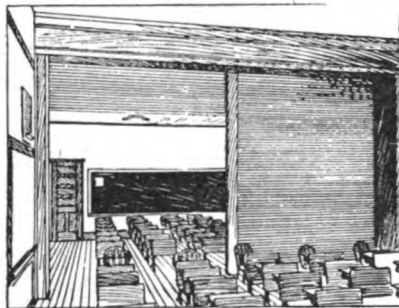
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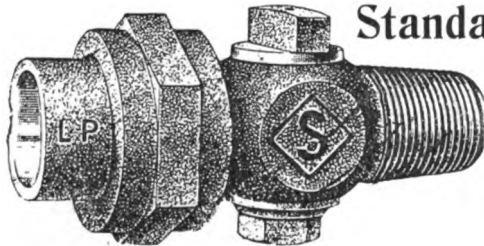
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A postal will bring our representative with samples and it won't take more than two or three minutes of your time.

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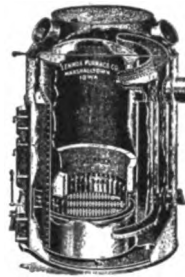
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REVERSIBLE
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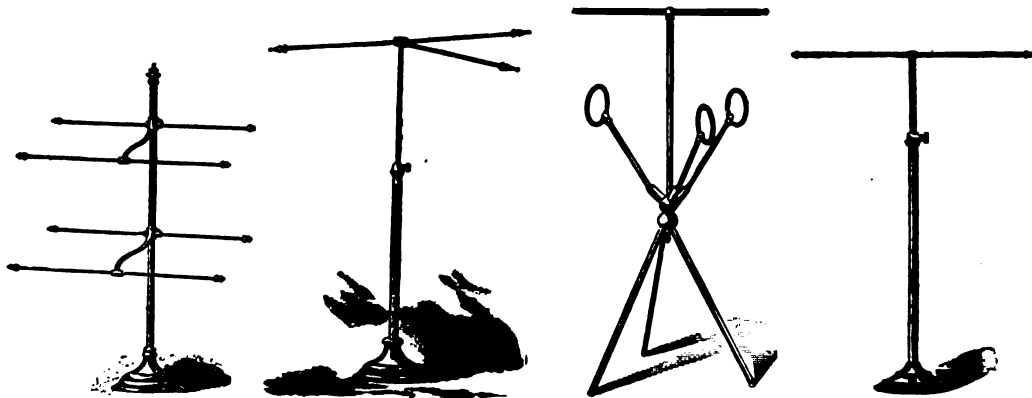
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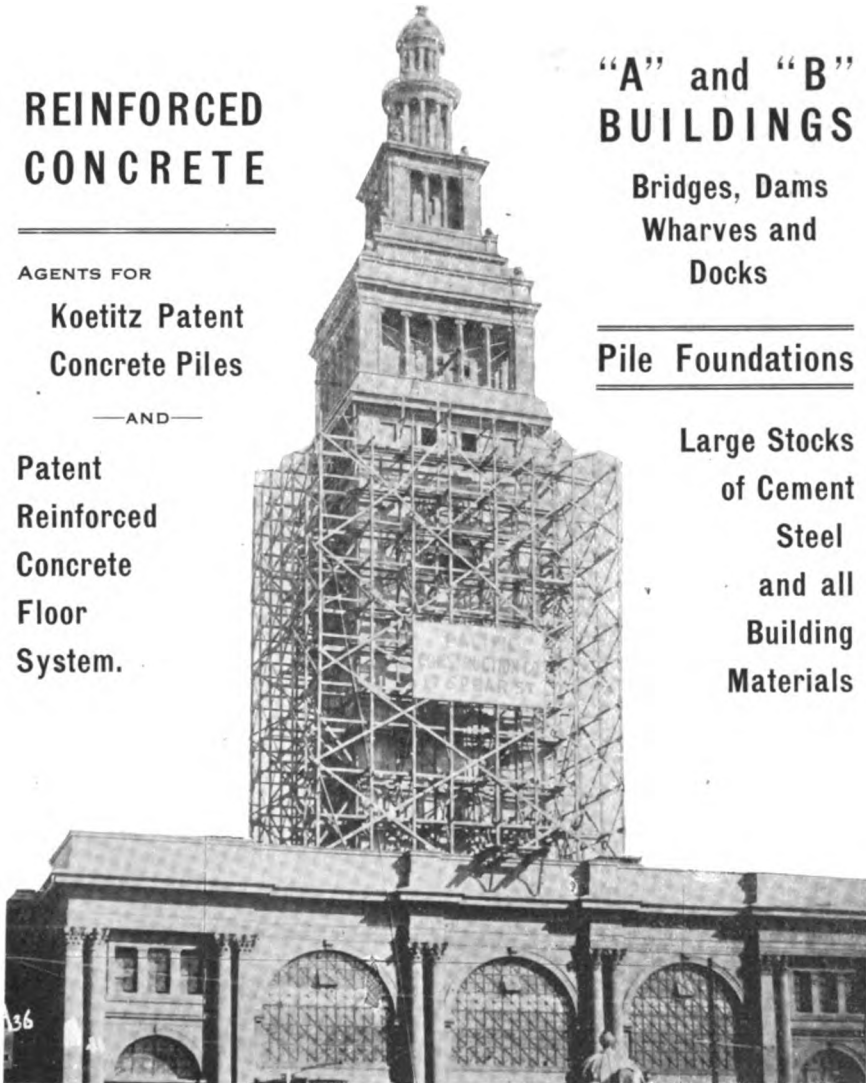
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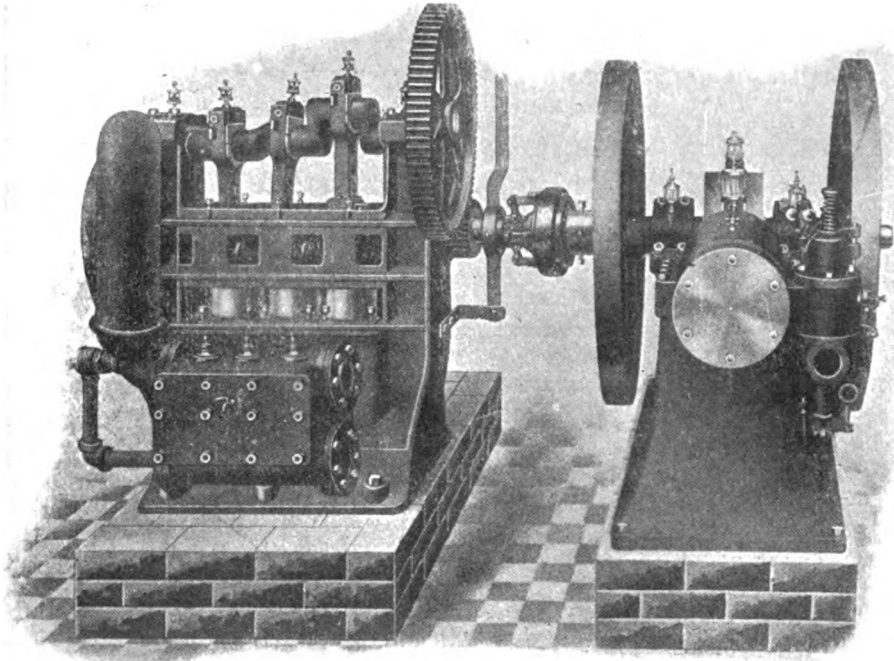
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ELECTRIC DEPARTMENT
THE M. LEVY CO.
Incorporated

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(Continued from page 101).

ing plate has found himself groping about with a bewildered and faltering step among the honest or dishonest assertions of this salesman or of that. All this is to be changed—the architect, the roofer or the house owner, provided only he can read—is to be able to secure precisely what he pays for, and is to be able himself, without any technical knowledge, to determine this point absolutely.

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square deal. That the company which has taken the initiative in this innovation runs some risk of a loss of business during the period when architects, builders and roofers are being made familiar with such a frank statement of quality must appear evident to all who give more than superficial attention to the far-reaching action. The move strikes at the very heart of the industry. It concedes to the tin roofer more than he has asked; it crushes the malpractice of years in one fell stroke, and with firm grasp uplifts the business to a plane of dignity and honor. As such in enforces co-operation, it demands the support of all manufacturers, of all roofers, of all architects, of all builders.

Eliminating single interests, a broad view of this bold advance more fully explained in another column leaves no doubt that the integrity and plane of the whole roofing industry will be raised by simple co-operation.

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5 1907

JANUARY
1907

VOL.
VII

THE ARCHITECT AND ENGINEER OF CALIFORNIA

NO.
3

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Reinforced Concrete Office
Building in World

William Ham. Hall Discusses Earth-
Quakes and Earth Faults

Engineer A. W. Rush Fears
Repetition in San Francisco of
Bixby Hotel Disaster

Reinforced Concrete Construction
in Southern California by
Harrison Albright

Henry H. Quimby, C. E. Writes on
Surface Finish for Concrete

F. W. Fitzpatrick Talks Straight
From the Shoulder on Fire
Proof Construction

C. Walter Tozer Discusses the New
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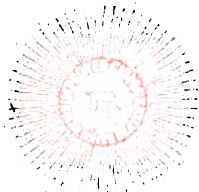
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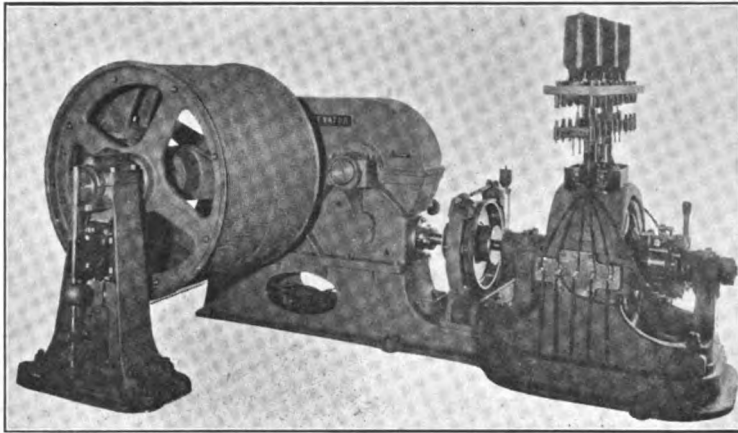
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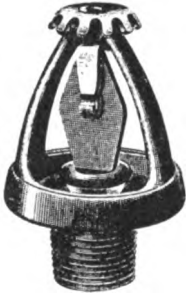
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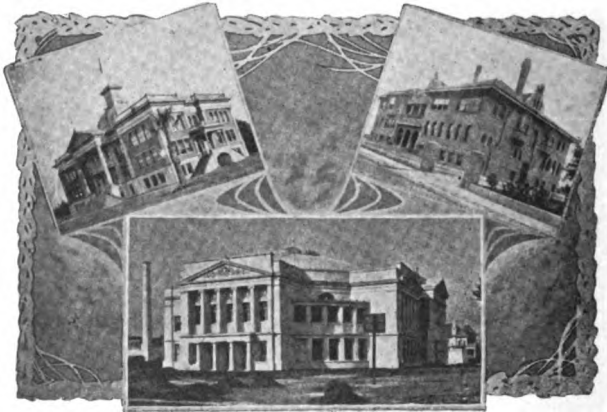
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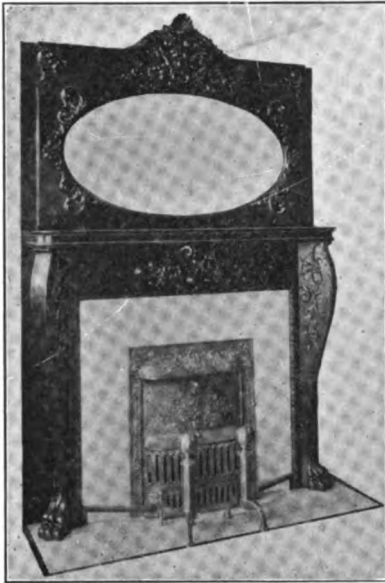
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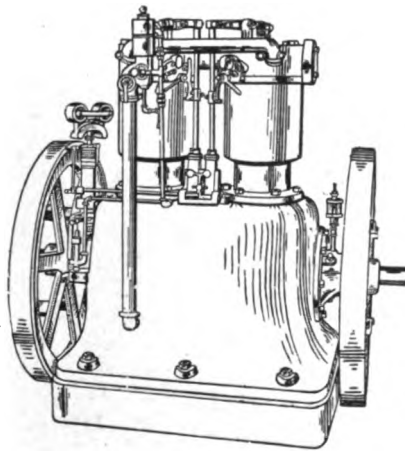
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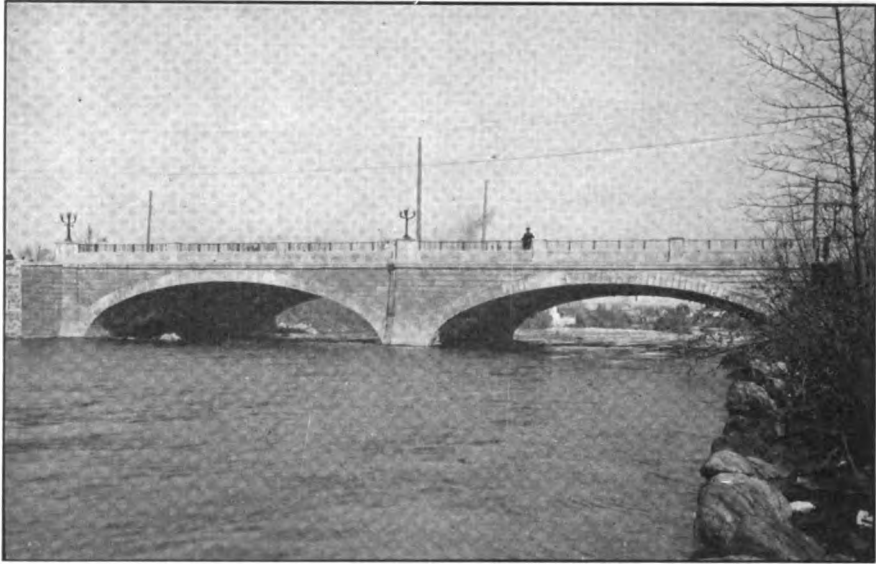
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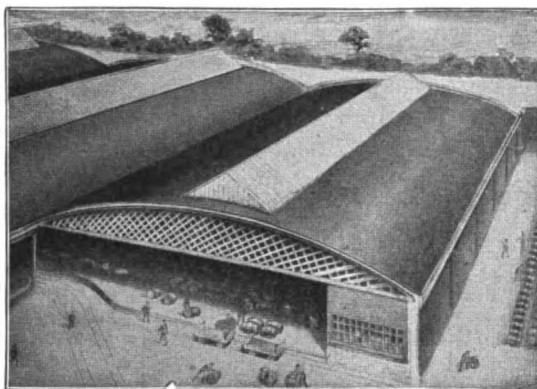
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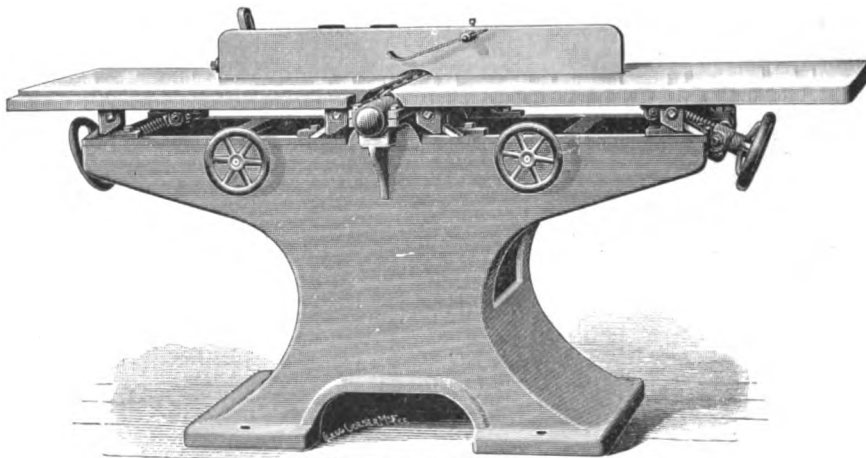
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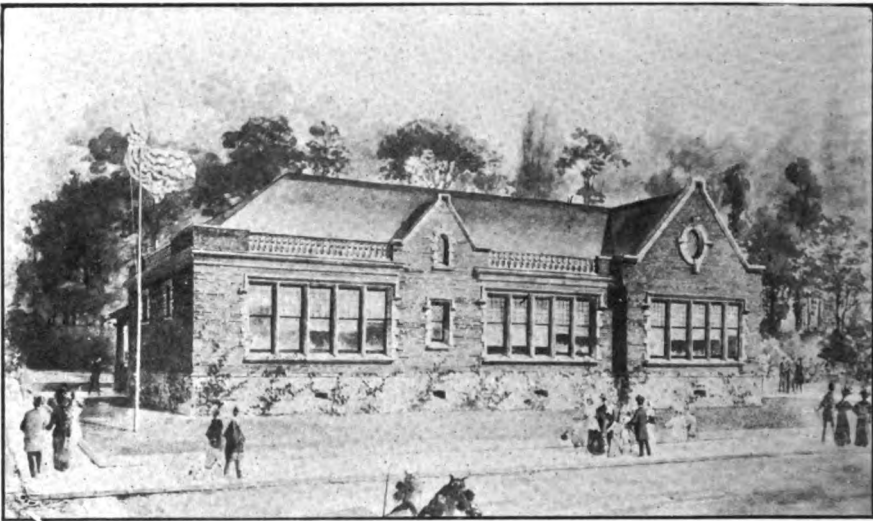
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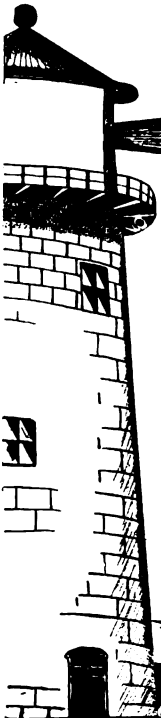
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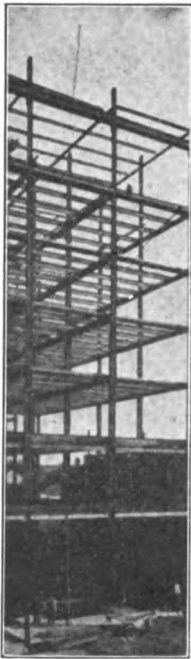
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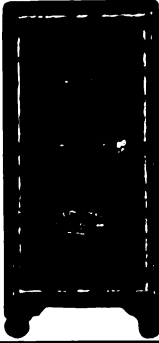
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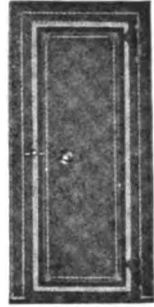
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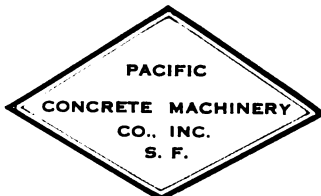
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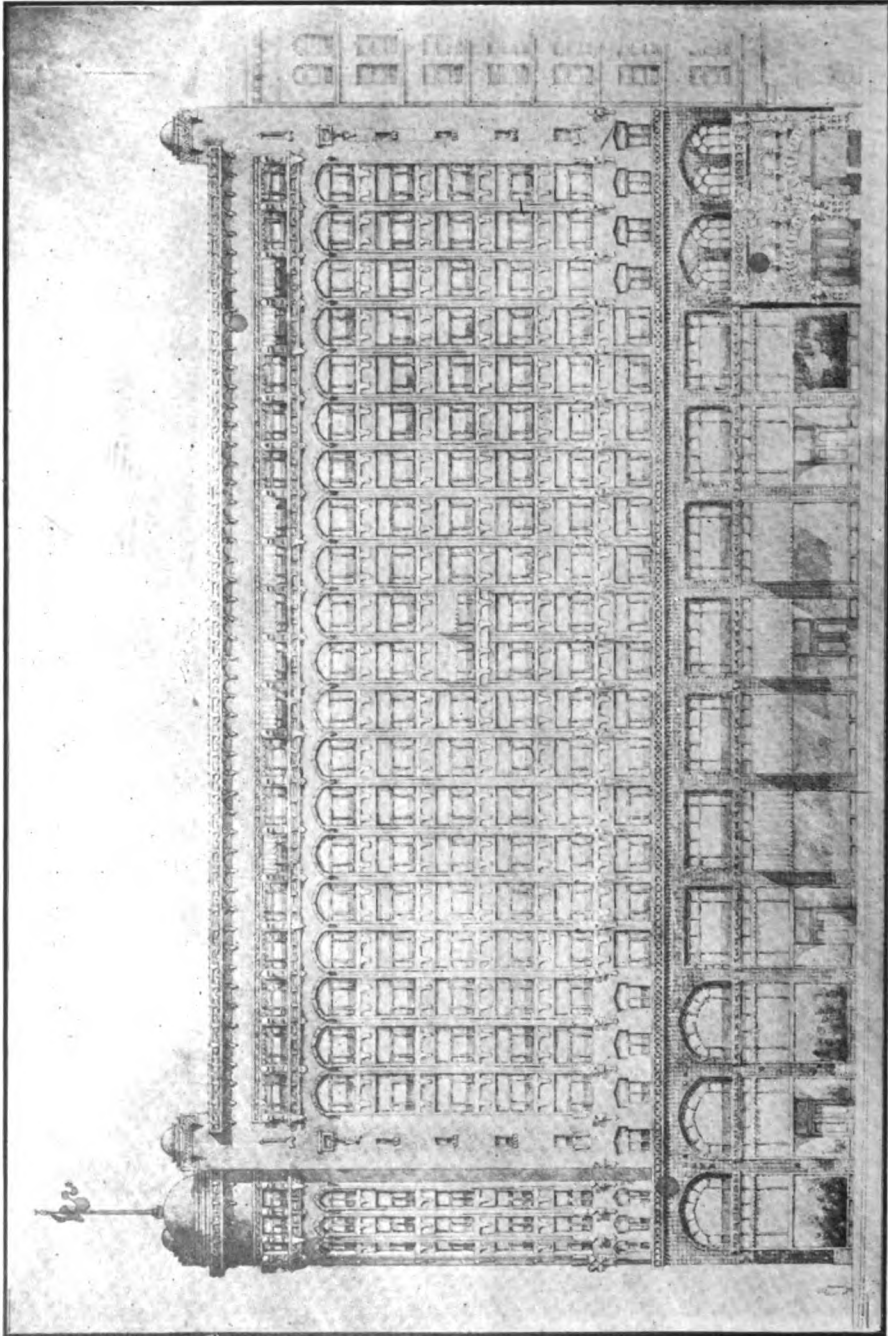
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*Front Elevation of Nine-Story Office Building to Occupy the Site of the Old Flood Building, Market and Fourth Streets, San Francisco
Charles F. Whittlesey, Architect*

THE
Architect and Engineer
Of California

VOL. VII.

JANUARY, 1907.

No. 3.

World's Largest Reinforced Concrete Office
Building



THE most notable reinforced concrete building which has yet been announced for San Francisco is being erected on the corner of Fourth and Market streets, the site of the old Flood building. It will be nine stories high and will cost \$1,000,000. Its exterior, for the first two stories, will be veneered with ceramic tile in rich browns. Above the second story, the entire front will be faced with dull glazed tile in a soft gray green with trimmings in cream colored glazed terra cotta in rich detail. The corridors and lobbies will be finished in imported marbles and six electric high speed elevators will be installed. All the offices and stores will be trimmed in mahogany. A splendid law library will be installed in the building for the use of the attorneys who may be tenants. The building will have a complete heating, lighting, and power plant sufficient to provide for the needs of all the neighboring buildings.

One remarkable feature of this concrete structure, as pointed out by the architect, Charles F. Whittlesey, is the fact that nine stories are made possible within the limit of height to which concrete buildings are restricted by the city ordinance—one hundred and two feet. The first story will have a height of twenty feet; the second, twelve feet; and the other stories ten feet each. An ingenious arrangement of the structure and the fact that the roof is of concrete, makes it possible to dispense entirely with an attic story.

The contract for the erection of this building has been let to the American Pacific Construction Company, which organization has built some of the largest and most substantial reinforced concrete structures in the United States.

Earthquakes and Earth Faults

By WILLIAM HAM. HALL, C. E.

*In the following Second Article of this Architect and Engineer series, Mr. William Ham. Hall reviews the subject of Earthquakes, with reference to their causes and their motions, as introduction to a description of their effects, which he undertakes in an article to follow. These together, will form the basis of a discussion of the merits and demerits of the several kinds of buildings to withstand earthquake influence.**

WITHOUT following the subject back to primary influences, such as solar and terrestrial heat, the force of gravity and influences which disturb the force of gravity, it appears from the later developed seismologic ideas, that nearly all earthquakes of note are due to one or the other of two proximate causes: first, contractions of the earth's crust, and, second, momentary expansions of parts of it.

The latter, produced by any and all happenings within the earth, of an explosive character or expanding tendency, and which cause outward jars to the outer part or "crust," so-called, are known as explosive or volcanic earthquakes.

The former, mainly consequent upon shrinkages or contracting tendencies in the outer part of the earth, occasioning slips, crushings or foldings of its masses, are chiefly due to extraneous influences or to changes of conditions in such outer part or crust itself, and may be called shrinkage or fault earthquakes.

Earthquakes which are outward jars propagated into shakes, from subterranean volcanic doings, follow immediately upon momentary occurrence of their cause. Those due to contraction of the earth's crust come as the result of a gradually accumulating cause. A volcanic action slight in itself, may initiate a violent earthquake due to the other cause, but the function of the volcanic jar in such case would only have been to advance the time of the movement which was the severe earthquake producer.

Correlatively, it has been argued that volcanic action, producing or leading up to volcanic earthquakes, may be induced in one earth-quarter by great shrinkages and consequent fault earthquakes in some other quarter of the earth.

Thus, there may be, in some cases, an interdependence, immediate or remote, between earthquakes of the two classes and their causes. But it seems that each kind more often happens wholly independent of the other, and that there are vast regions of the earth where shrinkage earthquakes occur but where volcanic influence is unknown.

In the regions of active volcanoes severe earthquakes not infrequently precede great volcanic eruptions, and great eruptions are believed to so expend the subterranean forces as to much lessen for a long period the probability of severe earthquakes.

As the violent shrinkage earthquakes are due to great accumulations of stress, the regular and frequent occurrence of slight earthquakes of the kind, in a locality, might be taken as indication that the stress is not accumu-

*I fear that the above note of the managing editor, may be taken as promising too much for my copy. I have not undertaken to review the causes and motions of earthquakes for the scientific reader, but in a practical way, though, on what I understand to be accepted ground among scientific people, and only in sufficient detail to serve my purpose presently stated. I do not, in articles to follow, undertake to describe fully earthquake effects, but only to marshal some of them so that my review may serve as a practicable starter for a talk about various kinds of buildings and classes of construction as regards earthquake resistance. And when it comes to this talk, I am not even making it technical, much less attempting to make it scientific, as these terms usually are understood. If I succeed in presenting this subject popularly and clearly, so as to convey a safe and sound common-sense understanding of building problems in an earthquake country, my object will have been accomplished. Wm. Ham. Hall.

lating for a great one; and, correlatively, we might argue that the frequent occurrence of slight volcanic actions, just sufficient to bring on earthquakes of the other kind, wherever these had to be, would constitute a safety valve action against production of conditions necessary to occurrence of the destructive shrinkage earthquake.

While to some extent, no doubt, the frequent recurrence of slight earthquakes of this class, through a long period of time, does tend to postpone the greater earthquake; as matter of fact, great shrinkage earthquakes are sometimes preceded by marked increase in number of small ones and are always followed by an unusual number of slight ones gradually growing more feeble and occurring at greater intervals of time. Understanding the cause of these earthquakes, we can readily appreciate these facts.

The Pacific Coast of North America earthquakes seem to be only of the shrinkage kind, and as I am reviewing the subject merely to establish some basis for studying earthquake effect as here presented, I shall in this writing consider these alone.

Our globe is held together by the attraction which all its matter has for each part of it. This attraction of gravity not only acts as the centripetal force which holds us and other loose objects to it, but also holds the crust of the mass itself together by drawing each part towards the center of gravity of the whole. Tending to counterbalance this and cause the earth to disintegrate, is the centrifugal force, or tendency of each part to fly off at a tangent, caused by the globe's revolution at immense speed, around its axis; and its motion, also at immense speed, in an orbit around the sun has another tendency to disrupt it.

The cooling of the mass, as it does cool slightly through the years, tends to produce contraction of the so-called formations which, geologically speaking, make up the earth's crust. But this tendency to occupy less space because of lessening temperature, would not hold the earth together, neither would our globe remain as one body because of the cohesive strength of its matter, merely, as opposed to the disrupting influence above referred to, were it not for terrestrial gravity, which is the controlling force and holds the mass closely against the strength to resist crushing, which the formations have.

In the process of coming to its present condition the earth has had many cracks or ruptures made in it. When the masses flanking such a rupture have moved so that the originally abutting parts have been displaced with reference to each other, it is called a fault. Of faults in the earth's substance there are very many, local, at least, and usually not far-reaching. Our mining and other excavations disclose these, innumerable and pronounced. But some faults are known to be far-reaching and to be measured by tens and even hundreds of miles in length. Faultings such as these latter have been traced by surface indications in various parts of the earth. Most of them appear to be permanently sealed, for no motion has been detected in them within historic time and surface appearances indicate that no disturbance had taken place in them for long before.

The tendency to contract as due to the earth's cooling, and greater cooling near the surface than within, and greater in some parts of this outer crust than in others, tends to set up strains as between the masses composing such different regions. The action of terrestrial gravity holds all in place without movement, until the strains accumulate somewhere to an extent such that something has to give way.

It is not necessary here to allude to other possible causes for such strains or to other probable reasons for their resulting in earthquake-making slips. The fact is that the strains evidently accumulate until something has to give

way. These givings of way usually occur along the planes of the greater faults, which, indeed, have probably been made and certainly seem to be maintained to admit of such adjustments, or new faultings possibly are even yet sometimes brought about in the process of relieving such strains.

While the location of most of these yet active faults, covered in as they are, for the most part, by deep beds of loose materials, or extending wholly under the ocean, can be surmised only, or determined but approximately, some of them are plainly traceable for long distances. Those known to be yet alive from their occasional slips, seem to be among the most far-reaching. Such a great fault lies close and nearly parallel to the Coast of the Central part of California. The surface indications of it are very plain and many, for the larger part of several hundred miles, throughout which it had been located and studied before the violent slipping of April, 1906, and on a less plainly marked route or routes it is known to continue for a much greater distance. Thus, faults such as this are believed in cases to divide into several, as well as to have subsidiary faultings near to and approximately parallel with them.

The evidence bearing on this general subject which has been furnished by the California happening of April 18, 1906, is most abundant, and surpasses in its plain character all other fresh evidence theretofore available for study since the subject has been taken up by scientists.

(A description of the California earthquake of April, 1906, and of its general effects in and near to San Francisco, is here reserved for a future publication.)

Earthquake Influences and Their Resistance

In a former article I spoke of stress upon structures from earthquakes running under them, in contradistinction to strains produced in bridges and viaducts by loads running over them. That earthquakes actually do run under structures is a suggestive fact. The initial disturbance occurs in one quarter or along one belt, and produces a progressive motion or motions away from that location. The direction of apparent shake may not be forth and back with respect to it, but the progression of the shakings is away from it. Thus, though at the location of the primary disturbance the earthquake simply occurs under structures, away from that location it passes or runs under them.

Though the rapidity of this progress of an earthquake is very great and the difference of time in its arrival at the nearest and at the farthest part of any building's foundation must be exceedingly small, the fact that earthquakes have such progressing character is not without practical bearing.

What is the earthquake motion and what its tendency to destroy? The testimony of individual observers, the evidence of apparent fact, and of instrumental records seem, for the most part, to indicate, three motions—one, horizontal, back and forth, another, horizontal and circular, and a third, wave-like, producing the phenomena of tilting, or rising and falling and of bumping.

We may consider these as the movements to be reckoned with in reasoning on earthquake effects and the guarding against them, even though, following the subject back to the initiation of earthquake phenomena, we clearly see that the forth and back shaking and apparent revolving and wave-like motions may all be merely consequent upon an original grating or bumping slip, in one direction only, of one vast portion of the earth's crust, along side of, or over, or otherwise with respect to another vast portion, or upon a jar occasioned by an explosion under some locality of the earth's surface. Thus do we conceive of what may be called earthquake movements and primary and secondary earthquaking motions. The jumbled-up jostlings which are imparted to us and our structures probably are, for the most part, the latter.

From whatever cause originating, a primary earthquaking motion, com-

mencing, we will assume, in one very limited locality, is probably propagated in radial lines in all directions, therefrom, through the solid deep-lying bedrock, at great speed rates and as simple forth and back elastic vibrations.

These disturbances, communicated to the less homogeneous, less solid and less truly elastic overlying and surface formations, start up resilient or quaking motions in these masses which progress through them at less rates of speed but with greater lengths of shaking movement.

Furthermore, according to the configuration of the planes of contact between the underlying solid bedrock and the overlying and surface masses, separate quaking motions are started at different points in these latter, which proceed through them also in radial lines away from these points of local origin.

Thus, any one vast body of surface material lying, for instance, between several upraised bedrock hills or ridges, and perhaps with other uprising parts of bedrock extending into but submerged within it, may have communicated to it, from the one set of quiverings in the elastic bedrock, a number of quaking impulses at widely separated points and in quick succession. These, being propagated through it in directions away from the points of local origin, meet and produce the jumble of motions which we and our structures are subjected to.

Returning now to the origin of the earthquake: if, instead of the primary disturbance occurring as was above premised, in one very limited locality, it should consist of a slip of one vast region of country, with respect to another vast region, along a plane of geologic faulting, as was the case in the great California earthquake of April, 1906, then there probably would be a number of limited localities along the line of rift, whence exceptionally sharp shaking impulses would be sent out through the deep-lying bedrock. These, proceeding away in radial lines from their several places of origin, would meet or cross each other at localities out from the rift. Here we have not only another probable cause for the confusing of motions, but for the following of shakes of different kinds in close succession, yet constituting the one earthquake, as well as for the apparently rotary motions and for the conflicts met as to the direction of shake in nearby neighborhoods.

Thus, as a rule, violent earthquakes, as these are generally felt, have no one well-defined motion which is lasting. They start in with some certain movement, but this is quickly complicated by others and generally is obliterated or replaced as the controlling movement by some other motion which in turn becomes jumbled up before the earthquake is over. So that at best each of us may only determine the direction of major shake as we experience it, and this may be governed by local circumstance of ground formation and even by the form and construction of the building in which we happen to be.

This rule, however, seems to be applicable only within the region of pronounced violence; for, as severe earthquakes are felt at remoter places, they frequently do present quite well defined and sustained motions.

Almost all of the visible part of the land on this earth is composed of the debris of rock, in various stages of being, from huge boulders to fine sand, earth and particles of mud, or of rock not in itself hard and firm, or of beds of rock distorted and shattered and thus not positively solid and truly elastic. At one extreme of the scale, the underlying bed-rock is solid, firm and hard, and with a true elasticity, while at the other extreme, the debris masses are unstable, soft and with a resilient elasticity or none at all. The jelly in a housekeeper's bowl takes on very much and lasting motion from a sudden push, jolt or jar of the vessel, while the bowl itself moves but imperceptibly and quickly attains rest. The bowl, we may assume, represents the solid rock part

of the earth, the jelly, that which is least solid—the deep mud of bay-shore waterfronts, like that of San Francisco, for instance. If we stick a match up in the contents of the bowl, we will find that it will show more motion in response to a like disturbance, than the jelly which supports it. A heavier article, like a nail stuck up a short distance from the match, will show less or more motion than the match, according as the jelly be weak or stiff, and the impulse imparted by the bowl be light and quickly over or hard and lasting. The match and the nail of our miniature quake in a way represent buildings on shaky ground during a real temblor.

These thoughts may serve to prepare us the better to reflect upon the practical significance of the fact that it is the earth which moves, while the structure, by its inertia, remains at rest until motion is imparted to it by its contact with the earth. The structure is shaken by its heels, as it were, and motion is conveyed to its mass only through the medium of its own rigidity.

Several Great Shrinkage Earthquakes

The great shrinkage earthquakes whose effects have been studied within the few years since the character of such happenings came to be understood have shown apparent slips or throws of five to thirty-five feet. That is to say, the vast regions on one side or the other of each of these faults moved as above stated, or the resultant of the motions on the two sides was as stated.

In 1897 a great earthquake in India disclosed several faultings, with an apparent throw down on one side of one of them, of five to thirty-five feet. But there was no relative lateral movement between the two sides. The scarp or little bluff, left exposed for miles in length by the action, was very pronounced, and where the material was solid rock, so that its face could be seen, the fault-plane appeared to be practically vertical.

The very notable Japanese earthquake of 1891 exposed the location of an old fault or made a new one for over forty miles. The differential vertical throw was, for considerable distances, as much as twenty feet; and the apparent horizontal throw was in several localities as much as five feet. A well exposed scarp in this case also showed a vertical faulting.

The Inyo earthquake of 1872 opened a fault for many miles; for about ten of which the fissure was clearly to be seen; and here the up or down throw was four to twelve feet and the horizontal throw ten or more feet; and still again the fault plane was practically vertical.

The late California earthquake of April, 1906, disclosed a fault rift of nearly two hundred miles in length; with a horizontal throw of five feet to twenty feet and an up or down throw of about four feet and less; and this faulting plane was practically vertical.

Seismologists tell us that these vast movements probably occupy much less time than the periods of the resulting earthquaking motions which are felt and observed. The quick and violent throw of such vast bodies and the sudden stopping of them must produce vibrations, back and forth, in the directions of such main movement. The region so moved in a great slip, such as either one of those above mentioned, is doubtless at least several miles in width on one or both sides of the rift. Here, then, would be produced a set of bed rock oscillations running in a belt parallel with and on each side of the fault; and these would naturally be most intense where the slip motion, had been greatest, near to the fault, and would diminish, with the amount of that main movement, each way from the rift. Another set of vibrations is caused by the friction or grating and bumping of the two sides of the rift together. These are the vibrations which progress in all directions from the particular places where produced and which are short elastic motions back and forth in the lines of their progression.

It has been estimated, or approximated to, that the probable depth of centers, or foci, of such great earthquakes as those of Japan and India above referred to, is from five to ten miles below the earth's surface. The total depths of fault rifts are doubtless much greater. From these depths also, and probably from the centers of disturbance, more especially, the primary earthquaking vibrations start in all directions, and these reach the surface materials everywhere within the region of disturbance, in diagonal upward lines.

* * *

Want More Class A Buildings

THE removal of the prohibition which limits the height of class A buildings to one and one-half times the width of the street upon which they face is advocated by the San Francisco Real Estate Board in an appeal to the Supervisors. Class A structures, by the ordinance adopted July 2d, are permitted everywhere in the city, but the prohibition which limits their height would prevent the present erection of almost every class A building which came structurally intact through the earthquake and fire.

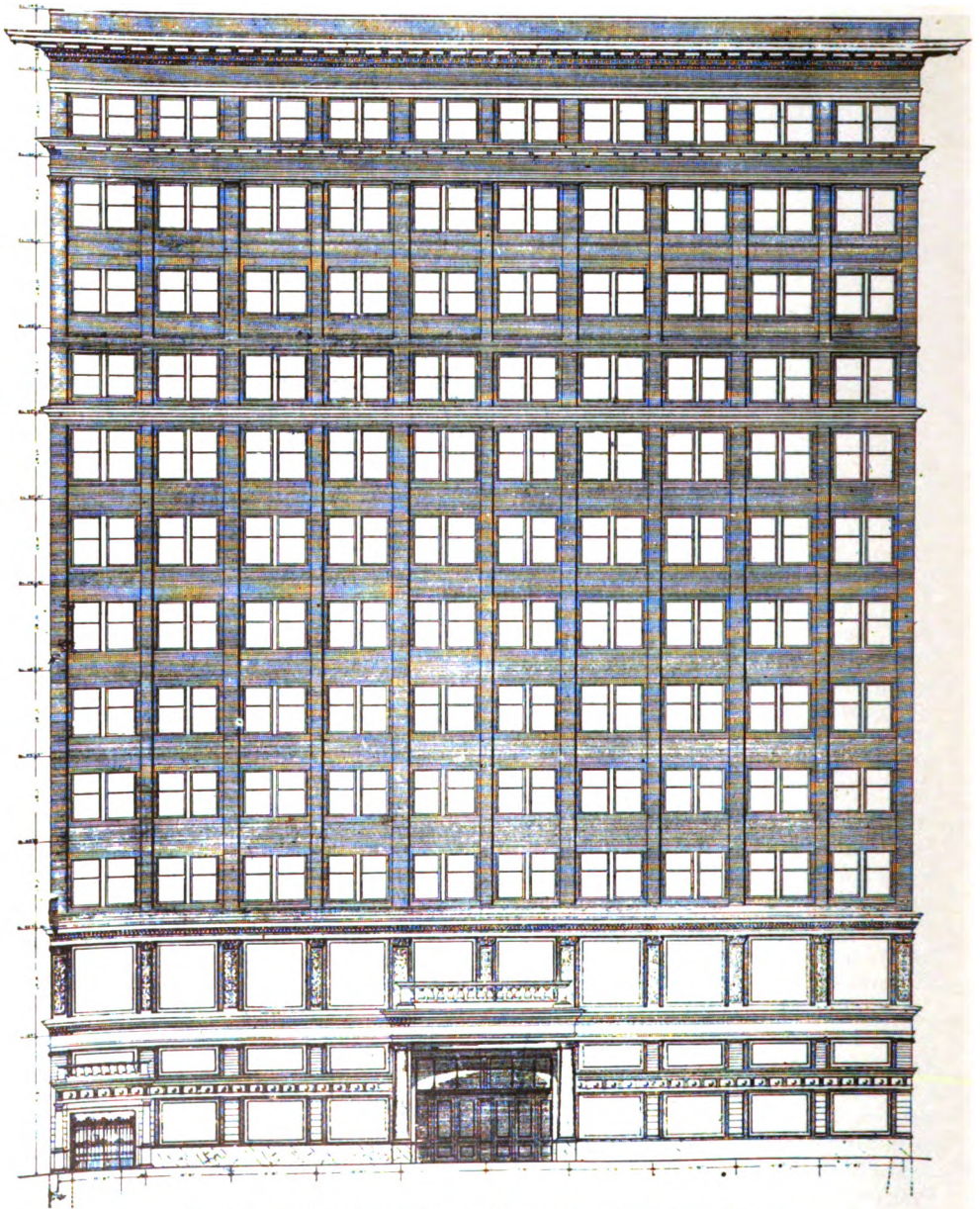
A summary of good reasons against the present restriction as to height is given by Secretary Cadwalader, of the Real Estate Board.

The fact that the tall class A buildings not only universally escaped serious damage from the April disaster, but also in large part withstood the ravages of the fire, is called to mind. San Francisco, it is argued, cannot lag behind the great cities of the East in the construction of first-class office buildings. Modern business conditions demand the concentration of conveniences and time and labor-saving devices, which is nowhere met except in the twentieth century skyscraper. The fact is noted that the city's Class A office buildings before the fire were full to overflowing and that the demand for office space since the fire has far exceeded the supply.

While the permission to erect lofty buildings would enhance the ground values of such holdings and thus benefit the down-town owners of real estate, buildings of as costly material and workmanship as are those of class A character cannot be built and return a paying interest on the investment unless a sufficient number of stories enter into the building. The present restriction, therefore, Secretary Cadwalader points out, not only tends to depress the value of ground holdings, but also discourages the erection of really first-class buildings, and thus draws away investment which would go to enrich the whole community.

Class A buildings cannot be low. The requirement of a steel frame supporting all floor and wall loads, and the requirement that these shall be of incombustible materials, makes construction too costly. The massive and deep-seated concrete foundations universal in class A buildings find no justification unless a sufficient number of stories be piled upon them.

The communication calls attention to a false statement in an Eastern architectural journal to the effect that San Francisco, "from fear of earthquake, is being rebuilt by low (in most cases, one and two story) wooded structures." It closes with the plea that the building law be so amended as to favor the erection of class A, and not class B, buildings. "We all want a class A, and not a class B city."



Proposed Front of the Whitney Building, Geary Street, San Francisco
Robert Morgeneier, Architect

The Recrudescence

By ROBERT MORGENEIER, Architect and Engineer

FOLLOWING the great conflagration, rearing skywards for three days and nights, San Francisco had become even but as a name.

Ashes, heaps of brick and cyclopiian walls rearing their gristly heads high in air, marked the mighty area over which desolation reigned supreme.

The great mass of humanity formerly teeming its thoroughfares scattered to the four winds! This same multitude, or rather its leaders, gathered from the corners of the earth and from every walk of life, had, by labor, endurance and devotion to a single purpose, builded a mighty city. Each individual aiming, however, first for his self-aggrandizement, yet, because of necessity, subjected to the common weal.

This self-aggrandizement is the life essence, the quickening of all communal development and progress, subjection to the common interest frets it, modifies it, but never subjugates it.

Individual policy, like water running down hill, extends itself into every niche and corner, maintains itself in every move and effort of the body politic and sums up its energy in the "final say" in everything spiritual, social or commercial.

What, then, even when the vapor columns still were mounting upward from our vale of desolation, gave first token of reincarnation? *The spirit of individual aid and effort!*

Out of the vast combustion and havoc without parallel strode the individual will, fixed in its determination to rear again its individual part of those things swept away.

Out of that which had become almost a bare sound, a name, "San Francisco", should through his energy occur a recrudescence of the ancient splendid spirit of "49", which had been seized by the flames.

Yes, it was splendid, that spirit and the city of its creation, which, alas, was doomed to heave and groan in its gigantic death struggle before our very eyes. Splendid because, above all, it represented the power, determination and will of men to clad and girdle its many hills with magnificence, make the land and the sea yield tribute, defy the storm, hew out of life's tenacious rock, each for himself, a cover and shelter. And all this within a generation.

But, to bring back the true spirit and replace our social, industrial and commercial magnitude, calls for more than a general deliberation. The individual must and will say, "I give not this city for lost! From this great fall, my work arising, shall appear more grand and glorious than if I had lived on in the even tenor of my ways, and I will now do and strive so that no second fate shall find me or my progeny unprepared."

Preceding all things constructive, however, comes the re-establishment of the individual status. For, we well know, the fire destroyed and the earthquake shattered not only our buildings, but our income, positions, commercial, family and social ties, our "good-will", acquaintanceship, daily rounds, habits, hopes and many ambitions. Herein is summed up the full measure of the calamity.

A regeneration of the entire social structure is going on, must go on, and happy he who drops not entirely out of sight. This regeneration takes time, hence we must be patient.

Wealth, its possession or supposed possession, is the background of our social and commercial fabric, say to the contrary what we may.

As the woof and web of that fabric is again repaired or replaced "things will move on."

To the praise of a vast number it may be said, they have taken time by the forelock and that which perished is being replaced.

But think not of a "City Beautiful", which at best, is but a figment of the mind, or at its worst, a sordid scheme of advertisement. We will never have a new City "cut and dried," nor stenciled out to order by any architect, howsoever competent or able he may be.

CITIES ARE NOT BUILT IN THAT WAY. Being built in the natural way, they will also *not* submit to revolutionary changes. If any one had a chance to try this, it was Louis Napoleon in Paris. Yet, despite power, unlimited means and Baron Hauseman, as his Major-Domo, the old "Cite" is today as it always was, and excepting the boulevards cut through the most bedraggled parts of the city at large, no great changes were made.

There is no despot to dictate to San Franciscans what and how they are to rebuild, nor can you take away their land for the sake of supposititious "beauty."

But why refer to this at all? Hand in hand with the readjustment of proprietorship goes the rebuilding of the new City. Within a fraction of the time required to build the first, a second San Francisco will be accomplished, and with it the incrudescence of its old spirit of enterprise is certain. The old City was the work of the fathers. The new will be that of the fathers, sons and grandsons.

It will glow resplendent in the sun of happy days. It will be new, clean, sanitary and eventually wealthy, let us hope also it will be devoted to the moral, as well as material, welfare of its inhabitants.

The question of where, what and how to build is following closely on the heels of financial settlements, and, always of prime importance, assumes, under our present peculiar situation, the nature of a complex or involved problem.

True, Market street, following a natural course, was and will remain the central or main artery of commerce, and, happily upon and near Market street stand clustered a number of the largest and best preserved buildings. These now serve as a nucleus or center from which, radiating in all directions, merit of a proposed investment may be somewhat approximated, and herein the judgment of a capable, experienced architect, familiar with the City as it was, and of sanguine temperament, comes into full play.

Having determined the utility of a certain location, the building to be erected thereon should meet all modern requirements and, moreover, discount the future to a certain extent.

In apportionments the building will generally follow the City Building Ordinance, its specific construction, however, is determined by the architect, and herein he should apply the old rule, that if an investment cannot afford a well constructed building, *that* investment is devoid of merit.

Exterior appearance, appropriate to the purpose the structure is to be devoted to, is of very great importance and should never be subordinated in the appraisal of merit. If the exterior properly proclaims its interior use, it accomplished its first aim from a business standpoint.

A large retail business established in a building of monumental exterior *suffers*. The appearance of the building eclipses the business carried on inside.

I assume that a meritorious investment for this particular business would call for a building the main street front of which should be comparatively plain, but with fine lines, and rich surfaces and generally a fine quality of workmanship and of materials. In illustration of this idea I append a sketch hereto,

taken from the routine of office work. It shows a double store and office building front.

The retail section of the City will certainly move uptown, that is "Up" Market street and across such streets as Van Ness and Fillmore, and if we remember that San Francisco will probably within fifty years be one of the greatest cities in the world, then investments up-town will appeal strongly to the sagacious business man, and the architect can safely place a high estimate on investments in that direction.

Wholesaling, shipping and light manufacturing will resume on the old ground, but finally extend more up-town. On the side towards the sea and extending entirely around the City westerly, the building will be of a lower average value, especially as regards residences. The tendency is, and will continue to be, to locate beyond the present confines of the city and away from the sea.

Finally a meritorious investment is developed in a building that cannot be shaken down by any earth disturbance. To me it is self-evident that buildings, which depend upon gravity for their stability, will be so disturbed.

On this subject in my next.

* * *

Wind Anchors for a Skyscraper

A SKYSCRAPER now in course of construction in New York is to have wind anchors so that it may be firmly braced against every gale. The new devices, which are being employed for the first time in any structure, have been put in position in the caisson piers which form the foundations of the new Singer building on Broadway, near Liberty street.

Skyscrapers of the ordinary type are not intended to withstand any uplifting strain. Their own weight prevents them from being disturbed. The new Singer building is to rise to a height of 625 feet, and is to have forty-one stories. The wind pressure, on account of the structure's great altitude, will be tremendous, and for that reason the building is to be literally tied to its foundations by an ingenious arrangement of steel rods. They will be three and a half inches in diameter and descend for nearly fifty feet into the concrete which form the caissons resting on solid rock eighty-five feet below the curb.

These rods, which are bolted together, are in lengths of from six to ten feet each, and the devices are put in before the cement is placed in the caisson. The lowest rod has on the end of it a great anchor plate, to which it is secured, and on the other end are bolted the two rods of the second section. The third section has four steel rods bolted alternately to those of the section below and connected with four rods above. The four rods are made to converge so that they may be carried through the grillage beams at the top of the caisson and the iron base of the column. They are then run up into the hollow column, which they are intended to support, for a distance of five feet and bolted into position. The column which is thus tied is built up to the very top of the structure. The strength of these rods is ample to counteract the effect of the severe storms.

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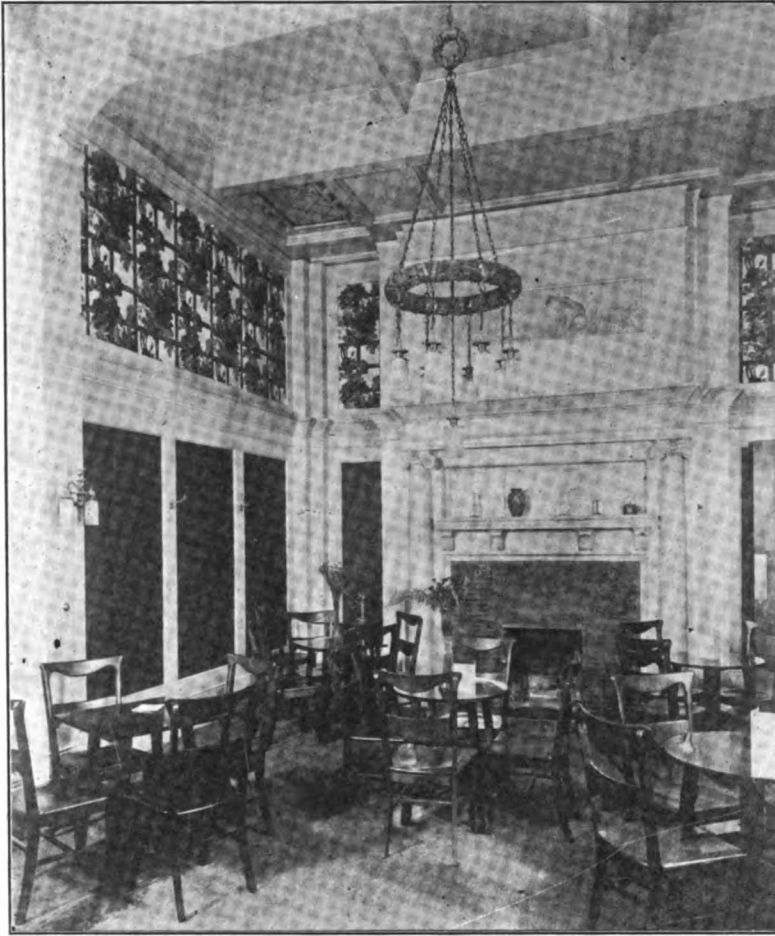
One of the most unique styles of finish for the exterior of a building has come to light in Milwaukee, Wis., where a one-story structure used for office purposes has been veneered with eight tons of grate coal, the largest size of hard coal sold in that section. The idea was conceived as an advertisement for the coal company occupying the building.



*Showing the Possibilities of Reinforced Concrete in Residence Work. Bungalow at Fair Oaks, Cal.
Albert Farr, Architect. Richards-Neustadt Co., Contractors*



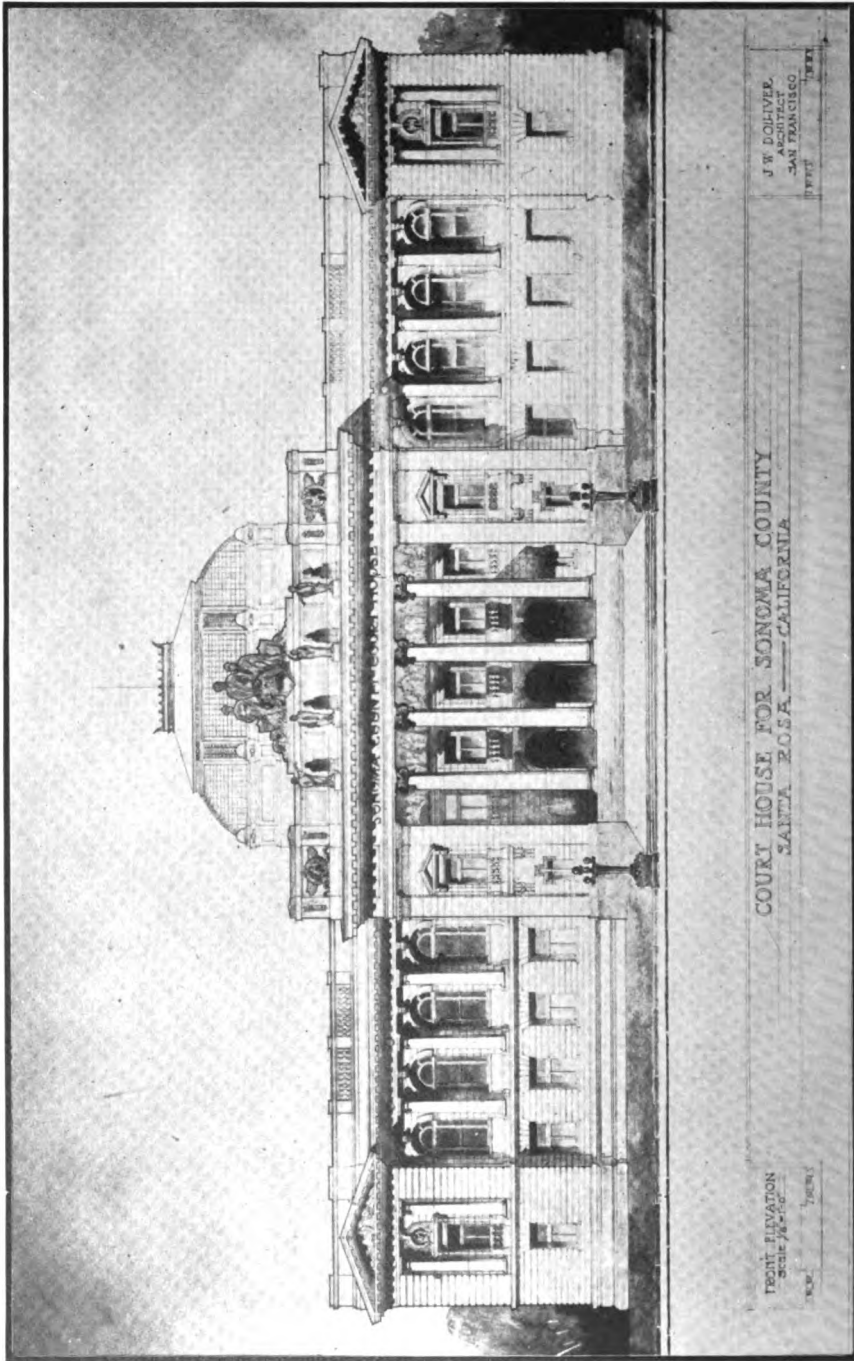
Another View of the Fair Oaks Bungalow



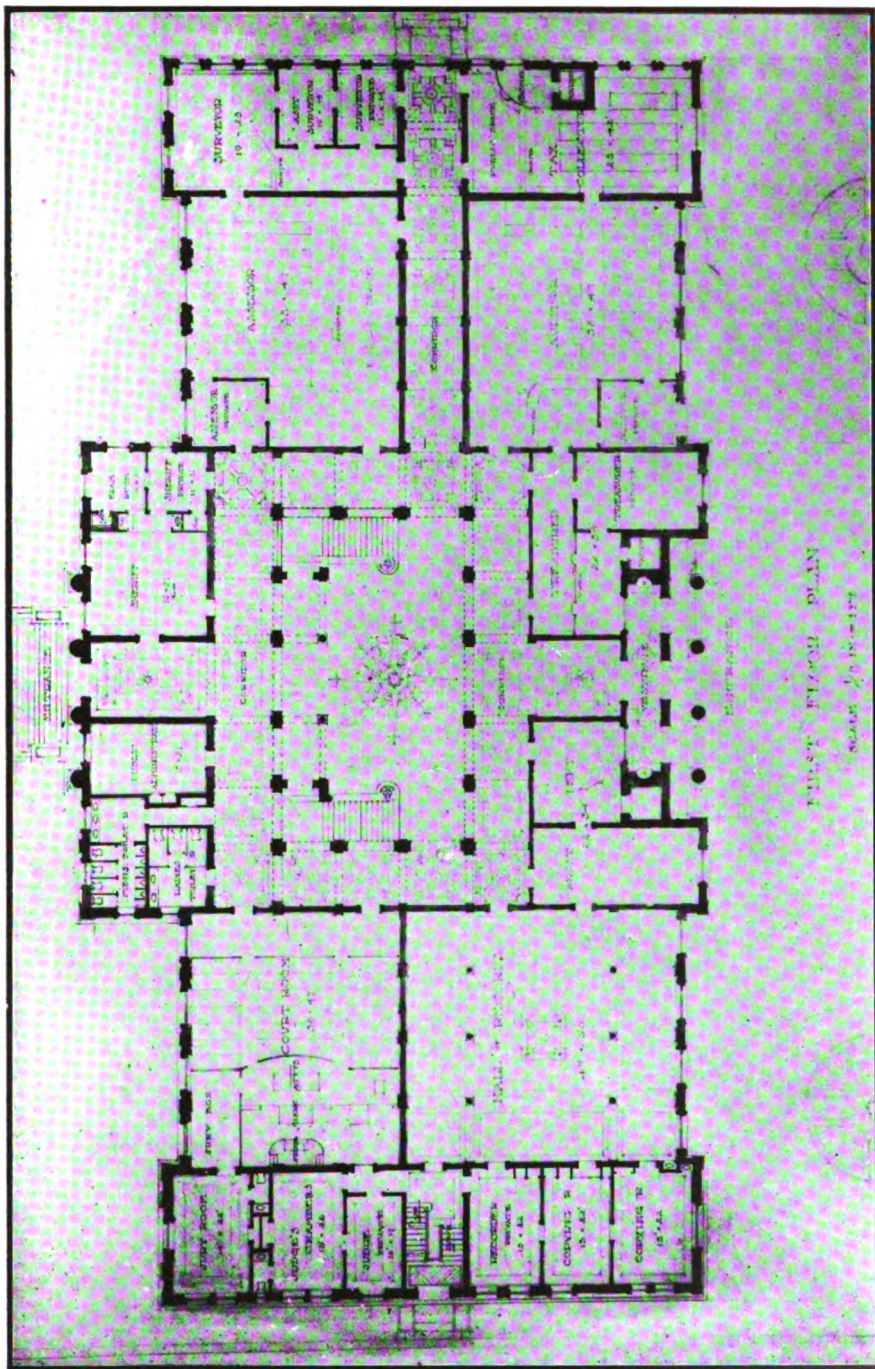
*Tea Room, "The Sign of the Bear," Berkeley
Meyers & Ward, Architects*

The Sonoma County Courthouse

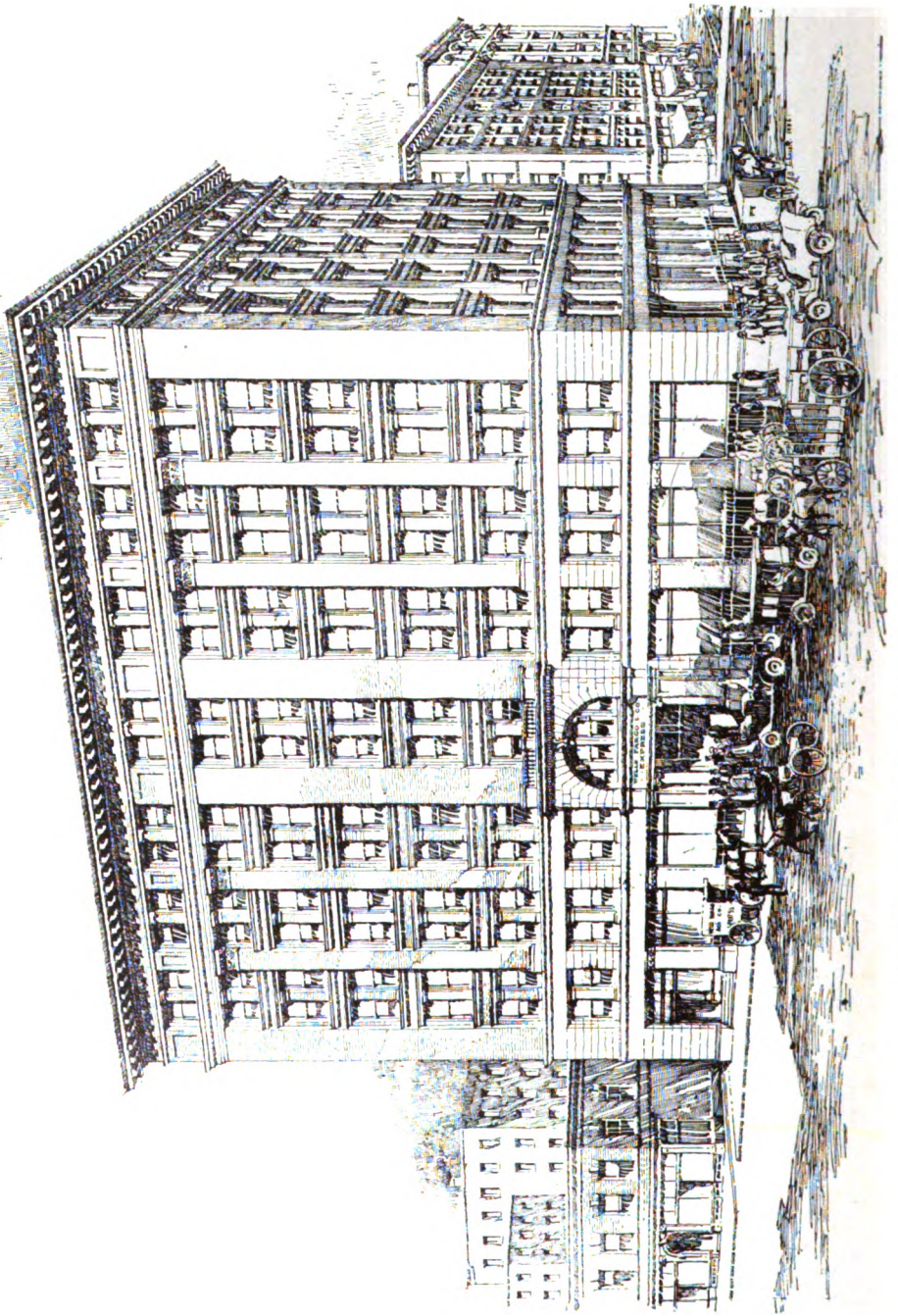
THE Sonoma County Courthouse, as illustrated in this number, is to be built on the old Courthouse site at Santa Rosa, from plans by Architect J. W. Dolliver. The site is more favorable than is usually accorded to public buildings and has the advantage of occupying a square in the center of the town, with streets opposite the two main entrances to the building, which are on the north and south sides. This gives a distance vista of the principal feature of the design—the main portico colonnade. The wings are slightly less enriched and corners varied. The ends are symmetrical and the elevations of each side have a relative value to the whole design according to their importance. The plan is arranged to have a simple symmetrical arrangement so far as requirements would allow, and the different departments are so grouped to facilitate the performance of business for both public and working force. The central court is rectangular and the colonnade supports the vaulted ceiling, which is inclosed by art glass, to throw good light to the innermost part of the building. The construction is to be a skeleton of steel carrying all loads to foundation, and reinforced concrete walls and floors.



Front Elevation Sonoma County Court House, Santa Rosa, Cal. J. W. Dolliver, Architect



First Floor Plan, Sonoma County Court House, Santa Rosa. J. W. Dollner, Architect



New Wells Fargo Building, San Francisco. Meyers & Ward, Architects.



*Tap Room "The Sign of the Bear," Berkeley
Meyers & Ward, Architects*

Fears Repetition in San Francisco of Bixby Hotel Disaster

By A. W. RUSH, C. E.

HAVE read with considerable interest the reports on the failure of the Bixby hotel building, and have noted the generally accepted conclusion that the concrete work was well and properly made and used, which, if true, leaves but one factor of any material importance in the discussion of cause; for the difference in concrete construction and any other, is mainly in putting together the required sections and selecting one already made for general use, i. e., taking the raw materials and placing or casting them together in such form and shape as may be required to serve the purpose, or to select a section, which has been made of other material, such as a steel beam or wood beam, and properly frame them into place. In either case the same forces are involved, and the same requirements must be met, so far as the strength is concerned, as the resistance of any beam to bending or breaking is the moment of two equal and opposite forces, consisting of thrust along the longitudinally compressed layers and tension along the longitudinally stretched layers in the section; and as the compressive resistance of concrete is quite as well known as that of iron or any other material, it is evident, of course, that it can be used in compression with as much certainty of safe construction as anything known at the present time. It moreover has many advantages over all other materials, not only on account of its fire resisting and time lasting qualities, but in its enormous resistance to vibratory conditions, having the greatest and most effective transmitting power of any material when combined with steel of the required proportion and proper placement.

The function of a beam or floor slab is to transmit the forces to the bearings on which they may rest, and to effect this, involves two relative forces acting with the same power. It does not matter what materials may be employed for this purpose. The requirements in resistance are the same. If a piece of timber be used, it must contain the required amount of equal tension and compression, and these two will always act with equal force; therefore, the limiting factor of strength would be that which was least in the section, i. e., an excess of any one factor would not make it stronger, but in many instances weaker.

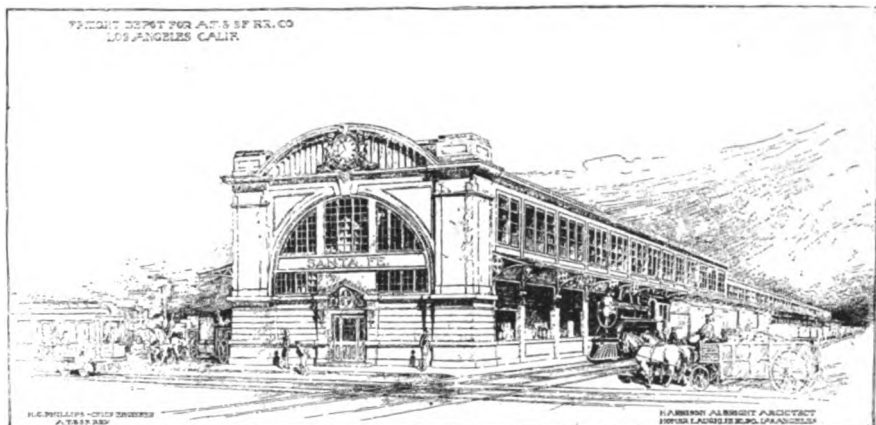
As the inert section is that portion of a beam or slab which is rendered incapable of active resistance by the forces of tension and compression gradually approaching each other with a resultant loss of power, and accordingly becoming neutral, it is important to note that while these forces may be said to act in opposite directions, they nevertheless do not oppose each other, and any attempt to create disorder in them by disregarding the area of their action can only result in failure.

The point at which these forces exhaust their energy is called the *neutral axis*, and the importance of its determination is of far greater moment in a concrete section than any other; because, unless this is known, the required area of compression cannot be known with sufficient accuracy, and accordingly the requisite quantity of steel and its proper relative placement cannot be found.

The destructive energy of a load on a beam or slab section at any point for which it may be computed, must be the determination of the required strength at that point, and for any distributed load will of course be at the center of the section, and this then becomes the distributing point for all forces; i. e., the forces which traverse a rectangular slab section are distributed from the center in all directions alike. That is to say, there is a concentration of forces at the center which governs the tension and compression throughout the section, and determines the lines of stress. That these lines radiate from the center to the beam sections surrounding it, no one having knowledge of the subject will deny; and hence, it is a fact that rods or bars running through the section in one direction do not and cannot take only so much of the tension as may be developed in that direction, while the radial forces are left to act with all their destructive power. It is evident therefore that the shape of the steel section and its placement most certainly determines its value as a reinforcement, provided of course that the necessary quantity be used; and any form or system of reinforcement that does not consider the importance of a uniform distribution of tenacity more generally than can be obtained by the use of bars or rods, as they are now being placed most certainly fails in reaching the standard of good and safe construction.

A glance at some of the work in progress in this city cannot fail to impress the observer with an anticipation at least of a repetition of the Bixby hotel failure.

Any system of reinforcement to meet the requirements of safe building must be a structural system. The beam and column sections must be capable of standard connections, and such, that when installed in the structure will be in their right place, and cannot be displaced by casting the concrete sections around them. The many failures in different parts of the country on account of the use of a loose rod or bar method of reinforcement, has created a demand on the part of careful investors for a more substantial and reliable method of construction. Such a system has been produced, and is now being used in other parts of the country with most satisfactory results.



*Freight Depot for the Santa Fe Railroad Company. Los Angeles
Harrison Albright, Architect*

Reinforced Concrete Construction in Southern California

By HARRISON ALBRIGHT, Architect.



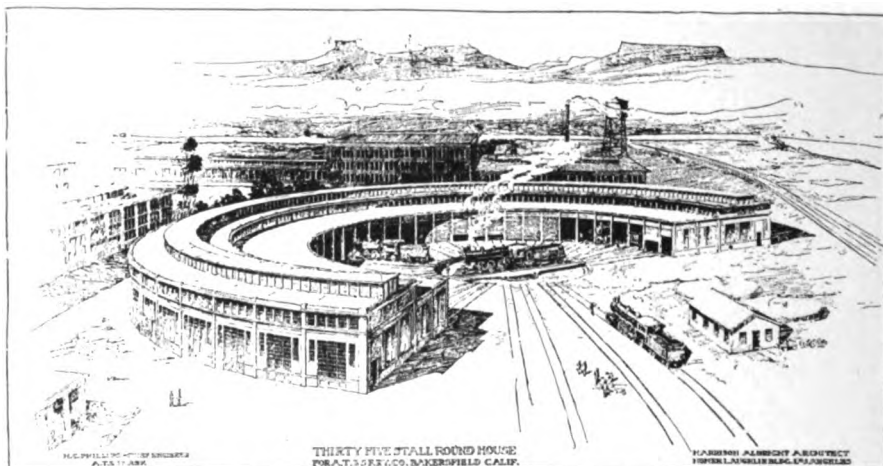
THAT reinforced concrete construction is highly regarded and greatly favored is evident by the great amount of that class of work now under construction in California and, for that matter, throughout the world. The illustrations accompanying this article are of concrete buildings either finished or under way in Southern California and Arizona. All were designed by the writer. The list includes a freight and passenger depot, hotel, curio store and power house at Ash Fork, Arizona, round houses for the Santa Fe Company, aggregating in cost over \$1,000,000; the U. S. Grant hotel, San Diego, to cost \$750,000, and a handsome office building for the San Diego Union Company.

When a great railroad corporation like the Santa Fe Company and such well-known and sagacious business men as U. S. Grant, Jr., and John D. Spreckels, adopt reinforced concrete construction and spend their money therefor it is reasonable to conclude that they have fully informed themselves of the merits of the construction and are convinced of its practicability.

Personally, I believe reinforced concrete is the only construction that does not deteriorate with age and the only construction that becomes better with age.

The U. S. Grant hotel at San Diego, California, is now being constructed on the site of the old Horton House, for U. S. Grant, Jr., son of the late General and President Grant. It will cover a ground area of 200 feet square on D street extending from Third to Fourth streets, opposite the city park.

The basement will extend to street curbs on D street, Third street and Fourth street, making it 214 by 228 feet. It will contain rooms for mechanical



Round House, Bakersfield. Harrison Albright, Architect

equipment consisting of heating, lighting, refrigerating cleaning and laundry plants.

The basement will also contain five sample rooms, each 19 by 60 feet; wine room, 19 by 60 feet; rathskeller, 64 by 77 feet; barber shop, 16 by 65 feet and the following for both ladies and gentlemen: billiard rooms, swimming pool, Turkish, Russian and hydropathic baths and accessories.

The lobby will occupy the corner of Fourth and D streets. In the rear of the lobby will be located the following: General office, manager's office, manager's private office, news and cigar stand, telephone and telegraph rooms and toilet rooms for both ladies and gentlemen. In the rear of the lobby on Fourth street will be the bar room, 19 by 58 feet, and the ladies' buffet. Adjoining these on Fourth street will be the cafe.

The main dining room, 99 by 118 feet, will occupy the corner of Third and D streets. In the rear of the main dining room will be dining rooms for the officers, nurses and valets.

The kitchen will be located in the rear of the main dining room and to the left of the cafe. Located as it is, access is had to the main dining room and the cafe on the first floor.

There is a mezzanine floor upon which is located the library, reading and writing rooms, servants' dining room, bakery and several private dining rooms.

Above the ground floor the building will be in the form of the letter E and in the six stories which comprise this part of the building there will be 412 bedrooms, each bedroom having access to an adjoining bedroom and bathroom and each bedroom containing a clothes' closet, lavatory, radiator and long distance telephones.

The open space on the second floor between the two wings, 100 by 112 feet, will be devoted to a palm garden, the entrance of which is under the great arch between the ladies' and gentlemen's parlors, both of which overlook the palm garden. The "Arch of Welcome" in the rear of the palm garden, the pergola in front of it and the fountain in the center are features that will linger long in the minds of those who visit the hotel.

On the eighth floor are the children's nursery and two assembly rooms with check rooms, dressing rooms and toilets adjoining.

On the ninth floor is the ball room with stage at one end and refreshment room at the other, also a palm room, retiring rooms, check rooms and cloak rooms.

In addition to the palm garden on the second floor, between the Third and Fourth-street wings, there will be two other roof gardens on the Third and Fourth-street wings.

The footings, columns, girders, beams, floors, etc., will all be constructed of reinforced concrete. The floors of the lobby, cafe, bar room, toilet rooms and bath rooms will be of mosaic tile, while the floors of the billiard rooms, ball room and parlors will be of wood mosaic. The floors of all the other rooms and corridors will be of cement with wood fastenings for carpets imbedded therein. The interior trim will be birch finished a rich mahogany color.

The walls and ceilings of all the rooms throughout the building will be beautifully decorated. There will be four high-speed hydraulic passenger elevators, one freight elevator and two sidewalk lifts.

The Union building at San Diego will be the new home of the San Diego Union and the Evening Tribune, as well as that of the various Spreckels companies and the Cuyamaca Club.

The building is being constructed for the San Diego Union Company, one of the Spreckels' companies, headed by John D. Spreckels and Brothers. It will occupy the site of the present Union building and in addition thereto forty-three feet to the south and forty-two feet to the west which was recently acquired. This will make the total dimensions 150 feet on D street by 85 feet on Third street.

The footings, columns, girders, beams and floors as well as the roofs and walls and external ornamentation will be of reinforced concrete. The building will be six stories high above the basement.

The basement will extend under the sidewalk on both Third and D streets and will contain the mechanical equipment of the building as well as the mechanical equipment of the Union and Evening Tribune, and in addition a restaurant and accessories.

The entrance lobby of the building will be in the center on D street. To the right of the entrance lobby will be three stores, each 20 by 85 feet, to the left of the lobby will be three rooms, each 20 by 40 feet, all of which will have entrances from D street. In the rear there will be two stores each 20 by 90 feet, with entrances from Third street.

The second floor will contain the offices of the various Spreckels companies, in addition to a law library to cost \$10,000 for the accommodation of tenants of the building.

The remaining three floors will contain in all eighty-one offices, or twenty-seven offices to each floor, with toilets for both men and women.

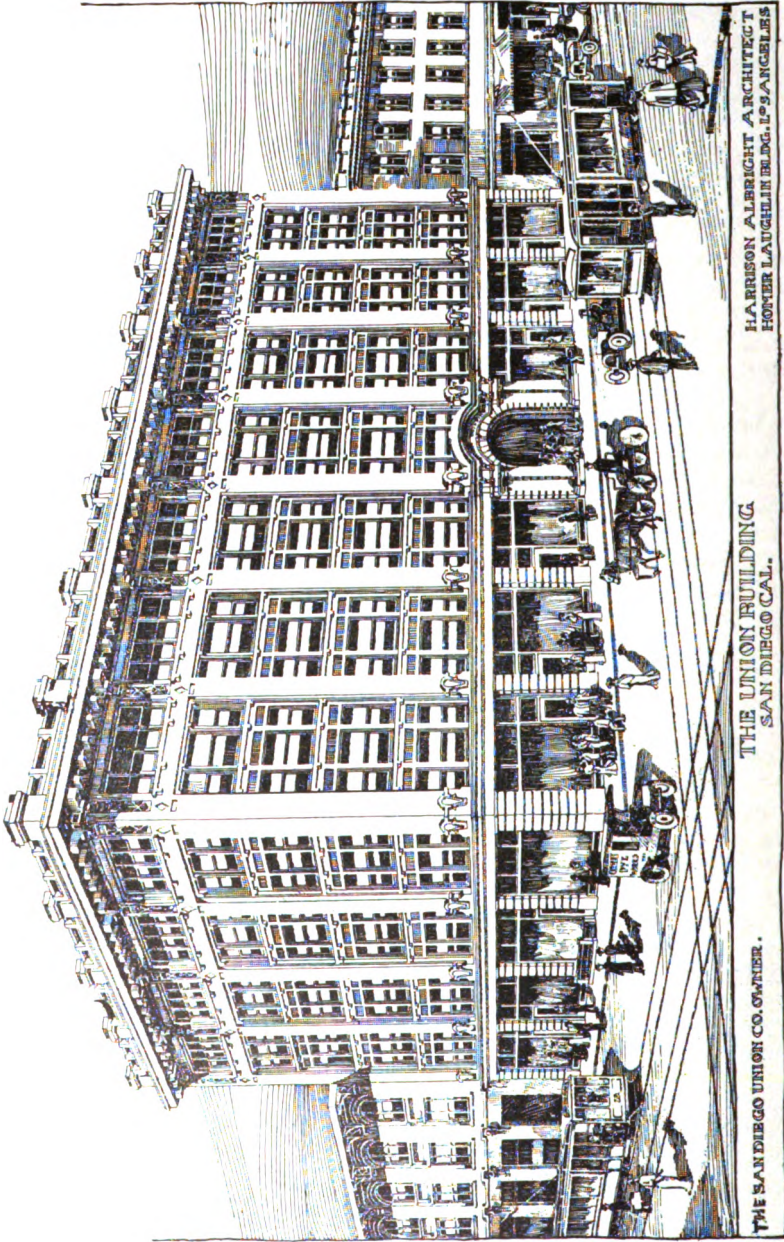
The arrangement of the building is such that all the offices will be opened to the outside air. No office will have less than two windows and many will have three or more. The offices will average in size 14 by 19 feet.

All offices will open directly from the corridors and will be communicating. They will contain clothes closets, lavatories and radiators.

The sixth floor is for the accommodation of the Cuyamaca Club.

The finish throughout the building will be mahogany. There will be two electric passenger elevators running from the basement to the sixth floor. There will be a roof garden over the entire building for the use of the club occupying the sixth floor. The building will be heated by steam, lighted by electricity and cleaned by the vacuum suction system.

The business offices of the two papers in the new building will be on



HARRISON ALBRIGHT ARCHITECT
HOTEL LAUGHLIN BLDG. 17 S. ANGELUS

THE UNION BUILDING
SAN DIEGO CAL.

THE SAN DIEGO UNION CO. OWNER.

Union Newspaper Building, San Diego. Harrison Albright, Architect

the first floor and on the corner as at present. The mechanical plant will be greatly enlarged, including a new Hoe perfecting press, capable of turning out ten thousand copies of a sixteen-page paper every hour, also a stereotyping plant.

The passenger depot, hotel, curio store and power house, now under construction at Ash Fork, Arizona, for the Santa Fe, will have a railway front of 450 feet and a depth of 215 feet. The structure will be virtually four buildings connected by colonnades.

The passenger depot contains the ticket office, ladies' and gentlemen's waiting rooms, baggage room, and toilet rooms for ladies, gentlemen and employes.

The hotel contains an office, check room, reading and writing room and news and cigar stand, bar room, barber shop, lunch room, etc.

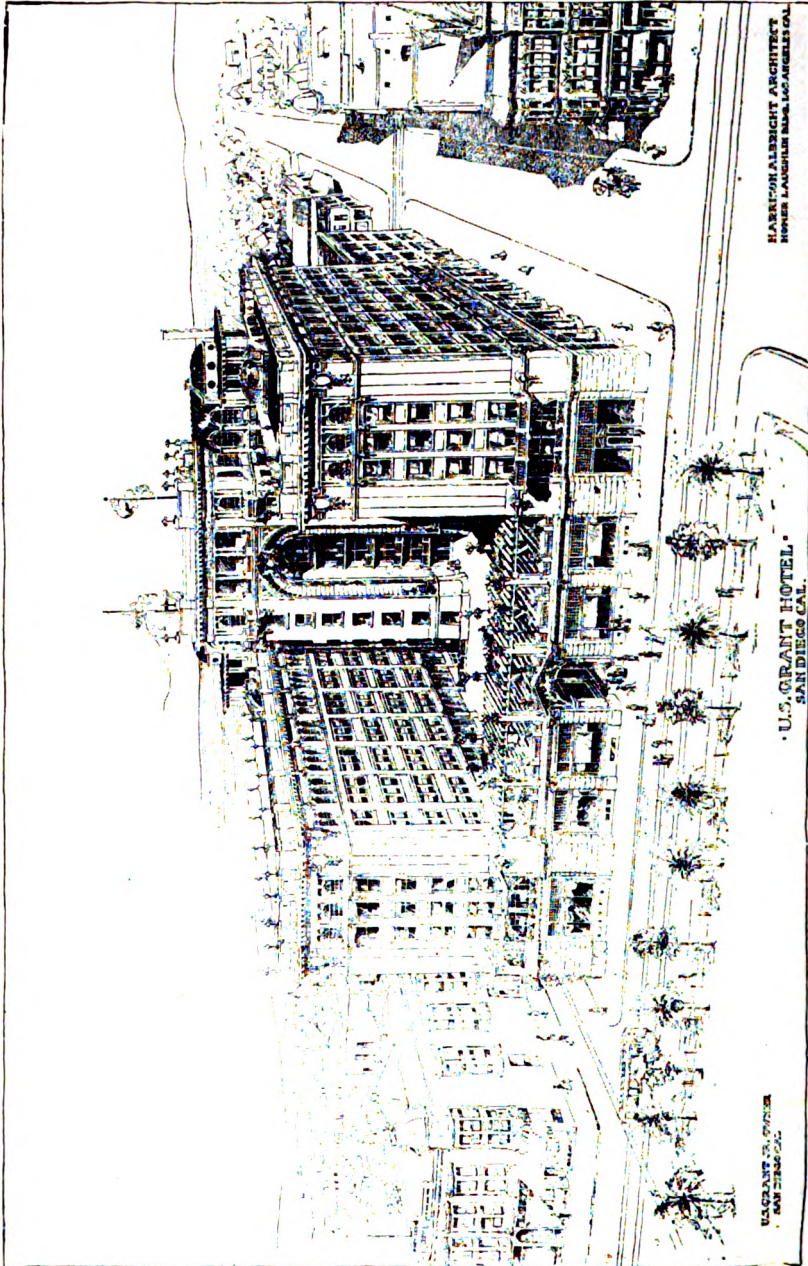
The Bakersfield, California, round house is 850 by 94 feet, and has thirty-five stalls, the San Bernardino, Cal., round house is the same while the Point Richmond round house has ten stalls and the Williams, Arizona, round house, six stalls.

All stalls of each building are alike and are of the following dimensions: 14 feet wide on the inner circle and 25 feet wide on the outer circle. Each stall is 92 feet long, divided into two sections. The stalls have the distinction of being the only two-span reinforced concreted round house stalls in existence. They are also the largest. The columns in the inner circle are 22 by 39 inches, the columns in the center of stall are 18 by 40 inches, and the columns in the outer circle are 22 by 39 inches.

The columns in the outer circle of the stalls and in the center of stalls are of the dimensions given for the purpose of carrying the traveling crane beam girders. Above the crane beam girders the columns are reduced in area and carry the roof girders. Radial lines of girder A are placed on a slope on the columns 17 feet 6 inches above rail on inner circle and 26 feet above rail on the outer circle. Ten longitudinal beams intersect the roof girders and on top of the roof girders and beams is a roof slab four inches thick. The roof girders in the high part of the building and which carry the clerestory longitudinal beams and roof are 11 by 33 inches. Crane beam girders carrying the traveling crane are 13 by 30 inches on both the inner and outer circles. The longitudinal beams are 5 by 13 inches. The clerestory girders are 5 by 18 inches. The exterior walls are seven inches thick. The reinforcement in the footings, columns, girders, beams, etc., is varied on account of different loadings. The footings, columns, girders, beams, walls, roofs, etc., of the building as well as the walls of the ring pits, engine pits, drop wheel pits, etc., are of reinforced concrete. The doors of inner circle are rolling steel; all other doors and windows are wood glazed with wire glass.

The railway company has adopted my design as standard for all future round houses, after much deliberation as to the initial expense, cost of maintenance and cost of insurance. The initial cost was found to be less than any other type of fireproof construction; the cost of maintenance estimated at zero, for reinforced concrete does not deteriorate with age but on the contrary improves with it. The cost of insurance is less than any other type of construction, the liability of fire being so slight that no insurance will be carried.

The Los Angeles freight depot is being constructed under the direction of General Manager A. G. Wells and Chief Engineer H. C. Phillips of the Santa Fe railway company.



HARRISON ALBRIGHT ARCHITECT
HOPPER, LAUGHLIN BANGS, LOS ANGELES CAL.

U.S. GRANT HOTEL.
SAN DIEGO CAL.

U.S. GRANT HOTEL
SAN DIEGO CAL.

U. S. Grant Hotel. San Diego. Harrison Albright. Architect

The extreme dimensions of the building are 1320 feet in length by 91 feet in width. The building is being constructed entirely of reinforced concrete, with clear spans between columns of sixty feet.

One of the many features of the building will be the ease with which it can be converted from a closed building into an open building. The turning of two levers will open one-half mile of rolling steel doors, and the turning of two other levers will open one-half mile of pivoted transom windows.

One half of the length of the building on the ground floor will be devoted to inbound freight, the other half to outbound freight. In the center of the building, on the ground floor, will be the yard foreman's private office, the yard foreman's clerks' office, the transfer company's office and the general toilet.

On the second floor will be the freight agent's private office, department offices, etc.

There will be twenty-four Fairbanks depot scales installed under the supervision of William P. Bemus, expert scale builder, for weighing all inbound and outbound freight. There will be two large freight elevators with automatic gates for conveying from first floor to second floor, supplies for general freight office and files from the general offices of the company and unclaimed freight.

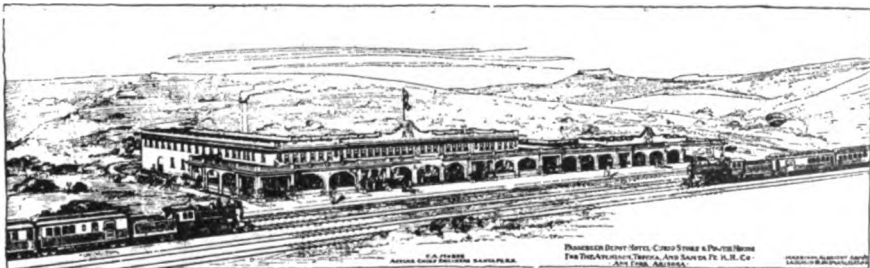
The orders of the general freight agent, T. W. Pate; the chief clerk, A. G. Compton, and the yard foreman, B. F. Rosenfeldt, will be transmitted to their various clerks by means of intercommunicating telephones and pneumatic tube service.

The building will be equipped with a watchman's time detector and an automatic sprinkler and an air-suction cleaning system, and will be heated by steam and lighted by electricity.

* * *

Durability of Concrete

The imambra connected with the Mohammedan mosque at Lucknow, India, contains the largest room in the world without columns, being 162 feet long, 54 feet wide and 53 feet high. It was built during the great famine in 1784 to supply work for a starving people. It is a solid mass of concrete of simple form and still simpler construction. In its erection a mold of frame work of timber and bricks several feet in thickness was first made, which was then filled with concrete. The concrete was allowed to set and dry about a year, when the mold was removed. Although the building has been standing for 122 years, it is said to show no sign of decay or deterioration.



Passenger Depot and Hotel, Ash Fork, Arizona
Harrison Albright, Architect

Cement and Concrete

A Surface Finish for Concrete

*How a Pleasing Texture is Obtained by a Simple and Inexpensive Process.
Conforms to the Plastic Character of the Material.*

By HENRY H. QUIMBY, M. Am. Soc. C. E.*

THE concrete surfaces shown in the accompanying photographs are easily obtained. The process consists in completely flushing the face against the form, removing the form after the material has set but while it is still friable, and then immediately washing and rinsing the surface with water.

The washing removes the film of cement which has formed against the mold, and exposes the particles of sand and stone. The appearance then depends, of course, upon the character of the aggregate in the concrete and the uniformity of its distribution in the mixture. As in well mixed concrete the cement merely fills the voids between the grains of the sand, and the sand fills the voids between the pebbles or particles of crushed stone, the cement visible in this finished surface is so small a percentage that it has very little influence on the color of the work.

A convenient means of securing a well flushed front uniform in texture is to make a fine concrete with the crushed stone or pebbles screened to not exceed say three-eighths inch, and apply it to the face form with a trowel just in advance of the body concrete, and ram the concrete into it or joggle the two mixtures together so as to ensure an intimate union. This fine concrete, or granolithic mixture as it is generally called, may be made of different colored and different graded aggregates for different portions of a structure to compose a color scheme.

The appearance may also be controlled somewhat by the extent of the washing, for if the work be done at the right time, the washing brush can be plied to remove the mortar to a considerable depth between the stones, leaving the stone in a very decided relief and producing a rough coarse texture which, by the way, seems to be the most admired by the majority of observers.

The time to be allowed for setting before washing must be determined with regard to the nature of the cement used and to atmospheric conditions. Quick-setting cement and warm weather call for removal of form within eight or ten hours. The usual practice in summer, using almost any of the American Portland cements, is to remove the forms on the day following the deposit of the concrete. Of course this must not be done with the under or supporting portion of forms for arches and floors where the concrete is subject to stress, par-

*Engineer of Bridges, Bureau of Surveys, City of Philadelphia. Mr. Quimby's article is reprinted from *Cement Age* by special permission of the publishers.

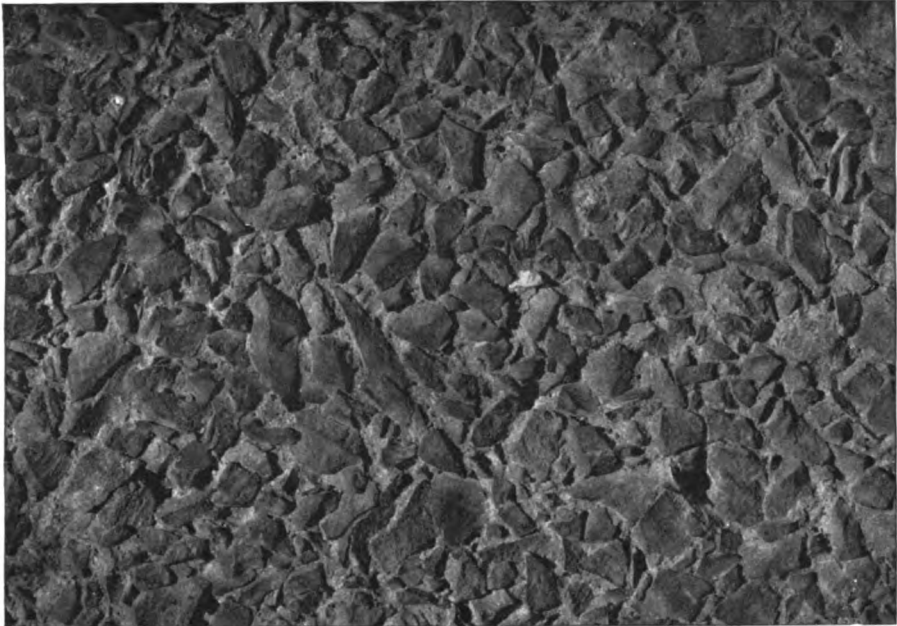


Fig. I. Example of Concrete Composed of 1 Part Cement, 2 Parts Yellow Bank Sand and 3 Parts $\frac{3}{8}$ -Inch Screened Stone. Actual Size

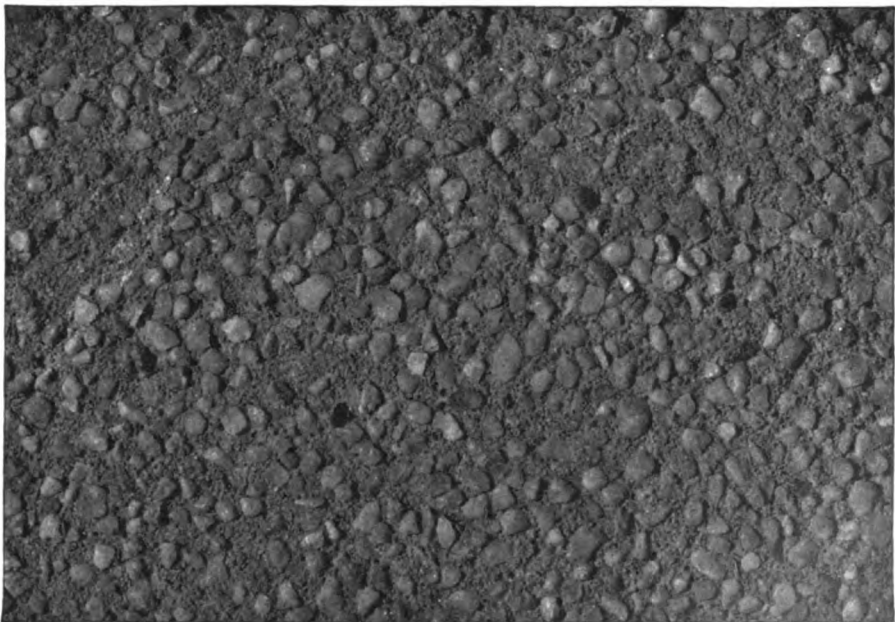


Fig. II. Pebble and Sand Concrete with Scrubbed Surface Composed of 1 Part Cement, 2 Parts Bar Sand and 3 Parts $\frac{3}{16}$ Inch White Pebbles. Actual Size

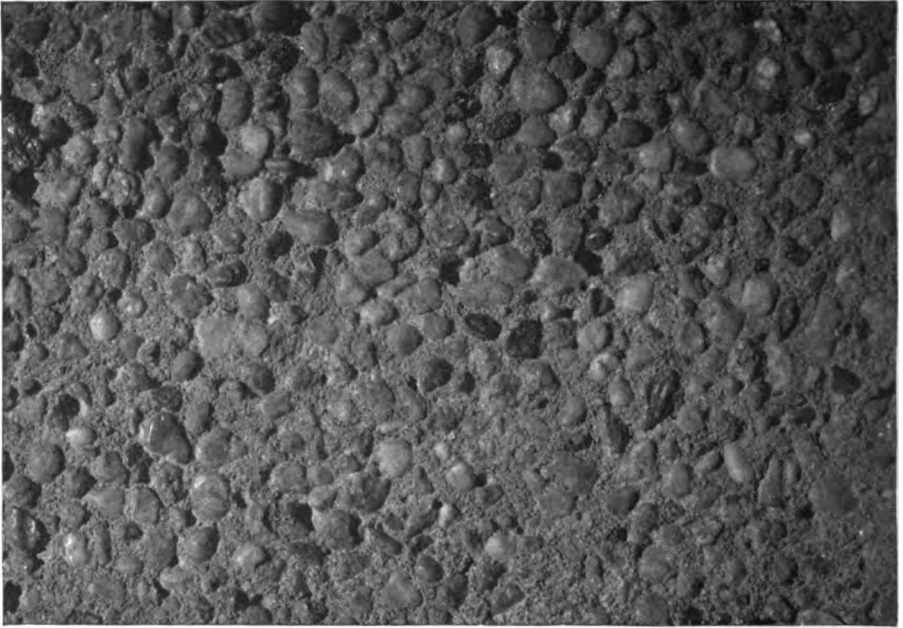


Fig. III. Sand and Yellow Pebble Concrete Composed of 1 Part Cement, 2 Parts Bar Sand and 3 Parts Screened Yellow Pebbles. Actual Size

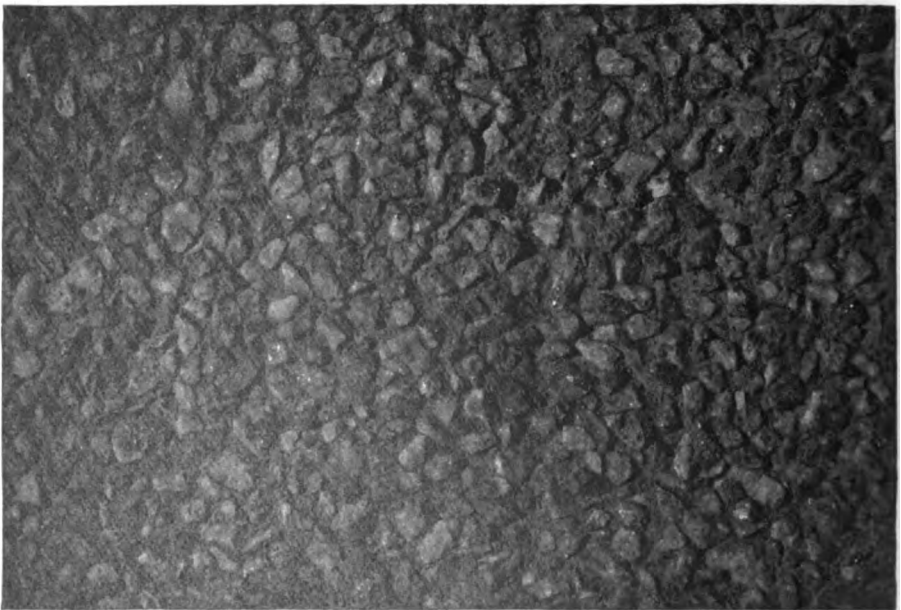


Fig. IV. Granite Grit Concrete Composed of 1 Part Cement, 2 Parts Bar Sand and 3 Parts $\frac{1}{4}$ Inch Granite Grit. Actual Size

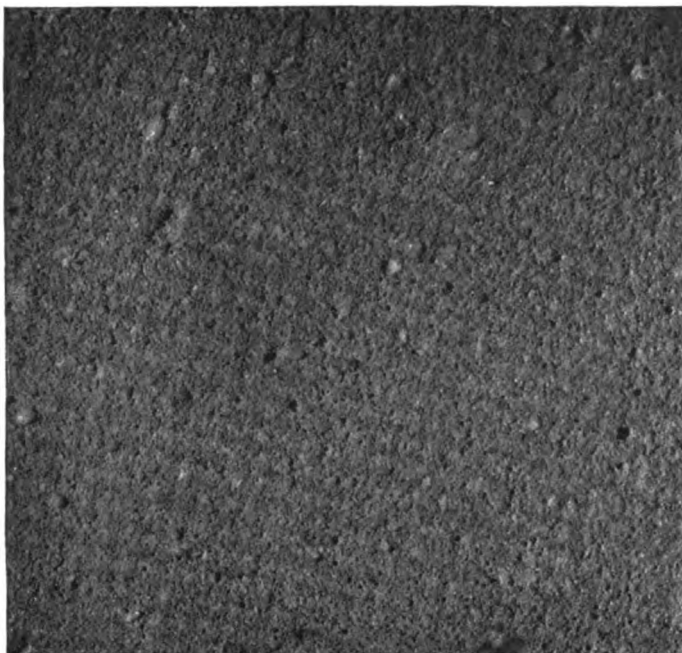


Fig. V. Example of Cement and Sand Mixture Composed of 1 Part Cement and 2 Parts Bar Sand. Actual Size

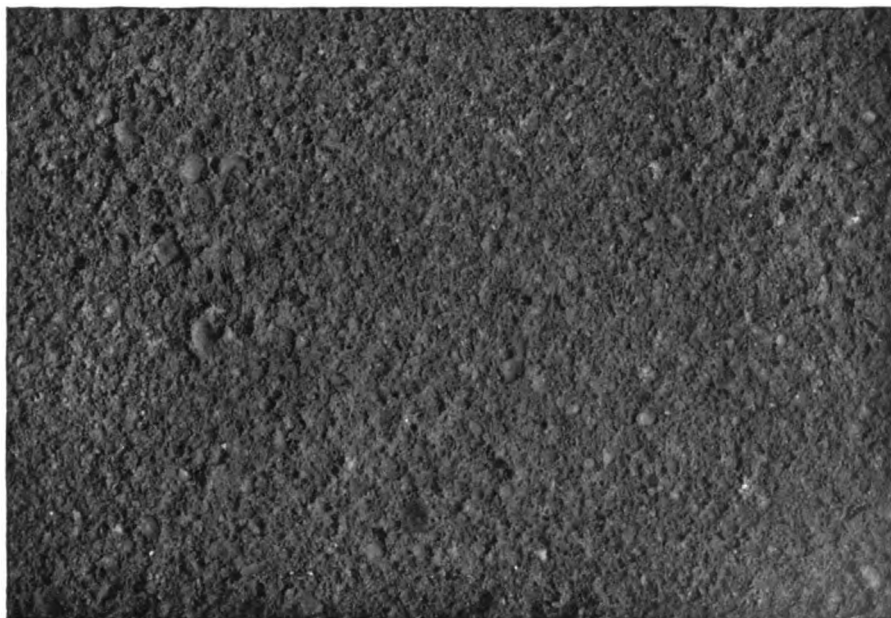


Fig. VI. Yellow Bar Sand and Cement Composed of 1 Part Cement and 3 Parts Yellow Bar Sand Actual Size



*Mission Hotel, Santa Rosa
Stone and Smith, Architects*



Fireplace in a Los Angeles Bungalow

ticularly in combination with reinforcement. Concrete that is sufficiently hard to sustain more compression than that due to the superimposed weight of a few of its own layers is too hard to wash. In cool weather when crystallization proceeds more slowly, the washing is practicable two or even three days after laying, and in cold weather a whole week has been found not too long to leave it in the forms when a slow-setting cement has been used.

If it should happen that a face has been permitted to become too hard for washing with a brush, the film can be rubbed off with a small block of wood or sandstone with a copious flow of water, but it is, of course, laborious and it cannot well be carried to the point of leaving the particles of aggregate in appreciable relief. The nearest approach to the washed surface is the effect produced by dressing with a sharp bush hammer and then washing with muriatic acid diluted one-half. The acid should be well rinsed off.

If the height of the wall to be thus treated is too great to be completed in one day, face forms must be constructed to facilitate the removal of the planking without disturbing the studs or uprights. This is easily accomplished by setting the studs 8 inches to 12 inches away from the fact line and supporting the planks with cleats—say 2 inches by 1 inch—tacked to the studs and the planks. This permits the lower planks to be removed and the washing done while the upper planks are in place and concrete being deposited. With the exercise of very watchful care on the part of the workmen and unremitting inspection two different days' work can be joined so that after washing, the joint will not be unsightly—even scarcely distinguishable, but such work is usually not obtainable throughout a structure, and it is found very easy to obtain thoroughly satisfactory joints by indenting horizontal grooves at regular intervals representing courses, and finishing each day's work at the apex of a groove. These indentations are made by means of triangular beads on the face forms. Usually the bead is the beveled edge of a strip set between the face planks and lightly secured to the planks with partly driven toe nails so that, if desired, a plank can be removed independently of the bead above it, the bead remaining to set the plank upon for the next course. These grooves in the face of a wall improve the appearance by relieving the blankness of a large area. It is found practicable to prosecute the work with one course of planks where the capacity of the plant for one day is equal to only one course of concrete. In this way the same planks have been used for many different courses on four or more different structures.

The cost of washing depends upon the degree of hardness attained by the face. If it be taken at the right time three or four passages of an ordinary house scrubbing brush with a free flow of water from a hose or sponge will be all that is required, and a laborer should wash say one hundred square feet in an hour if the work is conveniently accessible. With a harder surface, such as it is likely to have within twenty-four hours in summer, scraping with a wire brush first will accelerate the washing which may then require from two to five hours for one hundred square feet. Bush hammering will cost probably from five to ten cents per square foot according to the quantity and the outfit.

This wash method of finishing has been in use for about three years, and the surfaces are quite as pleasing after the lapse of time as when fresh. As yet no hair or surface cracks have been found in any work that was washed, which is doubtless accounted for by the fact that the only material in which such cracks can develop is removed by the process.

A material advantage in the use of forms that are removable while the concrete is green, is found in the opportunity for repairing blemishes. Incidental voids can be filled with the same material and bulges can be rubbed off because of its freshness without impairing the finish.

The accompanying illustrations are from photographs of specimens of various mixtures. The round baluster which is a left-over from a bridge is composed of 1 cement, 2 unscreened yellow bank sand and 3 cleaned 1-4 inch crushed dark stone. The square baluster, also a left-over—is composed of 1 cement and 3 uncleaned 1-4-inch crushed dark stone, the stone dust forming the sand portion. The mixture was used for the whole body of the baluster in each case, iron molds being used, and the washing done within twenty-four hours. The six cuts representing different mixtures as labeled show the actual size of the original.

It is very important to direct the reader's attention to the fact in all of the concrete surfaces shown herewith the coarse aggregate projects in low relief. It may appear to one person in proper form while to another it may seem sunken or intaglio, as though the surface had formerly been incrustated with pebbles and sand, which had washed away. This is a curious optical illusion governed by the position of the light as it falls upon the page. If what are really crushed particles of stone or gravel in relief should appear as depressions, turn the picture upside down or in proper position to get the true impression.

* * *

Structural Association and Its Affiliations Terminate

THE following is a copy of a circular letter sent out by the Structural Association of San Francisco:

"At the regular Association Meeting of December 20, 1906, it was voted to adopt in full the Report and Recommendations of the Committee previously appointed to outline the program for bringing the Association's work and life to a dignified ending.

"The report reads as follows: 1. That public meetings be discontinued after the meeting of December 20th, 1906, except at the call of the President; 2. That the weekly publication of the Association be discontinued after the last December issue; 3. That dues for the first six months of 1907 be \$3.00, during which six months it is contemplated that all reports will be submitted, edited, and published in permanent form, and the Association's work as originally outlined, practically completed.

"These moneys, for 1907 dues, are needed for the clerical expenses, incident to a preliminary editing of the final Reports; and the Executive Committee trusts it will receive the complete support of all members.

"For the Association,

C. DERLETH, Jr., Secretary."

* * *

Tit For Tat

A plumber who was sent to the house of a wealthy stock broker to make repairs was taken by the butler into the dining room, and was beginning his work when the lady of the house entered.

"John," said she, with a suspicious glance toward the plumber, "remove the silver from the sideboard at once and lock it up."

But the man of lead was in nowise disconcerted. "Tom," said he to his assistant who accompanied him, "take my watch and chain and these few coppers home to my missus at once."

The Architect's Relation to Concrete Construction

By JENS C. PETERSON, Architect, in Concrete.

IN an article in the October issue of *Concrete* on the question of the architect's relation to the use of reinforced concrete, some points are brought out that might have more light.

It seems from the writer's point of view that Mr. Brayton, a civil engineer, who has written articles in a recent issue of the *Architect and Engineer of California*, fears that the increasing force and power of concrete construction concerns is going to brush aside the general concrete architect and make his consultation and authority on items of strength and proportions uncalled for or unnecessary to them.

Mr. Brayton seems to contend that a standard method of reinforcement should be adopted in such a form that the architect, engineer or contractor is made entirely independent of any patented systems, and at the same time a standard should be arranged so that where it is shown to be profitable a patented section could be substituted for the standard reinforcement drawn in the plans of the designer.

The writer, with other architects who are interested in reinforced concrete construction and cement buildings in general, has found that so far no general standard styles have been adopted by the profession, but a scale sectional drawing has usually been made by the architect or designer, similar to those generally made for terra-cotta work, and terra-cotta sections.

If the architect does not care to discriminate between certain methods of reinforcing, he can specify the floor or column loads that will be imposed. This will leave the matter open for competing contracting and engineering firms, but would not necessarily instigate a free for all "scrap" as to who can do the work for the least money; but each firm from its own data and files can figure at what price it wishes to undertake to do the work under imposed conditions.

The architect will generally be consulted at the time a decision is made awarding the contracts or work (if same is done on the "cost plus a percentage" basis, or a "cost plus a fixed sum" basis, or by a direct contract), and should know from familiarity with or knowledge of each different style of reinforcement which one would be best for his clients, building in conjunction with the prices named, just as he would do in selecting a pressed brick, a tile-facing or other building material.

No one has heard an architect say anything for or against any certain kind of built-up steel column, though some of these are patented. Why should he discriminate against any one of the good forms of reinforcement?

The architect is not the agent of the contractor, but of the owner, just as he always has been. It does not signify that because certain large concerns are "designing and building," the architect is to be in any way handicapped or that his progress along similar lines of construction is impeded. He should be in a position to judge of the merits of all kinds of reinforcement without discrimination or partiality, and select for his client that kind which would best meet his certain requirements.

This is a progressive day; larger and better buildings are being built now than ever before. The systematizing of the handling of manufactured products and the changing of manufacturing plants to facilitate their work, cause owners to destroy the buildings that were built yesterday and rebuild them today in order to get a better relation between the departments of their works. Hence they must rebuild quickly and economically. Concrete seems to be the

material to meet these requirements, and with careful and conservative building it will meet every demand.

The architect is not being crowded out of his old-time prestige by the engineering concerns who design and build of concrete. He can and should get out his drawings and designs to suit his own ideas and tastes and surrounding conditions, together with those of his clients. He should study to make them artistic and harmonious, keeping in mind, if he will, the unlimited possibilities of concrete construction, since with reinforcement it may be said that it has no limitations. When the drawings are well under way, he may call in the engineer and the specialist, just as he does in the planning of brick and steel building frames and in terra-cotta covered buildings.

How many architects today execute anything more than the elevation drawings of terra-cotta trimmings, etc.? How many know how much it shrinks in burning or exactly how much a certain section will carry under all conditions? These matters are left to the manufacturing engineer, who executes his patterns and molds to conform to the designs laid down by the architect. The architect knows of course how those materials must be anchored and broken into sections and also about what he can do with them. The architects and engineers are both specialists; each should conduct his own specialty.

Some of us remember the "radical" ideas brought out when the first steel-framed building was built on La Salle street, Chicago. Yet this class of building endured. None the less "radical," in the opinion of some of our architects today, is the idea of a sixteen-story reinforced concrete building.

The increasing capacity of big contracting concerns who build in concrete is due to the fact that they see the possibility of the uses of cement and steel, and are grasping them.

* * *

Comparison of Cost of Concrete and Stone Masonry

THE cost of concrete and stone masonry varies largely with the local conditions and the character of the work on which they are used, says the Scientific American, but there are very few places where concrete masonry is not only cheaper than stone masonry, but better, being much stronger and more suitable in many ways. This fact is becoming more generally recognized, and more than one quarry which in former years produced building stone is now producing crushed stone for concrete. The following figures give a general idea of the comparative cost of brick masonry and concrete per cubic yard:

Brick:

500 brick	\$3.75
$\frac{3}{4}$ bbl. cement	1.50
$\frac{1}{4}$ load sand50
Labor	2.25

Making a total

\$8.00

Concrete:

1 bbl. Alpha cement	\$2.00
$\frac{1}{4}$ load sand50
Broken stone	1.50
Labor and forms	1.50

Making a total

\$5.50

From the above it will be seen that on this basis there is a decided advantage in favor of concrete.

Buildings Cast of Concrete

DESCRIBING his plan to mold whole houses in a single casting out of solid concrete, which will provide homes for workmen at a cost of \$500 or less, Thomas A. Edison, the wizard inventor, says:

"The first step will be to employ an architect to design, say, a dozen dwelling houses of different patterns. I purpose to have metallic molds made to correspond. The mold for each house will be made in detachable parts. There will be separate plates and small molds, that can be screwed together easily to form one mold for an entire house. That a fine finish may be obtained, the inside surfaces of the parts will be nickel-plated.

"After the mold for the whole house is set up it will be a simple matter to pump the concrete into every nook and cranny. After four days the parts of the mold will be unscrewed and taken off and the solid concrete house will remain."

Edison says the plan will be carried out in such detail that dormer windows, chimneys, spouts, and ornamental designs will be molded with the whole, and that inside cupboards, fireplaces, stairways with ornamental banisters, mantel pieces, and even bath tubs will be formed in the cast in which the house proper will be made.

The house will be so complete that when the mold is removed the installation of electric wires, window sashes, etc., will be all that will be necessary before the furnishers and carpet layers may go to work. Even the plumbing and gas piping will be of concrete and molded in the original cast.

As a practical demonstration of what may be accomplished by the process Edison has built a complete chicken house in his back yard, molded in one solid piece of concrete. It has many compartments, and doorways and decorated cornices of intricate design.

The original cost of each mold, with all its component parts, the inventor estimates at \$25,000. From each mold, however, he says an unlimited number of houses may be produced. Because the parts of the mold are to be detachable it will be portable and one mold may be sent with little difficulty from town to town. About ninety houses could be built in one year by the use of a single mold, at a cost of from \$500 to \$600 apiece.

* * *

Concrete Will Not Supersede Steel

BUILDINGS should not be constructed of reinforced concrete throughout. Such is the verdict of a well-known member of the American Society of Civil Engineers, who has just published a book dealing with the San Francisco fire. The writer made a thorough investigation of more than eighty buildings in the burned district, and has come to the conclusion that the protected steel frame type of construction is superior to all others in fire-resisting qualities. That there is great doubt about the ability of reinforced concrete buildings to withstand the severe heat of a conflagration is shown by the following paragraph in the current issue of a leading engineering weekly:

"Are these buildings an engineering mistake? Are the engineers and architects and contractors who are putting them up, building wisely and safely for themselves and for the owners; or may they look back some day and be filled with sorrow and regret because of the destruction of life and property?"

"Light has just been thrown upon this question by tests of reinforced concrete columns recently conducted in Chicago, and witnessed by many well-

known engineers and experts of the Chicago building department. The tests were conducted with a number of columns made from concrete mixed according to standard specifications. Each of the columns was subjected for three hours to a temperature averaging 1600 degrees F. At the end of that time, under load tests, it was found that the columns had lost more than 70 per cent of their original strength.

"Various lengths which had been cut from the columns before they were tested were covered with three inches of porous terra cotta and subjected to identically the same heat and load tests. Upon examination the columns were found to be in perfect condition, not having lost any of their original strength."

These tests prove that unprotected concrete columns are no more fire-proof than steel, and that if they are to withstand fire they must be protected with hollow tile in the same way that the steel beams and girders in our big sky-scrapers are now protected.

What will happen when fire attacks buildings in which concrete columns are left unprotected from heat is yet to be seen. There is no such doubt in regard to buildings of the protected steel and hollow tile type.—The Western Architect and Builder.

* * *

Why We Should Urge an Increased Use of Brick

THE common building brick industry stands in need of seed-sowing service. As the great common people are the base of all industrial life, so the common building brick is the backbone of the clay industry. The use of common brick is increasing right along, but not in proportion to its merits as a building material. Brickmakers should lose no opportunity of bringing the merits of brick to the attention of builders. Not only is the time ripe for seed sowing, but the ground is in excellent condition for cultivation. Our forest wealth is disappearing to an extent that ere long all available timber will be needed for cabinet work and special uses outside of structural work, and some other building material must take its place. If this fact is brought to the attention of builders, they will turn a willing ear to those who advocate a more lasting material. It is natural for people to want to build better homes and to build them of material that will withstand the ravages of time and stand as a monument to the builder long after he has himself turned to clay. This is a worthy pride, this pride of permanent home building, and should be encouraged in every possible way, not alone because it means material profit to the brick-maker, but because it will help mankind in general by encouraging the use of the best building material on earth. To build better is to think better and to live better.—The Clay Worker.

* * *

A New Wall Material

M. A. Waller, of Vienna, Austria, says it is only a matter of time when tile and steel now used in decorating and covering interior walls of stores and dwellings, will be replaced by a new material recently put on the market in Europe. It is called metloid and is already extensively used in European construction. The material is adjusted with a certain glue. Much more elaborate decorations are said to be obtained by the use of this material, which looks and weighs much like tin. It is less costly than tile or steel and can be washed and scrubbed with no injurious effect.

Fire Protection

The Red Monster

By F. W. FITZPATRICK

The International Society of Building Commissioners, of which Mr. Fitzpatrick is executive officer, is meeting with some success in having cities consider the re-vamping of their tax systems. As things are now, the more money a man puts into a building, the more precautions he takes against fire, for instance, the more is he taxed by the municipality. It is suggested that a more persuasive means should be employed by communities to get people into the notion of building better by graduating the taxes on property according to that property's safety or danger; that the man with a fireproof building should pay a less pro rata tax than the one owning a fire-trap. Such an arrangement of taxes would be equitable to all. It would put the burden of maintenance of fire departments upon those who needed the service, and would relieve those of that tax who are public-spirited and businesslike enough to build so as to not require such services. It is the one sane solution of the problem, and all right-minded men should join in the effort to bring about this much-needed reform in taxation.



NERO destroyed Rome to amuse himself, a little pastime that cost that nation many millions of its golden coins; French and other revolutionaries burned many cities; the Russians fired Moscow merely to cause that other devastator, Napoleon, some inconvenience, and in more recent wars whole cities have likewise been destroyed for strategic or other alleged reasons, but in our day and environment all our great conflagrations have been attributed to Accident. Erroneously, however; for the real culprit's name is STUPIDITY.

Strange though it may seem our people have only begun to suspect him; like many of our institutions he is being investigated and there is some talk of indicting him, but alas and alack, there is scant hope of a speedy trial and still less probability of his being put away where he can do no further harm.

In the times of our fathers, the pioneers, it was economy to build of wood. That created a precedent. And so people got into other habits of construction then and in times immediately following, habits that have stuck to them most tenaciously since, though the necessity or excuse for doing things in that or those particular ways disappeared years ago.

To build of wood today, and particularly in congested districts, and to do much else in our buildings that we do do, things that insure rapidity of combustion, that endanger life, that make destruction of property certain is no longer economical, but on the contrary is foolishly extravagant and positively, criminal. At law ignorance is no excuse,

but in this case it would seem that the most that could be laid against the people is that they are more or less innocent accessories before and after the fact. The architects are the most to blame for the fact that the people have remained in the rut of poor building. Indeed is not the profession chiefly to blame for nearly all the sins of bad building, insufficient building laws, resultant fires and our troubles and losses in that line generally?

Some people have recognized the condition, and frantic efforts are made to effect a cure. Most of them have been applying remedies, giving medicines after the trouble has started; few have thought of eliminating the disease or at least preventing its dissemination. Every effort has been made to put water on fire, to drown it, after it has started; few have ever even thought of cutting the fire damage down by giving it *less fuel* to burn.

Things have gotten to such a pass, however, that even if we should be sane enough to add nothing more that can burn there is already so very much fuel all about that we must perforce retain all the cures, the costly paraphernalia for fighting fire, in order to cope with the conflagrations that are bound to occur. But is it not the epitome of folly to keep on adding fuel? As the nation has grown in importance and prosperity so has increased its awful tribute to the Red Monster, though there is no more reason for that proportionate increase than there is for a proportionate increase of smallpox or the other pestilential diseases that have well nigh been wiped off the list of our supposedly necessary evils.

The tribute levied upon us by fire has reached an appalling figure, something tremendous, and, mark you, unlike most "losses" that are, after all, mere exchanges of money or values from one man's or set of men's pockets to other pockets, this loss is absolute; all that remains after fire is—smoke! And so far, with all our vaunted inventiveness, no one has been able to turn the latter commodity into any commercial use.

Tabulations may be convincing but certainly are awfully tiresome reading, so let us eschew them. But we can well afford to give a minute's time to a glance at the matter of the cost of fire, merely considering it in its general aspect and in round figures.

We actually have invested at the present moment \$14,250,000,000 in the 11,400,000 buildings of which the nation boasts. Russia has 36,000 more buildings than we, but the total value of all her structures is but \$3,500,000,000 (United Kingdom, 7,100,000 buildings; France, 9,000,000; Germany, 6,000,000; Holland, 1,000,000) so that we can safely say that we are the greatest builders of the age. Yet of all those millions of our buildings there are barely 4,000 that can lay any claim to being modern, up-to-date, and fire-resisting to the extent that their steel-frame and structural parts can not be over much damaged by fire, though all else about them is just as inflammable and damageable as the flimsiest construction of Slav, Mongolian, or other so-called semi-barbarian. In all this great country of ours there are probably not 20 what can rightfully be called moderately fire-proof buildings, and they are generally warehouses or structures of such character. Of the millions of homes throughout the land, palaces or cottages, there where we house those who are dearest to our hearts and our most valued material possessions, there are but three hundred that would withstand for even a little while against even a moderately hot fire, and there are certainly not over ten that are fire-proof.

Intelligence, progressiveness, leadership, are words we frequently hear applied, aye, that we constantly use in describing ourselves, what application have they to our generally accepted mode of constructing buildings. True we have evolved the "skyscraper," no other people on earth have the conveniences in their homes nor do any other people bring such skill to bear in the

utilization of every inch of space as we do, but at the same time, let not those things make us over-conceited, for we have to acknowledge that nowhere else, not even in China or Japan, the lands of paper houses, is the annual fire loss in bulk or pro rata, anywhere near our own!

And what does this folly of flimsy building cost us? In the first place nearly 7000 lives are annually sacrificed to the god of fire. In property we have offered up over \$1,000,000,000 worth in value on that same pyre in six year's time; our annual offering has reached the \$200,000,000 mark. But, stay, That is our *normal* yearly loss. Now then, what constitutes a normal year? A period during which there are no extraordinary conflagrations. We have barely recovered from the Baltimore fire. That took up the year's total to \$250,000,000. We were told that 1904 was therefore an abnormal year and probably would not have anything equal to it for the next twenty years. But here, just exactly two years later, we are confronted with the San Francisco horror, a fire that has cost over \$320,000,000. The year is but half over, yet if nothing else happens, no other great conflagration occurs, the year's losses are bound to aggregate over \$500,000,000. Are we not more or less justified in calling these tremendous losses *normal*, and the years when they do not occur *abnormal*? True, the San Francisco fire was primarily caused by an earthquake, but the actual earthquake damage scarcely reached \$10,000,000 of the enormous total we have just noted, and, earthquake or no earthquake, had San Francisco buildings been better built, had they offered less fuel for consumption there would certainly have been less to burn and therefore less total damage. But even in so-called normal years our average has reached three theaters, three public halls, twelve churches, ten schools, two hospitals, two asylums, two colleges, six apartment houses, three department stores, two jails, twenty-six hotels, one hundred and forty flat buildings and sixteen hundred homes burned every week. New York averages 8700 fires a year, Chicago 4100 and every day in the year there are 36,000 lives directly endangered by fire.

All on account of poor building!

We have built so wisely that 1,000,000 buildings have been destroyed by fire during the past ten years. What a commentary upon the intelligence of our architects!

Small wonder that we have to exhibit such wonderful activity in building as we do. Why, in New York alone there will be over \$200,000,000 worth of construction this year, and in the entire country probably \$750,000,000 will be spent in buildings during the year 1906. But what think you of the people, whatever its activity in the building line, that tolerates conditions that insure that there will be utterly wasted, destroyed, lost, in one year's time buildings equal to five-sevenths of the *entire* year's product?

Then there is the costly paraphernalia we have to maintain to fight fire. In salaries alone we pay over \$125,000,000 for our departments; then special water supplies, apparatus and all that sort of thing easily eat up another \$200,000,000. And last but not least is the tribute we pay to the gentlemen who condescend to gamble with us on the fire question, the insurance companies.

We have paid them in premiums \$1,610,885,242 in ten years. True, they indemnify us for our losses to a certain extent, it is a case where we win sometimes, but as in all gambling operations "the house" gets and keeps the major share of what money comes within its door. For instance, last year, throughout the country we paid in premiums \$196,352,374, and got back from the companies in paid losses \$95,272,488. But in years like this their gamble is not so productive, it is a case where the bank gets broken. Some of the smaller fry simply close up and get out of business, others quibble and

litigate, some pay up every dollar and try to look pleasant, and still others will try to effect compromises, but rest assured it will be many a long year before the San Franciscans will have gotten all that is coming to them rightfully from the insurance companies.

Positively the only redress a sensible man has is to so build that he need carry no insurance with the companies, that his building be as nearly absolutely fireproof as possible, and that the only loss that can occur is from fire in the contents of some one unit of space in his building, an insignificant loss at best and one that he can insure himself. Such a building is possible, not prohibitive in first cost, indeed actually an economy ultimately and a very decided advantage to the individual and the community.

Of late the companies seem to have awakened to the realization that their own welfare really lies in the direction of better building, and they are offering some advantages and a lot of advice in that direction. But the greatest help can only be derived from people's own intelligence individually and collectively. Individually, they must see that such losses as we submit to these days spell, in spite of our great prosperity and seemingly inexhaustible resources, ultimate bankruptcy; collectively, communities must realize that the fire drain is intolerable and having come to that realization, it is only another step to an intelligent re-adjustment of taxation that, more than anything else, will bring about the much to be desired corrections in our mode of construction. Let our tax be adjusted against improved property on a sliding scale; let there be a certain standard of construction established; upon all buildings being built or in existence that are below that standard let there be assessed an increased rate, for it is on their account that costly fire departments and other municipal expenses are incurred, and let there be a decreased rate of tax levied upon buildings that are above that standard of construction, they require the minimum of protection and their owners should benefit accordingly. An equitable, sane and encouraging system of taxation.

The next question naturally propounded will undoubtedly be "What is a fireproof building?" The answer, strange as it may seem, will be to point to San Francisco: that of all places, would seem to be the one least qualified to aid us in our search. In that city of fire-traps there were perhaps fifty buildings, the newer and larger ones in which any attempt was made to minimize the ravages of fire. Think of it! fifty buildings, in which some little thing was done toward fireproofing, in all that great burned district of nearly eight square miles, 700 city blocks, probably 18,000 buildings. In 30 of that 50 the steel skeleton was protected with fireproof clay tiles or some one of the substitute concrete systems. Generally speaking throughout the country as well as in San Francisco, the moment a man makes that provision against fire, protects his steel work thus with tile and builds his floor and partition construction likewise of tile or of a substitute system of concrete he deems his building "fireproof," advertises it as such and people occupy it in that belief. All else about the building is as inflammable as the veriest tinder box, his interior finish, his doors, his windows, every thing that can possibly be so is of wood, and the result is that sooner or later his building in all save the actual structural steel and tile is more or less seriously damaged by fire and the term "fireproof" receives an additional black eye and people swear there is no such thing.

* * *

"Say, Dick, what is this new fad they call phonetic spelling?" "It's the kind Jim, they used to flog you and me at school for using."—Baltimore American.

Terra Cotta and Brick

A Brick

By FRANK HONEYWELL.

"That man's a brick."—A thing of clay I see,
Baked to an adamant consistency,
Dugged from the earth and worked and in its mold
Crowded and pressed and dried and burned and sold.
But now the human brick an honor gains
Unbounded by six geometric planes:
The common brick is laid into a wall,
Sealed by its mortar firm against a fall;
The brick that walks and sees and breathes, howe'er,
Blessed with an intellect with love awake,
Brave in forgetfulness of self, with care
Seeks to work blessings for humanity's sake.
The human brick, when honor's walls are broke and swayed,
Leaps into place and sticks without the mortar's aid.

—Exchange.

* * *

Advantage of Brick Buildings Over Others

IN a recent interview a well-known Kansas City contractor gave out the following brick information:

"By employing actual figures a better comparison may be obtained. Let us assume a house to be 30x40, with basement, first-floor and second-floor heights 8 feet, 9 feet 6 inches and 9 feet, respectively. For a comparison only the finished exterior walls, including interior plastering of same, will be taken into consideration, as the interior finish will remain the same in all cases.

"First—The frame structure, with three coats of paint, will amount to \$2435.

"Second—A frame construction with pressed brick veneering, at \$20 per thousand, will cost about \$248 more than the frame.

"Third—A pressed-brick veneering, at \$20 per thousand, with tile backing, will cost about \$263 more than the frame structure or \$35 more than the frame construction with brick veneer.

"Fourth—The solid brick wall with pressed-brick facing, at \$20 per thousand, will cost about \$363 more than the frame structure, or \$115 more than the frame construction with brick veneer, and \$80 more than brick with tile backing.

"The material used for division walls or partitions should receive as careful attention as the outer walls. A frame partition lacks the quality of being

fireproof, but is the one most commonly used because of its cheapness, being but 11 cents per square foot. A brick partition is not very desirable because it requires an unusually heavy wall, which cannot rest on the floor unless it is supported by a firm foundation. This must either be solid walls or intermediate supports, thereby incurring an additional expense. Such a partition, exclusive of its supports, costs 20 cents per square foot. Tile partition is the cheapest as regards the cost of material, but as additional provisions are required for carrying its load, the cost may be considered as being the same as a frame partition. The brick partition will be excluded as being undesirable, therefore the choice will be limited to either the frame or tile partition. The fact of the tile partition possessing the quality of being deafening, fireproof and durable makes it the one which is more worthy our choice.

"Now, having established our comparisons between a frame and brick structure as to actual cost (a difference of \$363 on a \$4000 house complete), it will be seen the former is slightly favored. In ten years' time the difference in cost which exists between the frame and brick structure will be entirely eliminated and the cost of both will have been the same, as the repairs, painting and insurance considered will almost amount to the difference. The repairs and painting will alone be about \$40 per year after the first three years, and the insurance has a higher premium on combustible structures.

"The appearance which a brick house presents at the end of a long number of years is most gratifying, standing as erect and perfect as the day of its erection, having caused the owner at no time the trouble and expense a frame house would have made. He who foresaw all this at the beginning will appreciate and realize to what extent his broad intellect and clear insight as to the future resulted in."

* * *

Statistics of Clay Working Industries

THE report issued by the United States Geological Survey, containing statistics of the clay-working industries in the United States for 1905, shows a substantial increase in the manufacture and value of these products.

The common brick industry, the most widespread of all the clay-working industries, makes up a little over half of the brick and tile value, and 41 per cent of all clay products. The number of common brick increased from 8,665,171,000 in 1904 to 9,817,355,000 in 1905. New York continues to be by far the largest producer of common brick, reporting over one and one-half billions, valued at \$10,297,214. The next largest producer of common brick is Illinois, which marketed 1,125,024,000 in 1905. The only other state producing over a billion common brick was Pennsylvania.

The greatest per cent of increase in all clay products is that of front brick, the production of which jumped from 334,351,000 in 1904 to 541,590,000 in 1905, a gain of 24.69 per cent. The average price was raised, too, increasing the gain in value to 27.84 per cent. Pennsylvania was the leading state in this product, and the average price in that state was \$12.81. The next largest producer was Ohio, with an average price of \$12.01. New Jersey was third in quantity, but beat the leading states in average price, the price there being \$15.86. Illinois, which came fourth, only realized an average of \$11.44 for her front brick. On account of this the value of the Illinois product was exceeded by Missouri and by Virginia. The percentage of front brick in relation to the total of brick and tile products was raised a little, it now being 5.84 per cent, or 4.75 per cent of all clay products. In 1904 these percentages were 5.25 and 4.24.

Architectural terra cotta showed an increase during the year of nearly a million dollars, or 21.81 per cent, and is now 4.11 per cent of the brick and tile products. This industry is more concentrated than any other, that is, there are fewer of them in any given state. In fact, the reports say that only four states show more than three industries. New Jersey is the leading state and furnishes nearly one-third of the entire amount. New York has second place, Pennsylvania third.

* * *

About Sand-lime Brick

MANY handsome buildings have been put up with sand-lime brick the past year, and the volume of actual construction will probably be at least ten times that of the preceding year, or to state it differently, 10,000 bricks have been sold in 1906 for every 1000 that were sold in 1905. This represents an enormous expansion, and the difference in the testimony as seen by Rock Products can be stated thus:

One year ago, nearly every manufacturer seemed to have something to complain of, either in the way of equipment or in the quality of materials that he was using in the manufacture of his brick, while in the present season, they are only willing to say, "We are busy making and selling all the brick we can produce."

The manufacturers of sand-lime brick seem to be shy of publicity, or unwilling to tell all they know about the industry, probably fearing some one else will get rich on what they know, or have discovered in the course of their operations. This might have been a good idea in the Dark Ages when feudal barons preyed upon their neighbors, but it is not up-to-date and it won't go in 1906. If there is any reader who thinks he knows it all, we must pleasantly invite him to take another guess.

Sand-lime brick is being manufactured profitably at a large number of the plants now in operation. The machinery manufacturers have solved many of the riddles which at first seemed to offer insurmountable difficulties, and there have been many good lessons learned which will never again be encountered.

No better building material was ever manufactured than the sand-lime brick, and when the plant is located right, with regard to the supply of the proper kind of sand and equipped by one of several good systems of machinery, there is no reason why, with ordinary intelligence, that a satisfactory profit shall not be collected for the money invested. It is so, because the brick can be sold at a good price in almost any market.

In a recent issue of Rock Products there was published a query asking how sand-lime brick stands in a wall that is built in a wet place, using the sand-lime brick for foundation. In answer to this Mr. O. M. Tupper, of Antioch, Cal., says:

"We built a 17-inch wall, 20 feet high, to hold back a bank of sand, about three years ago. The roof of our factory rests on this wall and all rain water from the roof 60x24 feet runs on this sand. The pressure against the wall is great and is wet about one-third of the time. No water seeps through the wall. The recent earthquake shook this wall down and upon testing some of the brick we found they stood a crushing stress of 4200 pounds a square inch. I would say that sand-lime brick improve every year that they come in contact with water. The town of Antioch, Cal., where our works are located, have used our brick exclusively for foundations."

* * *

The National Association of Paving Brick Manufacturers will meet at St. Louis, Mo., February 5th and 6th, 1907.

Paints, Oils, Varnish

The Ready Mixed Paint Question

By H. T. JAMES

FEW people not directly interested in the manufacture appreciate the development and magnitude of the Ready Mixed Paint business of the present day.

The Paint Grinders' Association of the United States calculates that over 100,000,000 gallons are consumed yearly, of which one-half is used in the painting of houses.

Many brands are sold and guarantees given that are absolutely worthless, and naturally the result of this creates a prejudice against ready mixed paint, and the reputable manufacturer suffers.

It has been remarked that the American people consume more paint both in aggregate and per capita than any other people in the world.

The reason for this great consumption is two-fold.

A large proportion of our buildings, especially in small towns, and the rural districts are constructed of wood; and we as a people are given to neatness and cleanliness, and take it all in all there is nothing more sanitary or cleanly than paint.

Everywhere we find the neat, cheerful painted dwelling proclaiming the prosperity and self-respect of the population.

The manufacture of ready mixed paint as a special industry is of comparatively recent date.

Less than a century ago painters ground their dry colors in oil with slabs and mullers. It was the physical impossibility of meeting, in this manner, the demands of a rapidly growing population, and of wooden house builders, that led to the establishment of the ready mixed paint factories.

At first white lead and colors were ground in oil and supplied in paste form to the painters, who combined them with the necessary thinners in the shop.

The second step was the invention of ready mixed paint about the middle of the last century, and popularly called "patent paint."

The development was natural and logical. If white lead ground in oil by machinery, and pigments ground by machinery are better and cheaper than the same materials ground by hand in the paint shop,—why should it not be better and cheaper to leave the whole process of paint making and mixing to the paint factory?

Hence the modern paint factory and the modern ready mixed paint.

The annual consumption of ready mixed paint increased from zero in 1860 to something like 60,000,000 gallons in 1903. In comparison, the increase in consumption of lead in oil during this same period is hardly worth considering.

Some severe things have been said and written about ready mixed paint, especially by painters, and in many instances these strictures have been justified, as some peculiarly constructed mixtures have in the past been worked off on the consumer in the shape of prepared paints, and at the present time there are a number of mixtures being extensively advertised that are, as I said before, worthless.

Mixed paints differ considerably in composition, and yet the results obtained by the use of the higher, or better grade are surprisingly alike.

They are based on a certain percentage of carbonate of lead and oxide of zinc, and with or without inert materials. By inert materials we mean gypsum, barytes, etc. This is the material that the painter is chiefly exercised over, although in the past quantities of it were used in the manufacture of so-called pure white lead, and are being used at the present day.

A properly manufactured ready mixed paint prepared by machinery in a paint factory thoroughly equipped for analysis and testing is far superior to a paint mixed with a paddle in a paint bucket by a painter.

No matter what his skill may be he cannot in this way obtain a uniform mixture.

This fact can be demonstrated at any time by taking a few drops of such a mixture and placing it on a ground glass slab. On rubbing it with a muller, the tint will gradually deepen, proving that the coloring material was not thoroughly incorporated. If the coloring matter which can be distinguished is not evenly distributed, neither are the other ingredients, which we cannot distinguish.

Further than this,—the painter is likely to get adulterated oil, turpentine, and cheap rosin dryers. He does not know, the dealer does not know, but the manufacturer knows that this is a fact and is an explanation of half the complaints as to poor painting.

Honest prepared paints have won not only on their actual merits, but on account of convenience and economy. They are reasonably cheap, and are incomparably handy; but when all is said, the experienced painter is the proper person to apply even ready mixed paint.

He knows better than any one else the when and how, and the difference between painting and slathering is much greater than it appears to a novice.

A great deal has been said and written against prepared paint, chiefly in the interest of the painters, but the fact remains that the consumption after half a century's experience is increasing steadily.

* * *

About Filling, Varnishing and Finishing Interior Wood-work

By H. T. JAMES

SPACE will not permit of a long explanation in regard to wood fillers, but the proper filling or preparation of the wood, either open or close grained, is all important, and essential for the high grade finish.

Many articles are manufactured and sold under the name of "Paste Wood Fillers," for open grained wood that contain improper pigments, such as clays, terra-alba, whiting, etc.

Only materials of a certain hardness and transparency should be used of the silix order. This properly combined with dryers, varnish and oil produces the ideal filler.

This can be colored to match if the wood is stained; or beautiful effects can be produced by coloring the filler. This should be thinned to the consistency

of flowing varnish with turpentine, applied by an experienced finisher, and ample time allowed for drying before applying the first coat of varnish.

The same conditions exist in the improper manufacture of liquid fillers or first coaters as in paste fillers due to the demand for something cheap by the majority of the contracting finishers and painters.

A liquid filler is intended to stop the suction, give an even surface, and prevent the first coat of varnish from sinking in.

On the Pacific Coast a large percentage of the interior finishing is redwood, fir and pine, and the architects, as a rule, pay too little attention to the first coat or foundation.

He may specify one or several good varnishes, and the varnish may be condemned for the reason that the painter or finisher has used a cheap rosin filler for his first coat.

While the writer does not believe in the use of shellacs except under certain conditions, good shellac is preferable to a poor liquid filler, and the advent of denatured alcohol will so cheapen shellacs that it will be used in the near future almost exclusively in the place of liquid wood fillers for first coating new work.

As a matter of fact the best, toughest and most durable varnish finish is produced on close grained woods, either trim or floors, by using a good varnish throughout.

If you wish, add a percentage of good silex paste filler to the first coat of varnish.

* * * As To Varnish

Either a varnish is good for your wood-work or it isn't.

The cost of application is the same in either case. They differ in this:

The first cost of good varnish is more than the poor, but the lasting qualities, and the ultimate result in using the good saves the difference many times over.

The responsible agents are the workmen and the atmospheric conditions. The final result depends on the material.

A good varnish combining all that is requisite for a perfect interior finish is tough, elastic, will resist the action of hot water, will not crack or mar white; and it should take a beautiful polish if necessary, and leave a brilliant gloss if not rubbed or polished.

In using varnish the packages should be well corked when not in use, as it keeps the material clean and prevents evaporation; also prevents the varnish from going fatty.

When varnishing, the temperature should be between 70 and 75 degrees Fahrenheit, and the varnish the same.

Do not pour back unused varnish.

Varnish will not work properly if the temperature is too cold, too warm, or too damp.

Allow ample time between the coats for the varnish to become thoroughly dry all the way through.

Before varnish is used for finishing floors the wood should be perfectly clean, free from spots and stains and thoroughly dry.

Open grained woods should be filled in all cases with a good silex paste filler, and given two or three coats of tough, durable floor varnish.

Sandpaper lightly between coats and allow ample time for drying. Do not use shellac in any case.

If an egg-shell gloss is desired the final coat should be rubbed with pulverized pumice stone and raw linseed oil.

If a wax finish is desired one thin coat of tough, durable floor varnish should be given, and the floor wax applied after the varnish becomes thoroughly hard. Use a loaded brush after the wax sets.

One Coat Finishes

A word about the many so-called "One Coat Finishes," now being sold under various names and colors.

The manufacturers claim that these finishes, stain and finish at one application, and while pleasing effects are produced by them when first applied they soon present a dead appearance as they catch the dirt and dust, cannot be readily cleaned and are not sanitary.

To obtain permanency and bring out the beauty and grain of the wood, it should in all cases be finished properly with a good varnish.

This can be left in gloss or rubbed down to a dull finish if desired, or an imitation rubbed effect can be produced economically by using a Matt-Lac for the final coat. This contains no wax, will not mar and can be coated over with perfect safety.

* * *

The Refinishing of Floors

ONE matter to which attention should be given is the care of wood floors in a building. Marble floors are not practicable in office rooms, linoleum is distasteful to many because of the odor, and bare wood floors, unless they are properly taken care of, are likely to warp and splinter, fill with dirt and look very shabby. The expense of refinishing floors from time to time may appear to some to be a foolish waste of money, but exactly the opposite is true, especially in buildings of the higher grade.

Finishing the floors improves the appearance of an office just as a new application of paint or calcimine will, and makes it more easily rentable. It makes the room neater and more attractive and the tenant is better satisfied. Aside from this, however, it keeps the floor in good condition and in the end will be found economical. If a floor has frequent attention the wood will not warp or crack and will last much longer. Many managers make it a point to refinish their floors every year with a high grade varnish. Some have been found who prefer to use a cheaper varnish and refinish twice a year. With modern appliances for satisfactorily removing old varnish, the greatest expense has been considerably reduced and it would not be surprising if good floors were soon the rule rather than the exception.—Building Management.

* * *

Might Have Used a Ladder

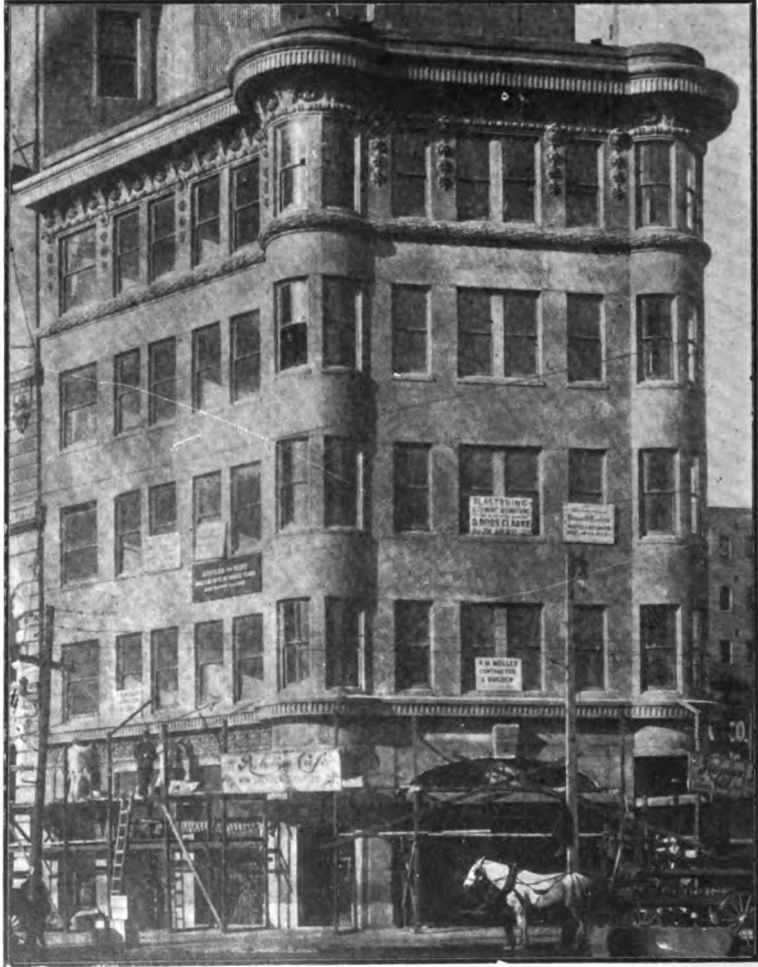
"That reminds me," said the architect, "when I was at Stanford University some years ago. There was a young woman there, an instructor in the faculty, very bright, very capable, but she didn't know quite everything.

"Her name was Miss Schallenberger, now teaching in San Jose. Would be her own architect. Drew up plans for a cottage. Didn't want them touched. Carpenters must follow her drawings in the minutest detail. It was to be an ideal little house.

"When it was nearly finished she suddenly inquired of the builder:

"'But where are the stairs? How am I to reach the upper story?'

"'Madam,' replied the builder, chuckling, 'your plans did not include a stairway.'"—Chronicle.



*The Flannery Building, Geary and Market Streets, San Francisco
Stone & Smith, Architects. Concrete Work by Victor Stanquist & Co.
Ornamental Plastering and Cementing by D. Ross Clark*

Interior Decoration



One of the New Friezes

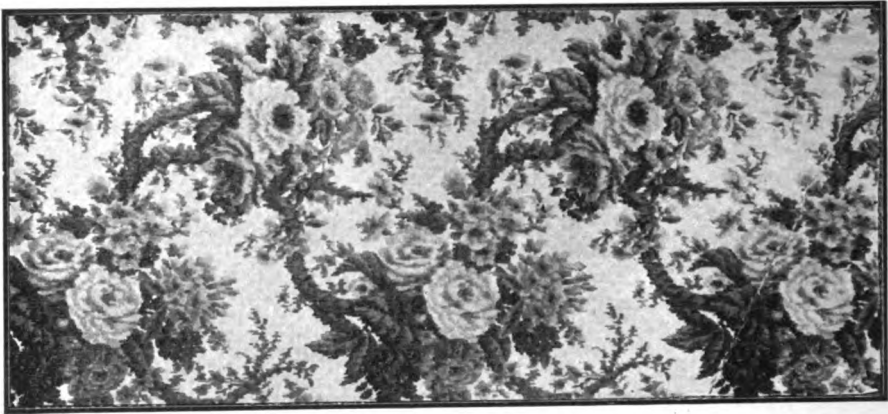
The Decorative Periods

Article I.—INTRODUCTION.

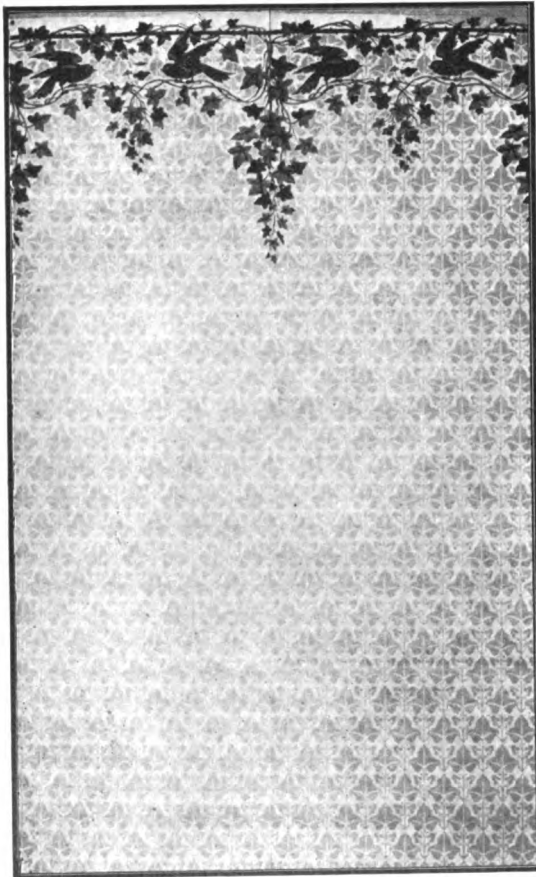
By C. WALTER TOZER.

ART is said to be the visible expression of one's belief in the beautiful, and it is unquestionably true that there is no motif in decoration that has not been suggested by nature. We therefore are obliged to assume that, all that is good in decoration is old. No matter what decorative period we may take up for analysis, we find that every motif, no matter how old, goes back to a suggestion by nature. Take, for instance, the Greek fret; the Roman acanthus; the fleur-de-lis; in fact, every motif found in the Renaissance period, and trace them back, and this is what one finds. Long before the Greek fret was used, the Chinese employed a similar form of design, suggested by the overlapping waves of the sea. The Roman acanthus and the fleur-de-lis came direct from the flora of Egypt. The palm, papyrus, and lotus, the growth and bloom of which had a religious significance to the people of the Nile, are the foundation of every motif in the Renaissance period. Motifs that have been in existence for centuries have been suggested by animal life. The claw foot that we see upon the Chippendale chair was Roman; the griffin, the sphinx, dolphin, bull, eagle, and beetle, all contributed suggestions that are now classics in design.

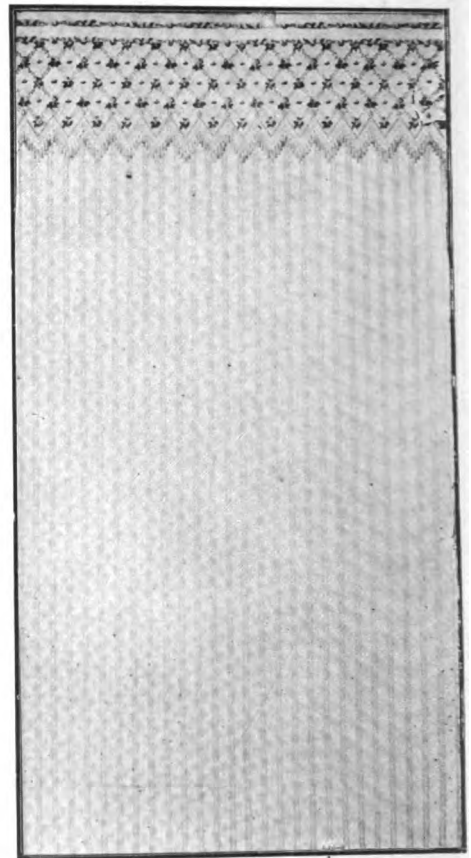
One of four influences always stimulates decorative development. They are: erudition, religion, commercialism and temperament. Each progressive stage of development constitutes what we term a period in design.



"The Sherington" Fine Shadow Silk Effect, Chamber or Parlor Work, Printed Warps to Match



Cream Border Treatment



One of Dumas' Crown Treatments, Cretonne to Match Motif in Border



A New Floral. Fine Upper Third or Frieze Treatment; Cretonne to Match

The middle ages were in darkness, because they were without erudition. A term of reproach—a synonym of vandalism—was the term Goth, and yet there came an awakening in art out of the Gothic period,—the Renaissance,—a period of erudition.

The elementary principles of the Byzantine, Romanesque and Gothic periods of design were characterized by religion, and the wars of the Crusaders spread Christian symbolism among the craftsmen of Northern Africa and the Far East.

The results of commercialism are found in composite design, merging the arts of one country with those of another.

Temperament is the individuality of expression. “The true periods, or the periods of origin, are few. The periods of revival are based upon erudition, for in art there is nothing new.” Why, even art nouveau, the “newest” art, sprung from our knowledge of the Japanese. The works of the brothers Adam came from the knowledge of Pompeii and Herculaneum restoration. Burne-Jones’s style was founded upon his knowledge of the pre-Raphaelites, the worshippers at the Renaissance shrine, and thence we revert back to Greece, whose art was Egyptian.

It was the knowledge of geometry, a science originated through the necessity of resurveying the Egyptian fields, following each inundation of the Nile, that developed the beautiful in Moorish paneled ceilings, Gothic traceries, guilloche work, Greek and Roman band motifs and diaper patterns. We can go back to the time of Rameses II, 1340 B. C., to the practice of geometry, and all that was accomplished in geometrical design may be attributed to the erudition of the ancient Egyptians.

Assyrians and Egyptians expressed their religion in their designs, the floriculture of the country had its meaning. The beetle, the winged serpent, the palm, the papyrus, the lotus—all had religious significance. In later years Christian symbolism permeated the Byzantine, Gothic and Romanesque forms of decoration, and influenced also the arts of the Mohammedans who conquered Constantinople, the arts of the Saracens who settled in lower Italy and Spain, and through the conquests of the Crusaders, penetrated the Far East. Every line in true decoration is suggested by a thought that arises from religious conviction or out of the effort to perpetuate some axiom of Truth or Beauty.

Commercialism has been much deplored as a disturbing influence in art, but is it not, nevertheless, commercialism that is a stimulus which creates, like new soil or new seed? The Queen Anne period in England was a period created by the furnishings introduced by the Dutch traders. The Chinese influence in England and France during the eighteenth century was primarily commercial.

The Persian spirit, conspicuous in the sixteenth century Italian work, and the East Indian spirit of the later century, as well as the influences which affected contemporary Spanish and Portuguese design, were all commercial. Prior to the discovery of America, Portugal and Spain, envious of the trade in the East controlled by their neighbors of the Mediterranean, endeavored to find a western passage to India. We know the result of Columbus' voyage, but it is well in connection with this subject to remember that it was prompted by that commercialism which spread the Eastern influence throughout Europe, and which reflected the Eastern imprints upon the arts.

And as regards temperament: Decorative art has been and always will be subjected to the influence of temperament. Decoration is the impulse of nature. We find it in the budding of the flower, or in the child's delight over a bit of ribbon. The bud in nature will evolve new forms and colors according to the soil and culture, and art shows the same subtle changes. In nature we note the change as we travel, north or south. In art we note the change, not alone as affected by topography, erudition, religion and commercial influence, but also temperament. Given, for example, a Renaissance theme of classic revival and we find the composition of the English, German, Italian, Spaniard, Frenchman, all totally different. Into the work of each is unconsciously injected his native temperament. We may find a new handling of a theme, but it is simply temperamental. The sturdiness of Dutch character stands out in Dutch workmanship. The Puritan spirit is betrayed in the Jacobean type of decoration. We have no need of history to follow the temperament of the French people. Excess and sensuousness are suggested in the voluptuous decorations, which, encouraged in the time of Louis XIV, marked the history of the people down to the Revolution, when temperament changed and adopted a simpler form, in turn succeeded by the martial spirit aroused by Napoleon's career.

There are only five distinct orders in classic architecture, but out of these spring innumerable related parts, all stamped by the influence of erudition, religion, commercialism and temperament.

* * *

The New Wall Papers and How they are Selected

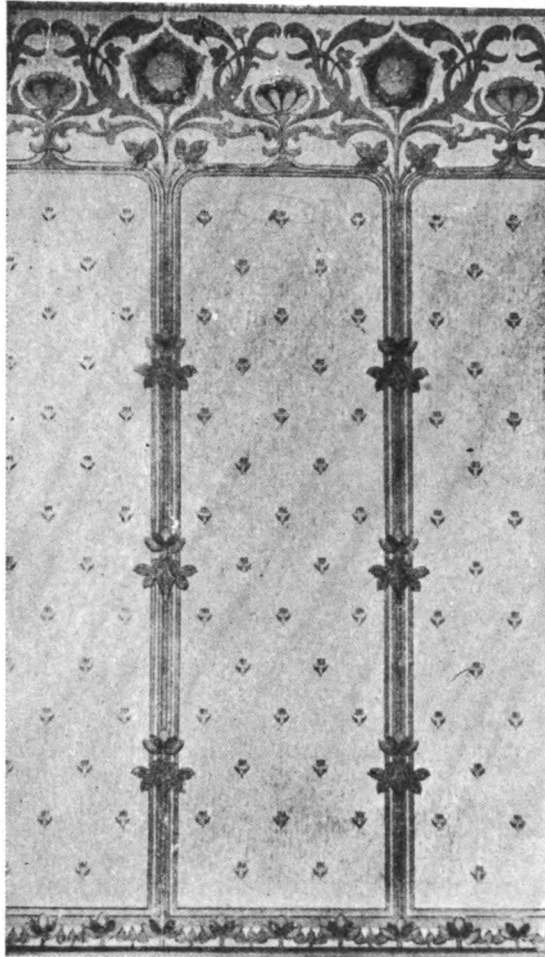
By C. WALTER TOZER.

VERY few people, indeed, realize what a task it is to the wall paper manufacturer to select the new patterns and colorings for his papers from season to season. It is a thing most every one never thinks about. We look at a certain wall paper; the pattern and coloring either pleases us or does not please us. This is all we think about it.

Never until this summer did the writer fully realize the immensity of this work. While in New York this summer, however, he was enabled to see what the manufacturer is compelled to go through in getting a new line ready.

To those in the trade a wall paper season dates from one July to the next. While to the user of wall paper there are really two seasons. The fall and the spring of the year, when the greatest activity in decorative work is manifest.

Every year the representatives of most of the leading wall paper manufacturers throughout the United States assemble in New York City for two weeks or more in the month of August, to show the advance samples of their lines for the coming season. The papers shown last August, for example, are those now being manufactured, and will be delivered to the decorators for next spring's trade.



Crown and Panel for Living Room or Library

Just after this convention closes in New York City, the manufacturer begins planning his line for the next August convention. He first has his patterns to determine upon. Professional designers (of whom there are a great many in New York), call upon him and submit water color designs and sketches they have executed. Those that suit are bought and the designer is not to sell the same design to any other manufacturer. Very often the submitted designs have to be changed regarding some detail. An instance occurred in the writer's presence, while with a manufacturer engaged in selecting new designs for next season. A certain floral sketch was shown. Upon it were two birds, one slightly larger than the other. The larger bird was at rest upon the stem of a large rose, and on the left of the sketch. The smaller bird was placed lower down, on the wing, and to the right. To the manufacturer's discerning eye, there should have been but one bird shown. That, the larger one, and not at rest but on the wing, and placed a trifle higher than the position occupied by the smaller bird. So the design had to be changed to conform to the manufacturer's judgment. Many times he will give orders to a designer to execute a design similar to a "big seller" of the season before; or turning to a certain

hall or parlor pattern in his last year's line, says: "I want something to take the place of this." Then, too, a great many successful patterns of the imported lines are modified or copied. Some of the manufacturers go through the fabric and carpet lines for their patterns and either copy or alter the pleasing ones and reproduce them in their wall papers.

Thus the process of examining and collecting patterns continues until early in the spring. Then the final selection is made of the designs they will use for the following year; the rolls or blocks are made, and the factory artists and superintendents get to work to see what combinations of color will be suitable for designs, in addition to those shown in the original drawing made by the artist. It frequently happens that some totally different coloring or effect will produce even better results than the designer had any idea of. For example, a pattern intended originally for a flat in colors may look better as a two-toned paper on a duplex or ingrain ground, or it may look especially well as a tapestry. In fact some of the most attractive effects are many times sort of accidents, as a result of experimenting. The development of these various possibilities of a pattern requires not only good color training and artistic judgment, but it needs also a thorough knowledge of wall paper machinery and its limitations and capabilities, such as the artist designer rarely possesses.

Much time is spent in this sampling process (the greater part of June and July), trying out each pattern or set of blocks in various ways. Some are rejected at once, while of others that seem to be satisfactory, perhaps fifty or a hundred rolls are run (for samples), and then another way is tested. Finally all the new patterns have been tried out, and a record has been kept which will indicate the cost of production of each way of each different pattern, that will enable the selling price to be fixed.

About the first of August each factory makes up several sets of sample books containing the different patterns and colorings that have been passed upon and finally selected by the artists, factory superintendents and sales manager, and the designs are numbered and priced. Then the factory's salesmen are ready to move upon New York City, for what we term the convention, or the advance showing to the trade. Just when this custom originated it would perhaps be hard to say, but at any rate it has become a well-established fixture in the wallpaper trade, and the buyers for the various large jobbing houses, book houses and large retailers from all over the country, wend their ways to New York at the same time, ready to place their orders for the new season.

For many years the headquarters of the visiting manufacturers has been at the Gilsey House, Broadway and Twenty-ninth street, where of an evening during the convention, one can count up a hundred or two wall paper men. This year, however, several manufacturers established themselves at the Breslin, on the opposite corner; while others were at the Victoria, and still others at the Grand Hotel, both of which are but a short distance away. The New York City manufacturers, as well as some of those having salesrooms or offices in the city, showed their goods at their own salesrooms. The show this year opened August 6th, and practically closed August 18th, a very short season. All the manufacturers reported the business done to be unusually good.

The lines, as a rule, showed a great advance in artistic merit and excellence of color over those shown in previous seasons, the manufacturers seeming to find that it pays to cater to a more refined and educated taste. Indeed, it is unquestioned that the general standard of taste has advanced very much within the past few years, owing to the influence of more progressive decorators, and to the influence of the popular magazines of general circulation that have devoted so much space to decorative subjects and have undoubtedly contributed very much to educate the public in artistic matters, however astray they may sometimes wander from a practical standpoint. Another noticeable thing is

that practically every manufacturer is catering to the needs of the decorator and offering independent friezes and side walls; decorations and small clothly effect figures suitable for paneling, and many of the wall papers are particularly recommended because of their adaptability for use as cut outs and for other original treatments. The new season's wall papers will appeal to the decorator largely because of their possibilities. Another thing noticeable is the general absence of fresh papers that appealed to the public simply because they were odd, even though oddity often meant ugliness. In color there seems to be no prevailing tendency. The browns and tans, so much seen last year, are less in evidence except in duplex and ingrain papers, where these shades are still prevalent.

Many beautiful effects in gray are shown. One or two factories showing a great many papers with a happy combination of gray and green. Very few strong red papers were noticed in any of the lines, and only occasional patterns were shown in the once popular delft colorings. Greens are still prevalent, and the reason is probably because this color usually looks well with most furnishings, especially with the popular mission styles. The chintz and fabric colors are in evidence in bedroom papers, as well as natural colorings of flowers and foliage on white or colored grounds. Dresden colorings are also seen quite a good deal. Metals are used quite a good deal, but, as a rule, quite differently from the old-fashioned gold parlor papers, and show evidence of much greater refinement of taste.

As regards the prevailing style of patterns, we might say that good floral effects seem to be more plentiful, and to be executed with a greater care. Large, bold patterns printed on grounds in imitation of fabrics are quite plentiful in all the lines. Fabric prints are also found in a great variety of patterns and range of colorings. These seem to be very popular now for use in conjunction with the many landscape, seascape and independent friezes. Quite a great many side walls formerly printed as independent hangings only, are shown with pictorial friezes to match. The tendency of the manufacturers, no doubt due to the public demand, seems to be toward the return of the matched border idea. The independent wall with a moire or tinted ceiling to match, has been in vogue now just long enough to cause the public to demand something else. Crown borders were shown to a fair degree, but borders suitable to be cut out were in greater number than formerly.

In fact, the decorator has a greater variety of novelties in wall paper this season than ever before in the history of wall paper manufacture. There seems, indeed, to be no limit to the resourcefulness of the manufacturer. No sooner does a critical writer call attention to a shortcoming or limitation of wall paper as a decorative possibility, than immediately there follows some new and hitherto unheard-of novelty which entirely overcomes a given criticism.

Not only are the wall paper manufacturers acutely alive to the shortcomings of their own product, but they also show an ability to recognize the shortcomings of other decorative materials, and with commendable enterprise they take note of those shortcomings and advance the special advantages of their own material. This is legitimate business enterprise and should be carefully followed and studied by the decorator or decorative paperhanger, not only for the purpose of following up the introduction of the new things which are being constantly introduced into the market, but also to study the manufacturer's methods of overcoming obstacles. More than half of the successful decorative work consists in overcoming obstacles and covering over defects in such a way that they no longer appear as defects, but in many cases as unique features. Up to a certain point wall paper as a covering for walls, in the ordinary sense of the word, is a complete success to most people. It is a quick and effective way to entirely change the effect of an apartment's decoration.

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Regular meetings, the second Friday in January,
April, July and October.

Personal Mention

D. Franklin Oliver, of the architectural firm of Oliver & Foulkes, with offices in the James Flood building, has gone East for ideas which will be embodied in plans for a big office building which the firm has been authorized to prepare. John Galen Howard, of the firm of Howard & Galloway, will also make a trip East, one of the reasons for the journey across the continent being to gather up a few draughtsmen of which there is a great scarcity in San Francisco just now.

Architect Maxwell G. Bugbee has associated with him Henry T. Johnson, C. E., formerly of Pittsburg, Pa. Mr. Bugbee has moved his offices to the Saint Mungo building, northwest corner of Fillmore and Golden Gate avenue. Among the large contracts which Mr. Bugbee has taken since the fire is a \$150,000 apartment house to be built on Broadway, San Francisco, by the Enterprise Realty Company.

Oakland Architects Busy

Never in the history of Oakland have the architects of that city been so busy as now, which is a good indication that the city across the bay is growing. Architects Mc-

Call and Wythe, who have offices in the First National Bank Building at Fourteenth street and Broadway, have about \$250,000 worth of work in their office, including business blocks, apartments, flats and residences.

The firm has just been authorized to prepare plans for a 54-room office building on Fourteenth street near Broadway; also a 50-room hospital at Claremont, to cost \$20,000; residence for J. S. Delancey, an Oakland attorney, to cost \$5000, and a three-story loft building for C. T. Morton, at Eleventh and Webster streets, to cost \$11,000.

"Lucky" Baldwin's Hotel

"Lucky" Baldwin is to build a \$200,000 hotel at Lake Tahoe.

The new hostelry is to be somewhat after the style of El Tovar, in the Grand Canyon of the Colorado. The same architect is at work upon the plans. It will be rustic in effect, and the dining-room, all its windows overlooking the lake, will accommodate 1000 persons. The pillars in this dining-room will be the natural trunks of huge spruce trees, the artistic rough bark left in its natural state.

A great power plant to generate 300,000 horse-power has just been completed. It is all ready for the installation of the machinery early in the spring. This plant is to furnish the power for Baldwin's own sawmill at which all the lumber will be prepared for the building. He will be independent of the lumber combine. The timber is close at hand.

San Jose Normal School

The San Jose State Normal School trustees have under consideration a number of plans submitted by various architects for the rebuilding of the Normal School, which was badly wrecked by the earthquake. The members of the board are: Dr. Thomas Addison, chairman; Fred W. Hall, George H. Mastic,

Senator J. B. Sanford, Frank H. Babb, Superintendent of Public Instruction Thomas B. Kirk, and Dr. M. E. Dailey, president of the San Jose State Normal.

Architects Howard and Galloway and J. C. Newsome of San Francisco and F. S. Allen of Pasadena, have submitted plans for the mission style. The architects and members of the board of trustees are in favor of the mission style of architecture, reinforced concrete and a height of not over two stories.

A meeting will be held soon to adopt plans for the building. Senator Walker will introduce the bill for the appropriation in the Senate and Assemblyman Dr. J. T. Higgins will introduce the bill in the House.

Feat in Bricklaying

In the erection of the House of Representatives' office building, adjacent to the United States Capitol at Washington, an interesting fact has developed in connection with the brick masonry work. The first brick was laid at the site on the afternoon of July 3, 1905, and on July 3, 1906, there had been laid in the walls 11,000,000 brick. This is believed to be the greatest number of brick laid on any building in one year in the United States, and probably in the world. One of the causes conducing to this record-breaking feat was the remarkably "open" winter of 1905-06. In those winter months the work continued almost without interruption from either snow or cold and not more than twelve or fifteen days were lost during the entire winter by reason of weather conditions.—Scientific American.

Petition Is Denied

The San Francisco Supervisors' Fire Committee has denied the petition of property owners that the building law be amended to permit of wooden construction encased in fire-proofing in area and light ways above the first story of Class C buildings. Chief Engineer Shaughnessy of the Fire Department vigorously opposed the proposed amendment on the ground that it would increase the danger in case of fire owing to falling walls.

Suspend Tariff on Building Material

The Mission Promotion Association has addressed a set of resolutions to President Roosevelt, the members of his Cabinet and Congress, asking that a drawback of the import duties be allowed on all building material brought into San Francisco for a period of five years. The State Legislature will be asked to use its influence to secure the desired legislation.

The Hotel Granada

A new Hotel Granada, larger and more attractive architecturally than the one which formerly occupied the southwest corner of Sutter and Hyde streets, will be erected on the old site by Dr. Julius Rosenstirn. The plans by Architect Frederick Noonan have been accented and work will be begun immediately in clearing away the debris of the old Granada. The building will be eleven stories high, thoroughly of reinforced concrete, and will cost \$400,000.

The hotel will cover 117½ feet on Sutter street and 77½ feet on Hyde street. It will be the first reinforced concrete structure in what is known to architects as post and girder construction erected in this city. An entire skeleton framework of concrete will be erected, and the floors, walls and partitions put in place afterwards. This system has been employed by Architect Noonan in the East in the erection of a number of large buildings. It has been found to be far more rapid in execution than the old way of building one complete floor at a time.

In furnishings and equipment the new hostelry will class with the finest establishments in New York and San Francisco, and will be second to none in this city.

There will be nearly 250 guest chambers, so arranged that they can be converted into apartments of one, two or three rooms, with a bath for each room, or one or more baths for the whole apartment. The building will be supplied with high-speed elevators, a compressed air cleaning plant, and will be heated with low pressure steam.

Besides this venture Dr. Rosenstirn intends to erect a ten-story office building on the northeast corner. This will cost about \$125,000.

Rudolph Spreckels' Building

Rudolph Spreckels will shortly commence the construction of a fine building, to cost \$750,000, on the site recently purchased from the Masonic Hall Association, at Post and Montgomery streets. It will be used to house the First National Bank and offices.

Joseph D. Grant of the Murphy-Grant Company has arranged for the immediate erection of a steel-frame twelve-story building on the southwest corner of Bush and Sansome streets, formerly occupied by the old firm.

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Beginning with this number and continuing through the year, The Architect and En-
THE DECORATIVE gineer will run a series of short ar-
PERIODS ticles on the decora-
tive periods. These articles will be made up of material culled from several well-known works upon the subject, and we beg the privilege of quoting freely. We will not claim originality for the greater part of the matter, but will only try to assemble correct and trustworthy material, and endeavor to present it in an instructive and interesting way. It is planned to give chronological tables of the decorative periods and any other information that may be considered valuable and interesting.

To understand and appreciate good decorative art generally, we believe it necessary to have some acquaintance with the styles which at different periods have enjoyed a ruling vogue. That these styles are the expression of passing fashion does not detract from their artistic value. Although the early periods are full of interest, and are worth studying, both from the evolutionary and the artistic points of view, still our rapid survey will not permit us to more than touch upon them. The later periods, however, from the Renaissance on and more especially the French and English periods, we will dwell upon more fully.

The article this month is devoted to cause and effect, as it were, or more properly speaking, an introduction to the subject.

On the Staatendam of the Holland-American line, which recently arrived in New York, came 14,000 white bricks, which were guarded very closely upon their landing and delivery, for they were duplicates in style and quality of bricks imported 200 years ago.

**RESTORING THE
OLD FRAUNCES'
TAVERN**

When the work of renovating the old Fraunces' Tavern, at Broad and Pearl streets, New York, was begun by the Sons of the Revolution, it was expected that materials could be found in New York to restore it about as it was when Washington said good-bye to his officers in the long room of the old hotel. In the two centuries that the building has stood it has undergone so many repairs that few people could tell anything about how the structure originally looked.

Among the things that happened to it was the tearing out of the lower wall facing on Broad street to make a show window for a store that afterward became a saloon. In the work of restoring the building for a clubhouse for its patriotic owners this wall has been put back, all except the outer facing, which was of small white bricks brought over from Holland. After a trying hunt, fifteen miles from Rotterdam was found the very brick-kiln where, 206 years ago, the bricks for Fraunces' Tavern were made. They are still making the same bricks at this place and the order for the 14,000 was placed.

The old fireplaces in the tavern have been rebuilt, the room where the saloon was is to be a cafe, the historic Long room has been restored, and the reconstruction is being done so thoroughly that the building will stand without change, it is said, for probably 300 years.

FEARS ANOTHER WOODEN CITY

By F. W. Fitzpatrick in Fireproof Magazine.

I AM afraid that the prophecy that San Francisco will be rebuilt a wooden city will be all too true. Apart from timber being brought into that city exclusive for the temporary buildings, it is reported that 2,000,000,000 feet of lumber has been ordered, or is to be ordered, for the "permanent" reconstruction of the city. Forty million dollars' worth of kindling with which to make another \$300,000,000 fire!

The New York Commercial was hopeful that the price of lumber would go skyward so far that it would soon be prohibitive, saying, "With fir at \$16 it would not be long before Class A, steel and tile building, will be the cheapest form of construction." One trouble is that people, in their anxiety to build and believing that there may be delays in steel, and knowing that, unfortunately, they can get wood at almost any minute, are letting their haste get the better of sober judgment and are going ahead with the same old tinder-box buildings.

Reports from San Francisco, as to rebuilding of the better kind, are not as favorable as we could hope for. The lack of labor, the extortion and suicidal maladministration of the labor union power, are anchors that will hold back that ambitious, though sorely stricken city. Think of it—bricklayers, \$7 a day; hodcarriers, \$4; plumbers \$6; unskilled laborers, \$2.50; and, with all that, room for 30,000 more skilled workmen, if the unions will let them work. Surely with 18,000 buildings in prospect, \$190,000,000 for wages, the unions need not be too rapacious and anxious to divide the proceeds among their own limited membership. They might take down the bars for a little while. They ought to remember the goose with the golden egg. It may seem a far cry, but there is always the possibility of the real people, the great majority, even the workmen themselves, tiring of this tyranny of the oligarchy of labor leaders and rising up in their strength and throwing off the yoke, even to the extent of reintroducing, for instance, cheap Chinese labor.

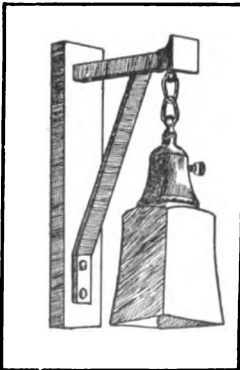
The Publisher's Corner

Make Swell Lighting Fixtures

One of the new San Francisco firms that has already made a commendable impression on the business community is that of Adams & Hollopeter, makers of lighting fixtures, at Market and Laguna streets. This firm was organized immediately after the fire by William Adams, salesman and buyer for the Roberts Manufacturing Company, William H. Hollopeter, of the mechanical department of the same firm, and Frank Adams, and reorganized about a month later by including in the partnership Mr. John P. Young, managing editor of the San Francisco Chronicle.

Adams & Hollopeter have one of the best equipped fixture factories in the city and enjoy the distinction of being the only lighting fixture firm in San Francisco, if

not on the Coast, dealing in goods exclusively its own make. Although having first had to build and equip its factory, the firm was delivering goods by the first week in July and since then has handled some very good contracts. Among these is for the new Palace Hotel, fixtures having been furnished for the outside, main vestibule, lobby, 'ladies' and men's parlors, and private dining room; also crystal chandeliers and brackets for the new Diamond Palace which Colonel A. Andrews has opened on Van Ness avenue. The firm has also fitted out a large number of banks, stores, saloons, flats, apartment houses, and residences, and has an excellent line for all such requirements. Adams & Hollopeter are adhering strictly to the policy of taking no more orders than can be delivered on contract time, which is a policy no one will appreciate more than architects.



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Morgan Oyster Company's Building. San Francisco
E. J. Vogel. Architect. H. L. Petersen. Contractor

Contractor Petersen Busy

H. L. Petersen of the San Francisco Artificial Stone Company has completed the erection of a substantial building for the Morgan Oyster Company, on Third, near Townsend street. It is interesting to note that there has been more permanent building on this thoroughfare than on any other street in the city since the fire. The structure which Contractor Petersen has put up for the Morgan Company is of reinforced concrete and it is one of the first buildings of that material to be occupied after the April disaster. It is a one-story affair with basement, and was designed by Architect E. J. Vogel. The exterior is simple from an architectural viewpoint, the mis-

sion style being followed in a general way.

The building has a frontage of 75 feet on Third street and a depth of 140 feet. The exterior is arranged to meet the requirements of the oyster company for carrying on its extensive business in bivalves. A well appointed office is a feature of the building.

Mr. Petersen is, indeed, a busy man these days, for in addition to the Morgan building he has several good jobs, among them the Empire malt house on Francisco street, between Powell and Mason streets, which is to be a two-story steel and concrete building; a reinforced concrete malt house for the Pioneer Company on Stockton street, and the foundations for the United States Custom House.

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New San Francisco Office and Salesrooms of the Joshua Hendy Iron Works

Joshua Hendy Iron Works

The Joshua Hendy Iron Works will soon move into its new office and sales-room building on Fremont street, San Francisco. The building is two stories and designed after Mr. Hendy's own ideas. It is a commodious structure, in every way up to date and an ornament to that part of the city. The company's new machine works at Sunnyvale are also nearing completion. The buildings are of frame construction with hundreds of glass panes for light and air. The shops are, without exaggeration, among the largest on the Pacific Coast, and when in full operation will give employment to a small army of skilled workmen. The company is now making a specialty of architectural and structural iron castings, as its new name would imply. Later on a full description of the big Sunnyvale plant, with illustrations, will appear in the *Architect and Engineer*.

Victor Stanquist's Good Work

Victor Stanquist, a well-known contractor, is being complimented for the excellence of his work on the new Flannery building at the gore of Market, Geary and Kearny streets. All the reinforced concrete work on this structure was done by Mr. Stanquist, whose wide experience in, and thorough knowledge of concrete construction enabled him to do a good job. The building is the first reinforced concrete office structure to be completed in the business section of San Francisco since the fire. It is considered both earthquake and fire-proof. The concrete is not only reinforced with corrugated bars, but it is set in a framework of heavy steel. The concrete decorations of this type of material from an ornamental standpoint. Besides the Flannery building Mr. Stanquist has put up several other substantial structures since the big fire, and he has some nice work in hand at the present time. Concrete and plaster work are his specialties.

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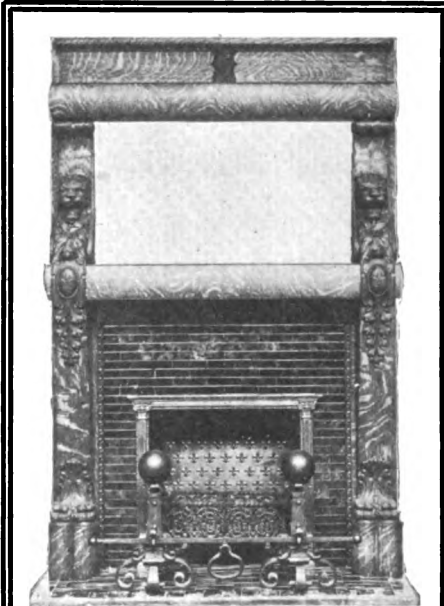
Maurer's metal Spanish tile is becoming quite popular with California architects. The new First Methodist Church at San Jose, planned by Architect Cather Newsome, is being roofed with it and the new Mission school house, at Modesto, planned by Stone & Smith, has the Maurer tile to add to its picturesqueness. The San Francisco representative of the Maurer goods is A. H. McDonald, with offices at 517 Market street. Maurer tile is light in weight and obviates the necessity of such heavy roof construction as is required to support the clay tile. The Maurer tile is furnished with a high wall side lock, which holds the tiles securely together and prevents water from leaking in through the joint.

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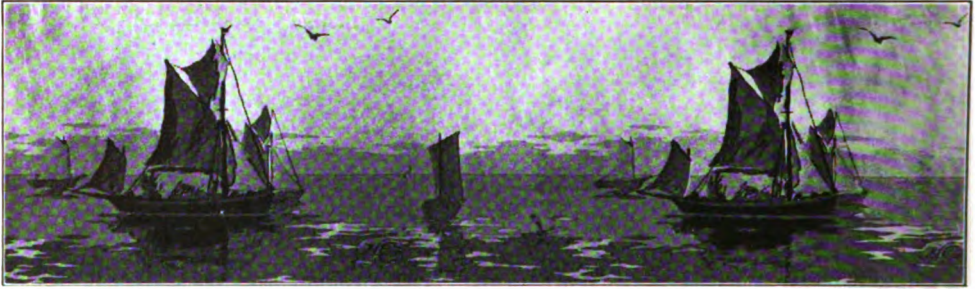
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Detail of Ornamental Concrete Stone for Reinforced Concrete Buildings. by O. S. Sarsi.

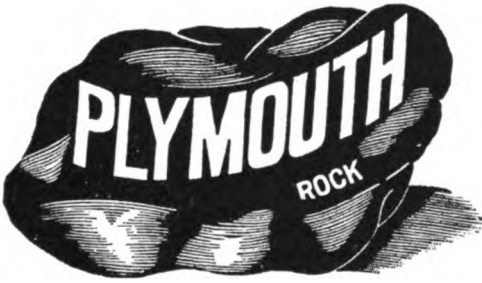
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**STATIONARY PLANTS
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READY ROOFING DURABLE. EASY TO LAY, FIRE-PROOF, INEXPENSIVE
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 Manufacturers of Hard Wall Finishing
 and Dental Plaster

SPECIFICATIONS FOR EMPIRE HARD WALL PLASTER

Metal lath three-coat work:
 First or scratch coat—One part Empire hard wall plaster fibred, two parts sharp clean sand (fresh water sand preferable). Thoroughly mixed and applied within two hours after mixed.
 Second or brownng coat—One part Empire hard wall plaster, two parts clean sharp sand floated up even with grounds.
 White or putty coat—One part Empire finishing plaster, three parts line putty gaged with hard wall plaster.

Sand finish—One part Empire hard wall plaster, two parts clean sharp sand.
Wood lath, two-coat work—One part Empire hard wall plaster fibred, two parts clean sharp sand (fresh-water sand preferable), mixed thoroughly and applied within two hours after mixing.
 White coat and sand finish same as for metal lath.
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16th and Harrison Sts., San Francisco Oakland Warehouse } **ADAMS' WHARF**
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ARTIFICIAL MARBLE, SCAGLIOLA
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HIGHEST GRADE WORK FOR WAINSCOT COLUMNS,
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NEW YORK CITY

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The Spirit of Progress

By C. E. Roesch

This sure is a friendly town,
No one here with that frozen frown.
From Fillmore street clear to Van Ness
The busy throng does forward press;
And upward, onward, day by day,
In spite of what the "knockers" say,
This grand old town goes swiftly on
All sorrow and hard luck are gone.

The knights of the grip from big New
York
Rake in the orders with a four-prong
fork
From these busy merchants in their
"one-horse" shacks,
For the "men behind" are cracker-jacks.

Listen, critic from across yon rocky
hills,
These here men all pay their bills.
We want your stuff, and will treat you
right,
But don't put prices out of sight,
For in six months we can put up mills,
And make our own goods from steel
rails to pills.

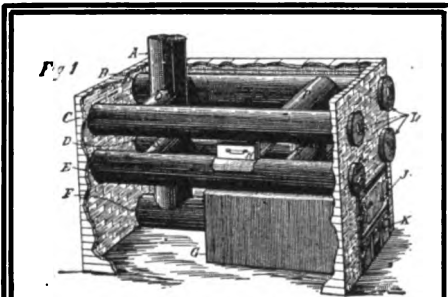
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CEMENT**

Highest grades in
stock and to arrive
at exceptionally
low prices.

A. BRESLAUER

PHONE TEMP. 2350

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This Is It

The KLEIN Furnace

"BUILT SQUARE"

Especially Adapted for Dwelling Houses,
Churches, Schools and Halls

Clean, Reliable, Simple, Economical

Architects and Builders Investigate This.
Write for booklet entitled, "A Square
Talk on a Square Furnace."

F. KLEIN

53 South Second St., San Jose, Cal.

**Cement
Structural Steel
Pig Iron
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G. W. McNEAR

210 BATTERY STREET

San Francisco, Cal.

Fine Reference Library

Messrs. Morgeneier & Drew, whose fine architectural and engineering library at No. 40 California street was destroyed by the fire, are receiving the first installment of books for a new and larger

library, at their Oakland drafting office, 528 East Twelfth street.

Draftsmen desiring to read up or study are cordially invited to make use of the volumes on hand. By previous appointment the office will be opened Sunday afternoons and on holidays.



Grill Work

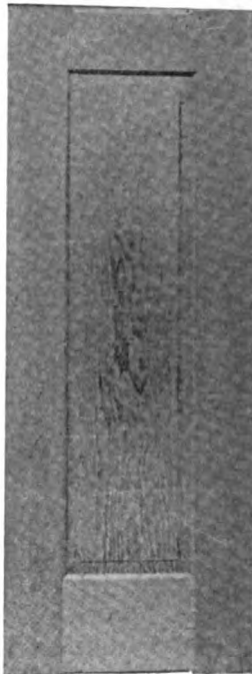
Stair Work

Office and Bank Railings

Wire Guards

Elevator Enclosures and Cars

Electroliar, Fresno City Hall
MADE BY
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Office and Works, 377 Tenth Street, Oakland
Telephone Oakland 7679
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Large Stock on Hand

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Windows Mouldings Mill Work House Finish Tanks, Etc

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1017 East 16th St. EAST OAKLAND

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The following text books are now on hand: Sturge's Dictionary, illustrated; Vignola, 5 volumes, Audit; Johnson, Framed Structures; Wright, Architectural Perspective; Martin, Building Details; Kidder, Churches and Chapels; Brown, 507 Illustrations; Sturtervant, Mechanical Draft; Waid, Law of Operations, Legal; Architects and Engineering Jurisprudence, Legal; Birkmire, Planning High Building; Briggs, Modern American Schools; Ketchum, Steel Mill Buildings; Birkmire, Skeleton Construction; Birkmire, American Theaters; Maginnis, Pen Drawing; Worcester, Hospitals; Meyer, Handbook of Ornaments; Wheelwright, School Architecture; Hunt, Hoisting Machinery; Crane, Steam and Hydraulics; Kidder, Strength of Beams, Floors, etc.; Kidder, Architects' Hand Book; Kents, Engineers' Hand Book; Carnegie, Hand Book; Laughlin, Hand Book; House Designing Roof Trusses; Patton, Treatise on Foundations; Freitag, Fire Proofing Steel Building; Greece, Trusses and Girders; Birkmire, Compound Riveted Girders; Eckels, Cement, Lime, Plaster; Wood, Rustless Coatings; Birkmire, Architectural Iron and Steel; Freitag, Architectural Engineering; Byrne, Inspector's Hand Book; Tayler, Algebraic Exponents; Marlin, History of Architecture; Considere, Concrete; Considere, Reinforced Concrete; Rosengarten, Architectural Styles; Edwinster, Architectural Drawings; Sturtervant, Ventilation and Heating; Richards, Engineer Notes; Tayler & Thompson, Pain and Reinforced Concrete; Gerhard, Sanitary Engineering; Heine, Steam Heating.

Will Be Handsome Residence

Bids are being taken by W. H. Weeks, architect in the Merrimac building, San Francisco, for a \$12,000 residence for Mrs. Dougherty, of San Jose. Fine lighting fixtures and plumbing equipment are to be installed. The same architect is taking figures for a rooming house, store and postoffice building for Mrs. Hollenbeck at Pacific Grove.



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Makers of LIGHTING FIXTURES

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American-Pacific Construction Co.

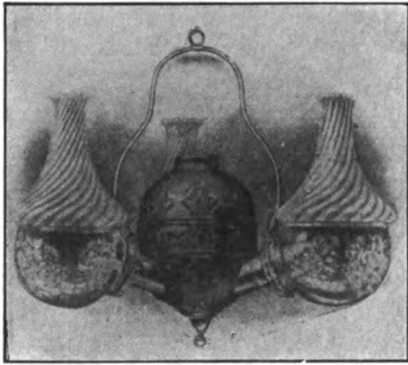
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NO SMOKE NO ODOR LITTLE HEAT
COSTS LESS TO BURN THAN AN
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As easy to operate as gas or electricity—
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Lighted and extinguished like gas.
Can be burned high or low without a
trace of odor.

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PACIFIC COAST AGENTS FOR THE

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SELF CLEANING ABSOLUTE SAFETY GREATEST ECONOMY

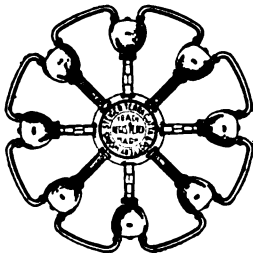
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Pressed Brick; Vitrified Salt Glazed Sewer Pipe;
Hollow Tile Fire-Proofing; Terra Cotta Chimney
Pipe; Electric Conduit Tile, Drain Tile : : : : :
Brick Mantels; Tile Mantels; Urns and Vases : : : : :
Laundry Tubs; Kitchen Sinks; Flush Tanks : : : : :
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Clay; Fire Brick Dust : **Fire Brick; Fire Tile**

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¶ Get your plans for what you want from some first class architect, bring them to me and I will tell you what your building will cost and back my judgment with a cash bond. If you are in doubt as to what you want upon your lot, come and see me and I will cheerfully give you the benefit of 25 years' of San Francisco experience in the building business.

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Butcher's Boston Polish

Is the Best Finish Made for Floors, Interior Woodwork and Furniture

¶ Not brittle, will neither scratch nor de-face, like shellac or varnish. Is not soft and sticky, like beeswax. Perfectly transparent, preserving the natural color and beauty of the wood. Without doubt the **most Economical and Satisfactory Polish Known for Hardwood Floors.** ¶ For sale by dealers in paints, hardware and house furnishings. ¶ Send for our free booklet, telling of the many advantages of **BUTCHER'S BOSTON POLISH.**

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OUR No. 3 REVIVER
is a superior finish for kitchen and piazza floors

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WILL PROVE BEST TO DRIVE

Brick Cleaning Machines, Swing Saws, Saw Tables Concrete Mixers, Etc.

HERCULES HOISTING ENGINES Single and double drum, single motion or reversible. 5 h. p. to 250 h. p.

High Speed Multiple Cylinder Dynamo Engines ALL 1906 MODEL

The Hercules Gas Engine Works

Works and Office, 2329 Blanding Ave., near Park St., Alameda, California 'Phone Alameda 91

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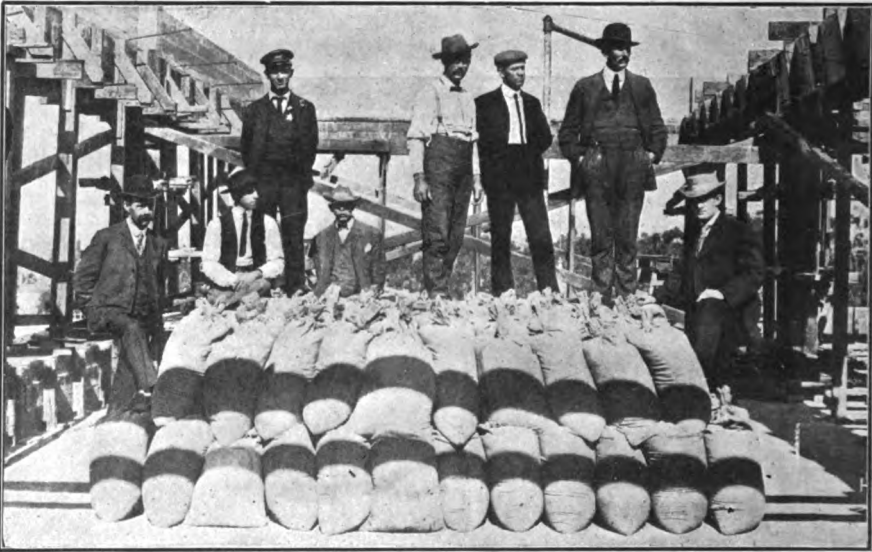
ARCHITECTURAL AND STRUCTURAL IRON CASTINGS

OFFICE AND SALESROOM
nearing completion at
75 FREMONT STREET
SAN FRANCISCO

WORKS AT
SUNNYVALE,
SANTA CLARA COUNTY
CALIFORNIA

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TESTS made upon the floor construction of the Bixby Hotel show remarkable strength and excellent design. In these floors and beams only the KAHN SYSTEM was used. This building is now being added to and the great success of the use of the KAHN TRUSSED BAR, as shown by these tests, especially as compared with the twisted bar or plain bar reinforcement, have led the architects to specify the Kahn System exclusively in these additions. The architect, J. C. Austin, has expressed himself as being so well PLEASSED with the Kahn System of reinforced concrete, that in the future he will use it in preference to any other system.



TONS of sacks filled with sand were placed on the floors of the Bixby Hotel, causing a super-imposed load of 240 pounds per square foot. This load is six times the load for which these floors were designed, and is equivalent to the weight of three tiers of heavy men packed together as closely as possible, and one tier on top of another.

Trussed Concrete Steel Company

DETROIT, MICHIGAN

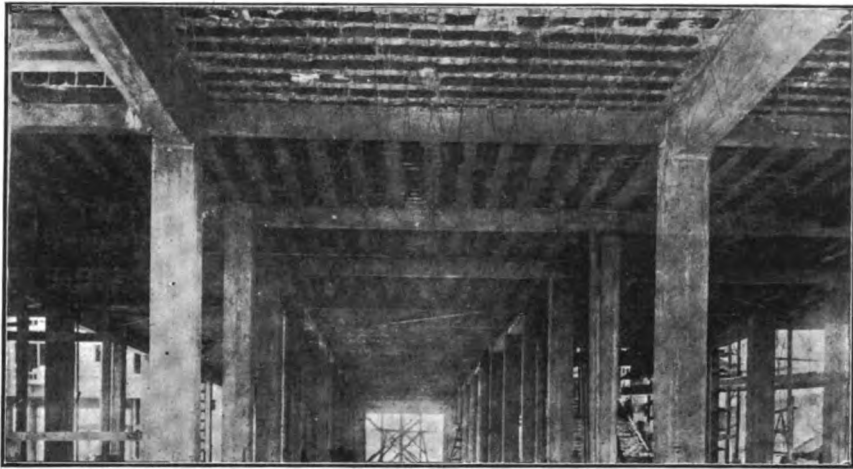
HEBER & THAYER
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Germain Building, Los Angeles

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CEILING construction under the load shown on preceding page. The clear span of these ceilings is 17 feet 8 inches. Note that the concrete joists spanning between the girders carry all the load, thus making it a true reinforced concrete construction. The rows of hollow tile are merely used to fill the spaces between the joists, which would ordinarily be vacant and unattractive in appearance. As far as strength is concerned, all of these tiles may be removed without any injury to the construction.

THE KAHN SYSTEM

Of REINFORCED CONCRETE is the HIGHEST TYPE OF CONCRETE CONSTRUCTION, not the cheapest but the MOST ECONOMICAL. It aims first for SUPERIORITY IN RESULTS, and second for economy in price.

In this locality the following structures are now being erected in accordance with the Kahn System of reinforced concrete:

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The KAHN SYSTEM OF REINFORCED CONCRETE is now being used in the United States at the rate of FIVE MILLION DOLLARS worth of building per month.



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DESIGN: NAPO
SCHOOL: L'ART NOUVEAU



DESIGN: LEYDEN
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Office and Sample Room:

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Old Mission and Spanish tile, sheet steel, pressed brick and stone, sheet metal cornices, galvanized iron skylights, tin and corrugated iron roofing and siding, galvanized iron chimneys.

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14th and Florida Streets

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Victor Stanquist

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Phone Market 1257

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*Contractors for
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First Reinforced
Concrete Office
Building*

Concrete Foundations, Artificial
Stone Sidewalks, Cement
Work of Every De-
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Between 14th and 15th Streets
San Francisco

THE SCOFIELD COMPANY

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NEW YORK

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KOHL BUILDING, Tel. West 6038

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are prepared to **CONTRACT FOR THE
CONSTRUCTION OF STEEL AND
REINFORCED CONCRETE BUILD-
INGS.**

We are equipped to handle with exceptional facilities such heavy construction as required in warehouses, factories, power-houses, railroad terminals, docks, piers, wharves, bulkheads and bridges of all descriptions. We have completed and are now engaged on some very important work for the Government and large corporate interests. Reinforced concrete a specialty

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Estimates furnished on any plans and specifications. Our electrical engineering force will gladly give advice, without charge, to architects, builders or owners, on any contemplated improvements.

The Standard Electrical Construction Co.

has done a great portion of the important work in its line in San Francisco and vicinity, including St. Francis Hotel; Mercantile Trust Co., Jas. L. Flood Building, Crocker Estate, Stanford University Buildings, University of California.

STANDARD ELECTRICAL CONSTRUCTION CO.

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The Beavers fast building block machine has the following features:

A patented tongue and groove so placed in the ends of our block that when laid a perfectly solid and straight wall is assured.

The blocks can be laid more rapidly and accurately than any block on the market today, and no need of high-priced mechanics.

There is a continuous air-passage throughout the entire building constructed of our blocks.

A block may be laid so as to bind four others, and never binds less than three.

Our corner stone is all one piece, thus making a better appearing corner.

Plastering can be placed directly on the inside wall without furring and lathing. Our walls are frost and damp proof.

With our machine one man can make 300 blocks per day.

With our machine every block will be molded accurately.

The blocks may be tamped upright or face down.

Three blocks may be tamped accurately at once.

We furnish a complete set of beam

molds, which are very essential for a well-built wall.

Our machines are right and our prices are right.

Write for full description to
OLSON & RICHARDSON,
Stoughton, Wis.

Asbestos and Its Application to Building Construction

The old saying, "It is cheaper to build a warm house than to heat a cold one," is becoming almost an unwritten law among architects and builders. This is undoubtedly brought about by the growing tendency of the American people towards more luxurious homes, and the great demand at the present time for residences and public buildings where the extremes of temperature during the various seasons are equalized; that in summer, every room in the house, from the kitchen to the attic, is comfortably habitable and equally comfortable during the rigors of our extremely cold weather.

Even the most modest homes, at the present time, are equipped with heating plants. Hot air furnaces, steam and hot

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STRUCTURAL STEEL

For Buildings and Bridges

Estimates Furnished on Material Fitted Ready
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High Carbon Steel Bars

For Re-inforced Concrete, Twisted Squares
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STEAM, GAS AND WATER PIPE
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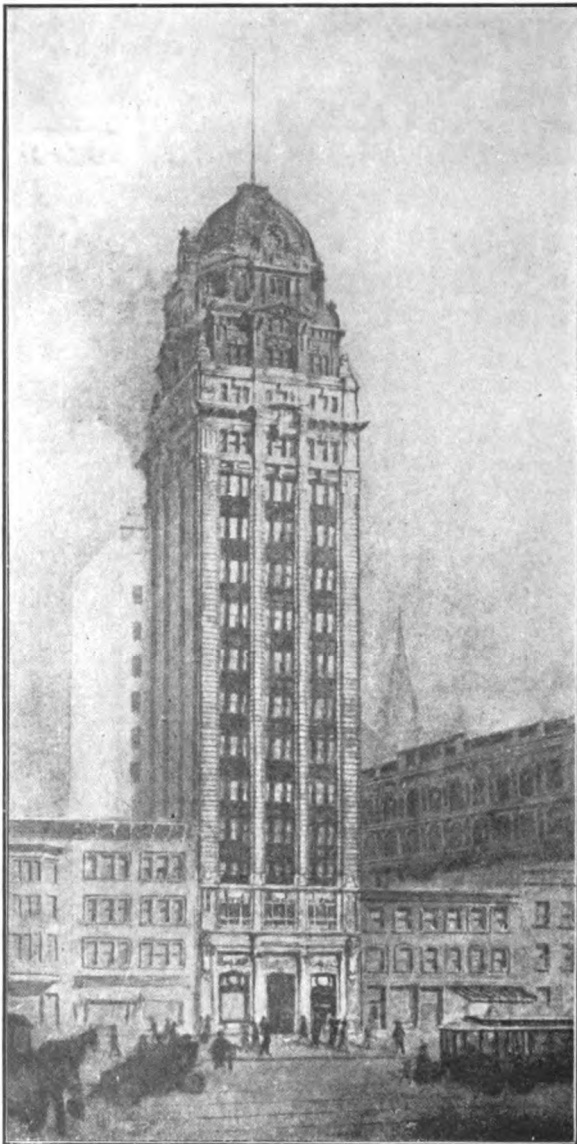
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Steel Frame
Reinforced
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Opposite Palace Hotel Site

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 "Quality Counts"
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Also Telephone Builders Ex. Park 11
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Fourth and Natoma Streets, S. F.

The Hassam Paving Company Patentees of **Hassam Pavements**

SATISFACTORY IN EVERY WAY

Hassam Foundations most Suitable Foundations for
 Any Kind of Pavements. Saves 25 per cent cost.

Worcester, Mass. Boston New York

Represented by Boyle-Luey Company, Inc.
Engineers and Construction Supply Merchants

Monadnock Building San Francisco, Cal.

water systems are coming more into general use, but even the best system of radiation and ventilation that can be installed is not complete, nor is the building a satisfactory investment, unless it is made weatherproof as far as possible.

A wide field is being opened for a material that will not add greatly to the total expense of construction. This material must be a first-class insulator against heat and cold, and, as far as possible, fireproof, so as to meet the underwriters' requirements by the reduction of fire hazards to a minimum.

The present wide development of the asbestos manufacturing industry has produced various products, the basis of which is asbestos, and adapting them for use in building construction.

Asbestos is a natural heat insulator. Its silky fibres are capable of manipulation into any form. They are not affected by the extreme weather conditions and are absolutely fireproof and of moderate cost.

Commencing at the very foundation of modern buildings, asbestos and its by-products enter largely into their construction and it is used throughout, exterior and interior, even to roof coverings. The H. W. Johns-Manville Co.,

whose Pacific Coast office is at 180 Second street, San Francisco, has developed various lines of building materials, the basis of which is asbestos, and makes the following suggestions as to their use:

After the first floor joists of a modern residence are put in place, "J-M" asbestic plaster can be used in conjunction with either wood or metal lathing as a "scratch" coat on the ceiling of the cellar. Thus used, it offers a positive fire-barrier between floors and presents the most satisfactory form of plastering known.

Between all floors and between the outside boarding and clap boards, the use of "J-M" Asbestos Sheathing Papers and Asbestos Sheathing Quilts has met with universal success. "J-M" sheathing and quilts have many advantages over other products, owing to their natural fire-resisting properties. They not only prevent the transmission of sound waves between rooms, but will effect a saving in fuel of large proportions, when placed upon the side walls of wooden structures.

These felts are also used on roofs, under shingles and slates, and insure a comfortable building throughout the entire year.

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TELEPHONE TEMPORARY 935

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CONCRETE**

**Engineers and Gen-
eral Contractors**

**"A" and "B"
BUILDINGS**

Bridges, Dams
Wharves and
Docks

Large Stocks of Cement
Steel and all
Building Materials

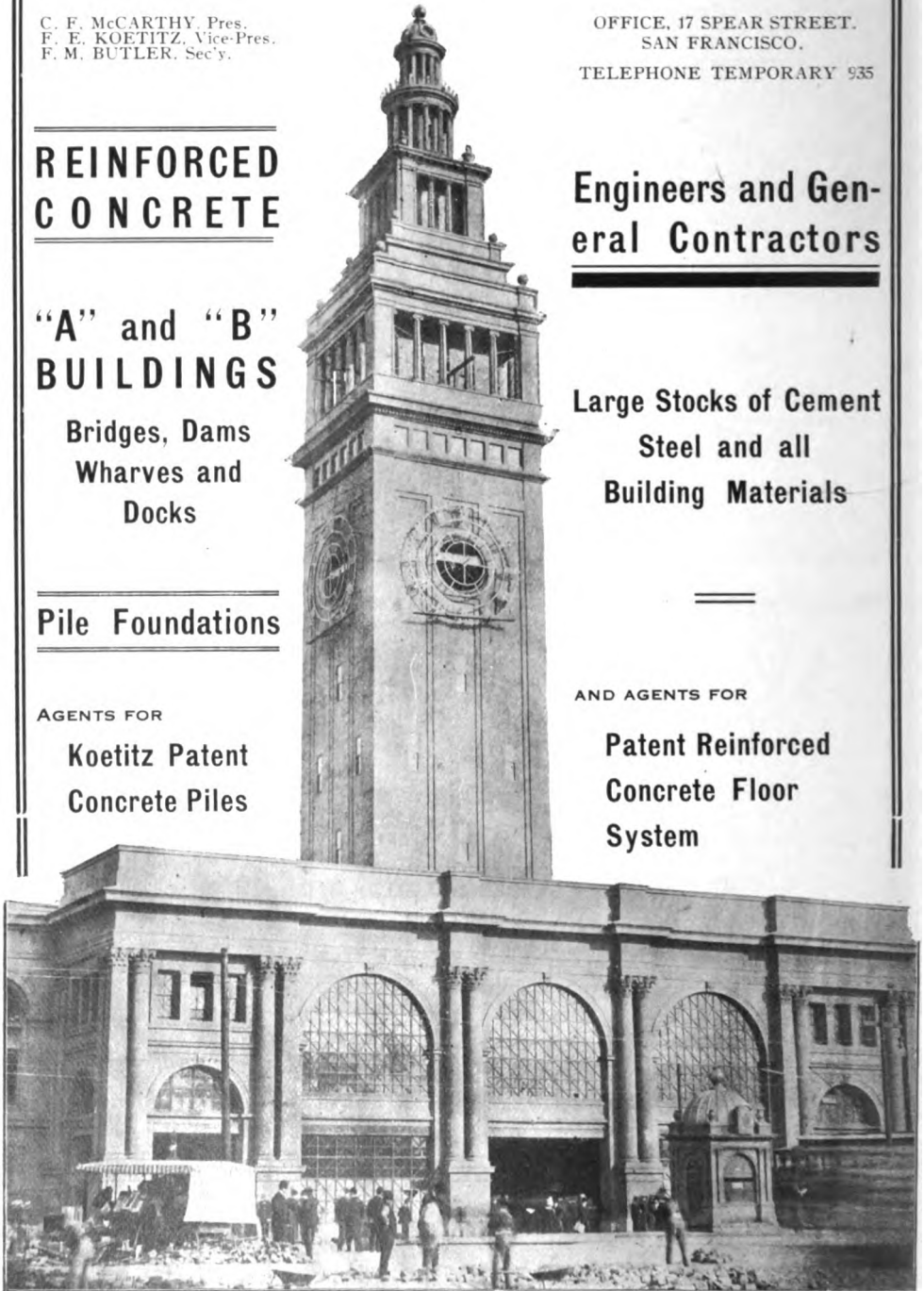
Pile Foundations

AGENTS FOR

**Koetitz Patent
Concrete Piles**

AND AGENTS FOR

**Patent Reinforced
Concrete Floor
System**



REINFORCED CONCRETE TOWER OF UNION FERRY DEPOT BUILDING



HERCULES PLASTER FIBRE

**For Hard Wall
and Lime Plaster**

GIVES BEST RESULTS

**Length of time in mortar, hot weather or
hot lime will not injure or destroy it.**

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**For Raising Lumber, Cement, Concrete,
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in Building Construction. Also
for Ore, Coal, Water,
etc., in Mining
Operations.**

**CONCRETE MIXERS
FRICTION HOISTS
CONCRETE CARTS
CONCRETE WHEELBARROWS**

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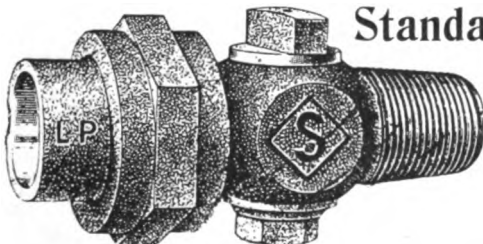
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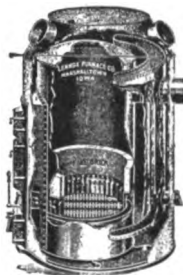
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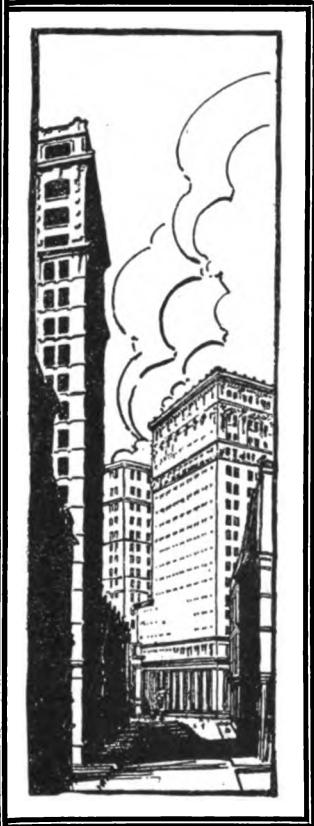
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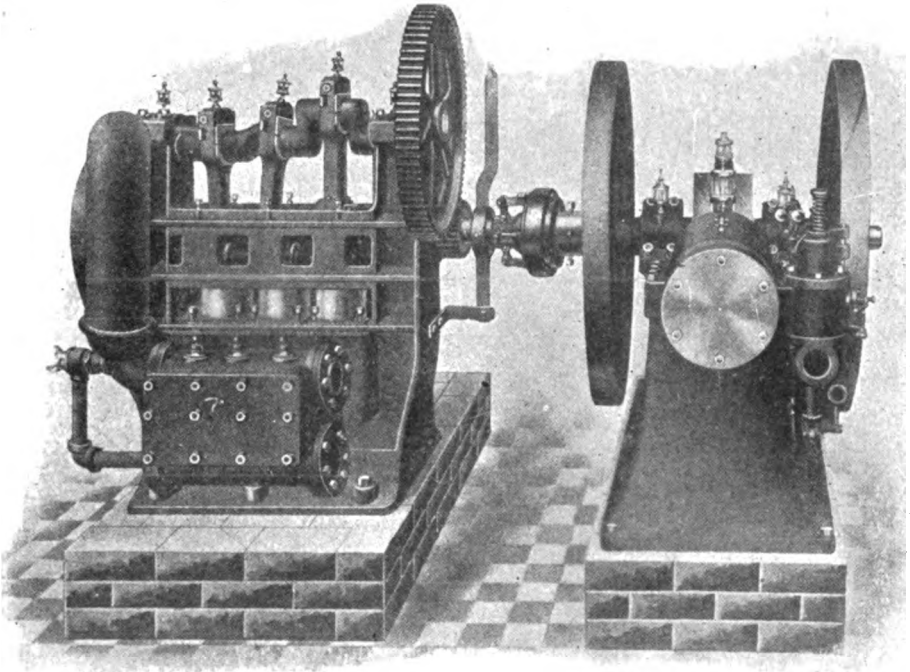
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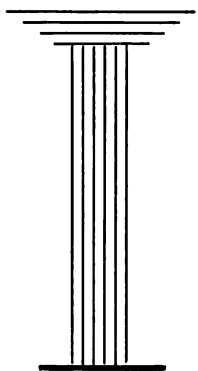
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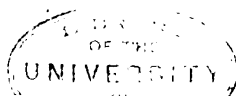
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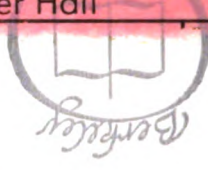
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