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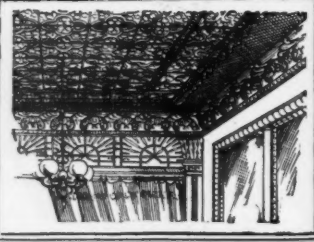
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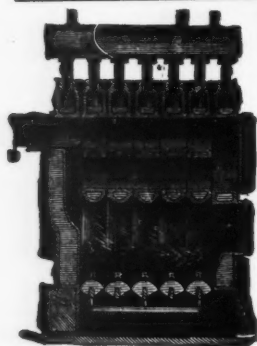
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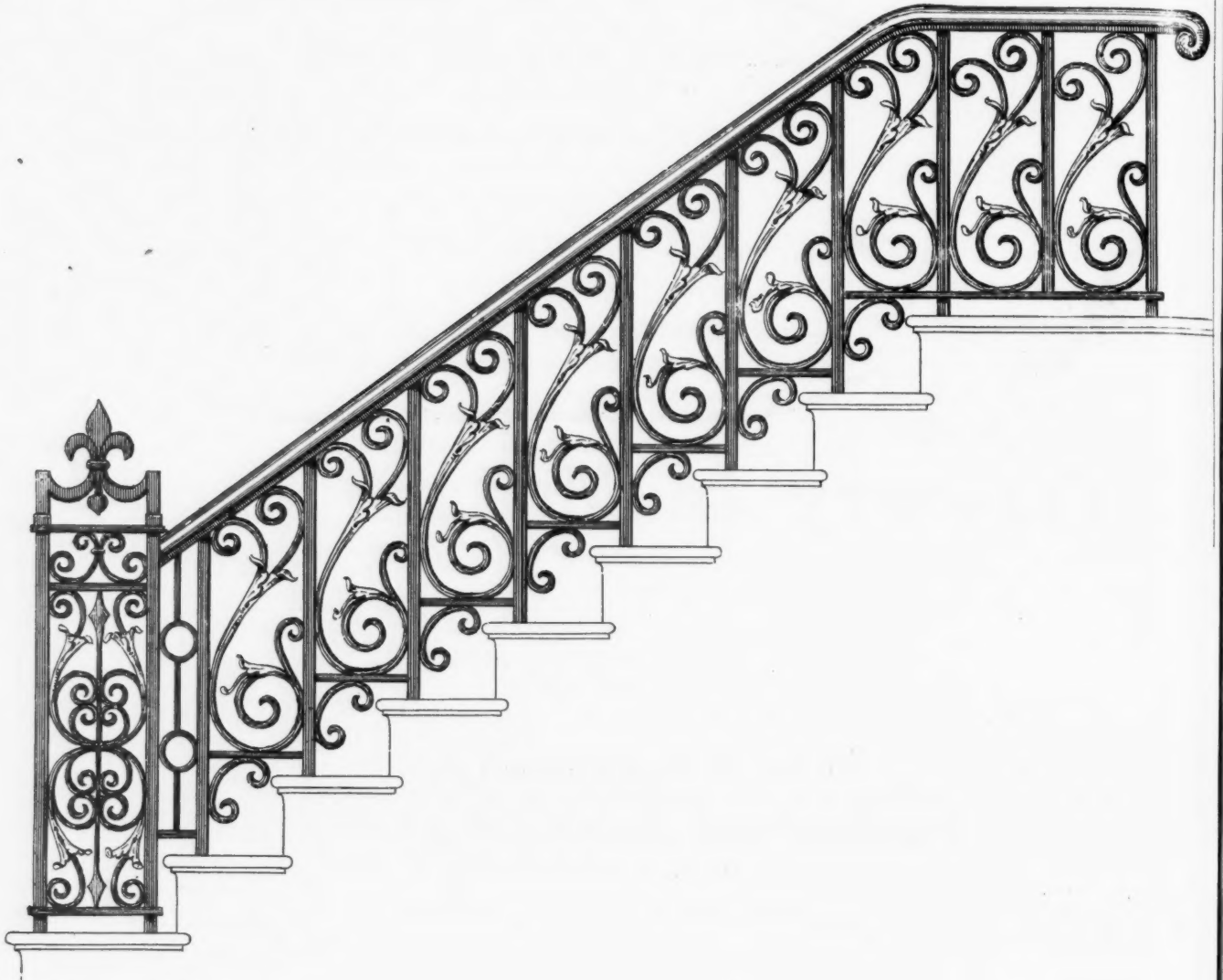
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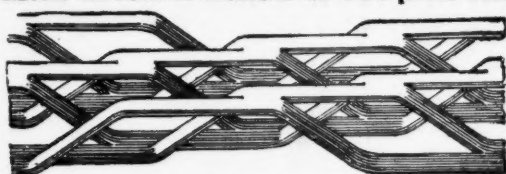
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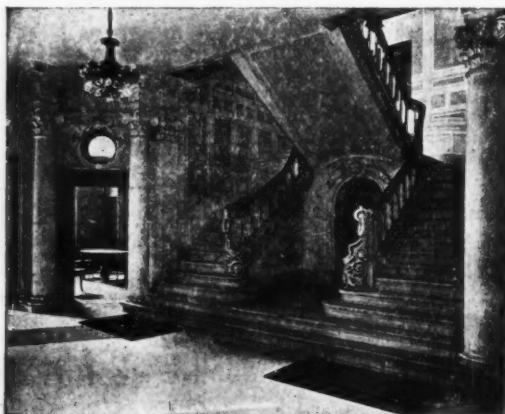
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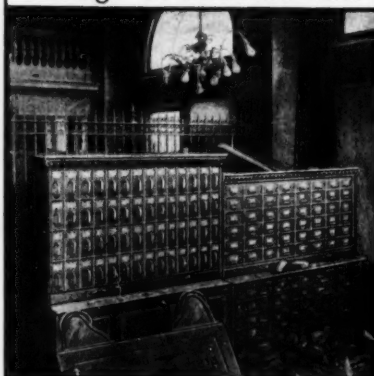
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VOL. LXXXIV

SATURDAY, JUNE 4, 1904

No. 1484

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TIED with white silk cord and consisting of fifty pages, the programme for the competition for the Carnegie Technical Schools of Pittsburgh, Pa., is a rather unusual document and deserves consideration on several grounds. In the first place the competition is distinctly stated to be held for "the selection of an architect"—not of a design, and, secondly, no limit of cost is named. The first is not an altogether unusual provision, but the second, if not the first of its kind, is at least a very great rarity, when the work is to be actually carried out—and shortly. (The programme for the University of California was understood to be somewhat chimerical, so far as its complete execution was concerned.) The absence of a cost limit will tend to cause the competitors to treat the matter as an academic problem, and so will lead many astray, since they may feel quite at liberty to indulge in the finest of architectural fireworks. But, we fancy that the architect who shows the greatest mere common sense in selecting his cost limit will probably get a more respectful hearing than the one who has thrown considerations of cost to the winds. The competition is a "mixed" one, with modifications, five firms, Carrère & Hastings, Cass Gilbert, Howells & Stokes and George B. Post of New York, and Frank Miles Day & Brother, of Philadelphia, having accepted the invitation to submit a design, for a honorarium of one thousand dollars each, and being also open to other architects under a novel restriction. The committee is willing to invite any other architect to take part in the competition, provided he first lays before the committee proof that he has already done work of enough importance and merit to warrant his receiving such invitation, and this information he must furnish by filling in a blank forwarded to him on application. This is an admirable provision, for the appointed architect must have experience and proved executive ability, so it is no hardship to the clever draughtsmen and inexperienced architectural fledglings to have the door closed against them, since they have not had the necessary experience, and in place of complaining they should be

grateful that the committee saves them from wasting time and money on a set of drawings. As for the incompetents, any expedient that will get rid of them is a wise one. The committee foregoes the remote chance of finding the best scheme to be sent in by a beginner, for the sake of being relieved of handling and considering twice as many designs as are now likely to be submitted.

FIVE prizes, of one thousand dollars each, are also to be distributed among those architects whose invitation to take part is due to their own proffer of service, and in the fact that one of these five prizes must be awarded to an "Alleghany County architect" is found the only recognition of the claims of "local talent." Although pains have been taken to require as few drawings as possible and these at a reasonable scale and treated with entire simplicity of rendering, the fact that the site embraces thirty-two acres and the floor-space in the five groups called for by the programme exceeds twelve acres will assure the prize-winners that their net profit cannot be large, and the losers that their loss must be very real. The winner of the competition is assured the appointment of architect to the buildings actually described in the programme and presumptively to those which may be added later, and will receive the full commission, less one thousand dollars already paid as first prize. In preparing the programme, Professor Laird, of the University of Pennsylvania, who is to act as expert adviser to the committee, had the advantage of consulting with the five specially invited firms, so that the number of drawings required, their scale and character, and the date of closing the competition, which is to be at noon of September 10th. next, have been adjusted on the most satisfactory basis.

THE purely aleatory base on which the commonest of legitimate business undertakings rest is made very patent by the language of the defendant's pleadings in a case just dismissed by the Supreme Court of New York. It was urged that "where a contract is fairly made and it is uncertain whether it will end in a profit or a loss, the parties to it take upon themselves the risk of the result, and neither has any title in law or equity to be relieved upon the ground that his expectations have been disappointed," and further that there could be "no injustice in holding that the person who would have retained all the profits, however much they exceeded his calculations, must be content to bear the losses he failed to anticipate." The Court agreed with this argument and dismissed the case, thus establishing a precedent of considerable value.

THE case in question was a suit to recover sixty thousand dollars, brought against the City of New York by the contractor who undertook to clear the site for the new Public Library, an unusually substantial piece of work, since it involved the removal of the old reservoir on Forty-second Street and Fifth Avenue, which, from the nature of the structure, was built with the utmost solidity. The contractor certainly seemed to have reasonable grounds upon which to found his suit, and so the Court seemingly admonishes him that, as he must have known he was dealing with uncertainties and gambling with chances, it was his own

fault if he did not figure in a margin large enough to cover all possible contingencies. It appears that he was given to understand that there was a system of drainage by which the water in the excavation could be wasted, but that no such drains were found to exist, and consequently he had to spend twenty-five hundred dollars in pumping. Further, the drawings of the reservoir prepared by the architects, Messrs. Carrère & Hastings, for the guidance of intending contractors in preparing their bids, showed that about one hundred and six thousand cubic yards of material were to be removed, whereas his records showed he had removed about one hundred and fifty thousand cubic yards of material, and this increase of nearly fifty per cent had swelled his outlay by forty-six thousand dollars. And finally he showed that his work had been hampered by the public improvements going on in Forty-second Street, so that it had cost him ten thousand dollars more than it need. The contractor, Mr. Eugene Lentilhon, made out a good case, much better than contractors usually do when they find they have underestimated, but, nevertheless, he lost his suit. The contract invited was for a "lump sum," and not for a price per cubic yard of material removed, and it is matter of common knowledge that when a lump-sum tender is invited, it is because the actual factors are known to be uncertain and that the proposition is and must be a gamble, where profit or loss may be greater than either party anticipates; in other words, bidders are clearly warned to use a financial factor-of-safety large enough to cover every possible contingency. The drawings furnished by the architects, who had no original knowledge about the reservoir, were, as argued, intended to be used merely as a chart in carrying on the work of removal and were trustworthy only in that they were based on the records of the Croton Aqueduct Board, and, at any rate, since the contract was for a lump sum, the contractor was put upon his inquiry and should have verified the conditions as expressed in the architects' drawings.

NEW YORK is blessed, or possibly cursed, with an indefinite number of art societies, of whose names and functions it is rather hard to keep track, for, like protozoa and other formless things, they propagate by fissure, and nothing is more common than to learn that one of these societies has been rent in twain—whether the resulting parts are of equal or unequal size and importance—and that the separated cells go on living—after a fashion. But why they should separate, or why live, or in what the efforts of one part are better than the efforts of the other part, it is almost impossible to determine. The latest of these protozoic fissures is taking place in the National Sculpture Society, a certain number of whose members are seceding, with the intention of forming a new society and drawing to themselves other discontented spirits and, probably, a certain number of sculptors who either could not get into the original body or who, for one reason or another, preferred not to apply for membership in it. These fissures and disruptins are of such common occurrence in art bodies, whose members are supposed by the public, perhaps wrongfully, to be peculiarly susceptible to personal jealousies, that it might be a good idea if every new association of the kind should start out on a trial basis, and by its constitution fix a date of disbandment at one, three or five years, with the proviso that, when that date should be reached, the association should either be permanently disbanded or else reorganized and incorporated. In

three years it can be readily discovered whether the body has any valuable function to discharge and whether it properly discharges it, or whether it is being maintained for the personal glorification of the man or men through whose activity the society was organized. A definite date at which the real usefulness of such a body must be deliberately weighed and passed upon would, we feel sure, lead to the elimination of many useless bodies which really consist merely of some official with a penchant for writing frequently to the newspapers on his official letter-head.

ONE of the first of culinary rules, "first catch your hare," has its parallel in the practice of building contractors, one of their most honored rules being "first get your contract, for after you have it you can do with it pretty much what you please." But a case is making its way up to the Federal Supreme Court which, when decided, may prove that, after all, a contractor may not do quite what he pleases, even after he has secured the contract. The case is made on the contract for the stonework of the Post-office at Cleveland, Ohio. As is frequently the case, the Government invited proposals for erection in two varieties of stone, granite or sandstone, and finally awarded the contract to Bradley & Co., of New York, for a building erected of sandstone, as, naturally, sandstone in that region would cost less than granite, and Bradley & Co.'s bid was the lowest in its class. Having caught their hare, Bradley & Co., who are said to be merely the ostensible contractors in whose name what is known as the "Government Granite Trust" operates, undertook to work their pleasure with the job, and, through wire-pulling and influence, are said to have induced the architect to join with them in urging the Secretary of the Treasury to consent to the substitution of granite for sandstone and to pay, because of this substitution, three hundred and eight thousand dollars more than the sum called for by the sandstone contract, the amount of this additional sum being arrived at by noting that the lowest bid submitted for granite work exceeded by that figure the bid for sandstone that secured the award. The reason for desiring the change is obvious: The granite trust, even if it may possibly control sandstone quarries, prefers to use granite, as it has locked up in its unused product the greatest part of its capital, and it is merely good business to realize on it, if it can be done. But it appears doubtful whether in this case it can be, for the Charles McCaul Company, of Philadelphia, who submitted the lowest bid for a granite building, come forward and maintain that, if the building is to be built of granite, the work must be given to them, the lowest bidder, and all the more since the figure they named is now adopted by the Granite Trust as their revised bid. The McCaul Company intend to make a stiff fight, and are collecting evidence to show how the game has been worked by the granite people before, so successfully, as alleged, as to bring into their hands some forty million dollars' worth of work that did not naturally belong to them.

THE eighth annual award of the John Stewardson Memorial Scholarship in Architecture has just been made to Mr. Christian G. Spoerl, of Philadelphia, as the result of his design for a terminal station for an underground electric railway. Mr. Spoerl, who is a this year's graduate from the Architectural Department of the University of Pennsylvania, has in the one thousand dollars that he wins a sufficient sum to make the time he is to spend abroad of very real value to him.

REINFORCED CONCRETE IN BUILDING CONSTRUCTION.¹

IT is my purpose, in reopening the discussion on this topic, to bring to your attention the application of this material to building construction, particularly to factory or mill building, and to discuss the subject from the architect's standpoint, showing the advantages and drawbacks incident to its use.

With the marked improvement in the design of mills, brought about largely by the requirements of the insurance companies with a view to reducing the loss from fire, the modern mill, erected on the principle of "slow-burning mill construction," and equipped with all the accessories to prevent the spread of fire, should one take place, has come to be regarded as a standard for such buildings; the idea of constructing fireproof mills not having taken a very firm root in this country. Since the advent here, however, of reinforced concrete as a means of construction, the subject has engaged the attention of architects and engineers, until to-day, we see its use becoming more general; but, like all new systems, it has met with varied success.

Being closely identified with the construction of mill buildings, the problem of making them more nearly fireproof and less susceptible to deterioration and at the same time consistent with a fair first cost, has, we think, been solved in the use of this system of construction. Moreover, the scarcity of good quality, large size, yellow pine timber for posts and girders in slow-burning mill construction, has often compelled the use of a greater number of posts or other feature of construction not altogether desirable.

In considering the advantages and disadvantages of reinforced concrete, the architect is confronted with many important questions which must be answered aright before any definite plans can be drawn.

First and most important, Is reinforced concrete "reliable"—will it stand up?

Second: Does its added weight work to its disadvantage?

Third: Can it be erected with sufficient speed and in weather of varying degrees of temperature?

Fourth: Does the stony and monolithic character of the construction render the building less adaptable for the introduction of overhead shafting, fixtures, etc.?

Fifth: Is it fireproof?

These questions naturally occur to one who has little or no experience with this construction, and it is only the proper solution of them that will result in the more general adoption of reinforced concrete. The answer to the first question depends on certain factors, the most important of which embodies the personal element; or, in other words, reinforced concrete in the hands of thorough and conscientious workers will be just as safe as any other form of construction, while the reverse is true if the designing and execution is left to inexperienced persons. The question of its added weight can be passed by as one of little moment, when we consider the saving of cost, effected by its use, over other fireproof methods of construction.

Can reinforced concrete be erected with sufficient speed and in weather of varying degrees of temperature? The first part of this question I will answer by giving the record of the reconstruction of the Forrest Laundry last year. This building is a four-story and basement structure, 50 feet wide by 160 feet long. The entire structure was finished on December 12, 1903, whereas the contract did not require its completion until January 15, 1904. On November 26th all the plastering was finished; the concrete construction of the entire building, except the roof on top of the tank tower, was completed on October 29th. As the work was given out on July 25th, this shows a very rapid progress. Since the work of erecting the staging for the concrete construction started on August 5th, the time occupied for putting in the concrete construction was, therefore, twelve weeks. As this involved the laying of about 35,000 square feet of floor and roof, this is remarkably rapid progress. As to laying reinforced concrete in freezing weather, I might say that it is not impracticable to do so, provided the temperature does not fall below about 26 degrees Fah., but the precaution of leaving the forms or centering in position until the concrete has thoroughly set and hardened, after the thawing process, is absolutely necessary.

The stony and monolithic character of reinforced concrete is somewhat of an objection for buildings in which the location of the machinery is not predetermined, unless some means are adopted by which the shifting hangers, etc., can be located at any point. This feature of the construction I will take up more fully in the latter part of this paper.

The fireproof quality of reinforced concrete has been established beyond a doubt, not only by actual conflagrations, but also by experimental fire tests made under the direction of the Philadel-

phia Bureau of Building Inspection and the New York Building Bureau.

One other important feature, which is interesting to the architect and engineer, inasmuch as it affects the pecuniary interest of the client, is the rate of insurance. Making the comparison with similar buildings of the slow-burning type, everything else being equal, the rate on the reinforced concrete type is considerably lower than on the slow-burning type; this is seen in the case of the Bilgram Machine Shop, where the rate is only twenty cents per hundred, while on the slow-burning type the rate would be more than double this amount. The rate on the Forrest Laundry is thirty-five cents per hundred, while on a laundry building of the slow-burning type the rate would be seventy cents per hundred. We understand from the insurance agent that the rate on this particular building is cheaper than any other laundry rate in the United States; furthermore, the same owner, while in temporary quarters after the destruction of his building by fire (the building being of slow-burning mill construction, sprinkled), paid \$1.57 per hundred insurance. This gives some idea of the saving effected by using this system of construction.

The cost of reinforced concrete, as compared with the slow-burning type on the one hand and steel frame, fireproofed with terra cotta, on the other, reveals some interesting figures: The following data are from the actual estimates received on the buildings mentioned. The bids of the Forrest Laundry for the slow-burning type amounted to \$1.07 per square foot of floor area; for the reinforced concrete, \$1.45 per square foot; for steel floor and roof construction fireproofed, the cost would have been \$1.85 per square foot. The bids on the Union Mission Hospital do not show the same variation; the construction being lighter, the cost was not affected as much as with a heavy construction. The actual bids on this building were \$2.45 per square foot for reinforced concrete and \$2.54 per square foot for steel construction, fireproofed, making a total difference between the two systems of almost \$2,500 in favor of the concrete. We see at once, therefore, that while as a fireproof construction, reinforced concrete is cheaper than fireproof steel construction, it is at the same time not too expensive to prevent its use in factory or mill construction.

The first building designed by us, in which reinforced concrete forms the integral part, and which, I think, is the first building ever erected in this country, having a saw-tooth roof, constructed of reinforced concrete, is the Hugo Bilgram Machine Shop; the building being the second one in Philadelphia in which reinforced concrete has been used for the entire floor and roof construction.

I might mention here, that it is due to the indefatigable labors of Mr. J. O. Ellinger, whose work in this field is well known, that reinforced concrete is a reality in Philadelphia, and through his persistent efforts, in conducting to a successful issue his fire tests, the Philadelphia Bureau of Building Inspection has placed buildings constructed of reinforced concrete under the head of buildings of the first class; likewise, New York has placed his system in the class which comes under the head of "fireproof."

To come to the practical application of the various patented systems, such as the Ransome, De Valliere, Hennebique, etc., we find that a disposition of posts and girders similar to that in slow-burning mill construction is entirely satisfactory, and that it is only necessary to consider the wood construction as being petrified and we have the construction in reinforced concrete; that is, the heavy beams taking the place of the cross girder and the concrete slab the three- or four-inch plank. As to making the walls of concrete in mill buildings built in the city, there is no saving of cost, and our practice so far has been to use brick walls. An isometric view of such a floor is shown elsewhere in this issue. It has, in addition to the cross beam, a longitudinal beam or girder. The construction is what would be termed a framed construction if it were executed in wood. The longitudinal girder is a few inches deeper than the cross girder for a very important reason; that is, to permit the bottom rods in the beams to rest on top of the bottom rods of the longitudinal girder, so as to obtain direct bearing, one on the other, and thus avoid straining the concrete. Other details of construction are shown in this view, such as the stringer pieces to secure the shafting. An isometric view of the steel reinforcement is shown in the lower right-hand corner. In the lower left-hand corner is shown the method of anchoring concrete beams to the wall; a dove-tail pocket being built by the mason, into which the concrete is poured. Cast or wrought iron bearing plates should be placed under all girders.

It has been our practice, in the better grade of buildings, to plaster with white-coat the reinforced concrete, which increases the brilliancy of the building at least twenty-five per cent. Where a very smooth finish is not absolutely necessary, the concrete work can be painted with some make of cold-water paint or white-washed. This was done in the basement of the Hugo Bilgram Machine Shop with very good results.

¹ A paper by Mr. Emile G. Perrot, read before the Engineers' Club, of Philadelphia, and published in the *Proceedings* of that society.

Theory.—The usual theory of the resistance of materials, based on the hypothesis that a section plane before bending remains sensibly plane after bending, while not held by all engineers as being absolutely exact, is, however, sufficiently so for all practical considerations when applied to simple flexure; and this hypothesis forms the basis of all the formulæ used in the writer's calculations. Such French engineers as Considere and Cristophe, and American engineers, as Thatcher, hold to the above tenets, and I do not see any good reason why the theory of reinforced concrete beams should be so refined as to reduce the calculations to an exactness which is undoubtedly rendered nil by the inequalities almost sure to exist in the concrete mixture and irregular workmanship.

On the assumption that, within the elastic limit, the stresses are uniformly varying across the section, the fundamental formula for the flexure of beams may be reduced to the following, for reinforced concrete beams of rectangular section, with reinforcement in the bottom only, neglecting the effect of the concrete in tension:

$$M = \frac{2}{3} a \times \frac{1}{2} p a e + t s b.$$

in which:

- M equals bending moment in inch pounds;
- a equals the distance from the neutral axis to the most remote fibre in compression;
- p equals the unit compressive strain on the concrete;
- e equals the width of the beam;
- t equals the unit tensile strain on the steel;
- s equals the area of the steel;
- b equals the distance from the neutral axis to the centre of action of the steel.

The determination of the neutral axis is, therefore, the key to the solution of the equation. If we represent the height of the beam by h , then the fraction a divided by h , which we shall call x in the next formula, represents the fractional part of the height of the beam in compression; likewise, the fraction s divided by $e h$, which we shall call y , equals the percentage of the metal in relation to the total sectional area of the beam. By assuming the coefficient of elasticity of steel as being twenty times that of concrete (the value established by the Philadelphia Bureau of Building Inspection), we deduce the following formula, which defines the position of the neutral axis in fractions of the percentage, or—

$$x = 20y \left(-1 + \sqrt{1 + \frac{1}{12}y} \right).$$

This formula is based upon the steel reinforcement being located five-sixths the depth of the beams from the top.

In calculating the strength of beams with floor slab united thereto, the beams and slabs are considered a T section, and the beam figured accordingly; of course, should the neutral axis fall in the slab, the formula used for rectangular beams will hold good for these T sections, since we neglect the consideration of the concrete in tension and are only concerned with that in compression.

The formula for T sections, then, when the neutral axis falls below the slab, becomes—

$$M = \frac{p}{6a} \left[a^2 w (3h' - a) - (a - g)^2 (w - e) (3h' - a - 2g) \right].$$

in which p , a , and e have the same meaning as before, and w equals the width of the slab.

h' equals the distance from the top of the slab to the centre of action of the reinforcement.

g equals the thickness of slab.

The working stresses of the concrete we have assumed as 500 pounds per square inch, and that of the steel as 16,000 pounds per square inch; these values being established by the Philadelphia Bureau of Building Inspection.

The effect of shear upon a beam seems to have been very little considered in the early study of reinforced concrete, but since data obtained by practical tests seem to indicate that beams designed without the use of steel, to take up the shearing strains, fail by the cracking of the concrete, several systems have been devised to meet this objection. The De Valliere has a very good form of twisted stirrup, which is built in the beam and unites the steel rods of the beams to the reinforcement of the slab. The Kahn system employs a square bar with side wings bent up at an incline. The stirrup in this case being originally part of the bar and cut away, leaving just enough material to unite the two securely together. The Hennebique system uses stirrups bent in the form of a U-shaped loop extending under the tension rods and running up through the beam and projecting into the slab. The oldest system in the country, the Ransome, is usually constructed without stirrups, but personally I think it is not only more logical but safer to use stirrups of some form.

The dangers of reinforced concrete I mentioned earlier in the evening, and to show how a legitimate system of construction can be abused, I refer you a list of failures of concrete buildings for the year 1903, given in the January (1904) number of the magazine *Fireproof*. The list comprises fifteen failures for the year.

One important investigation in the matter of the protection of the embedded steel in concrete was made by our firm. A test prism, 6 by 6 by 8 inches long, with four five-sixteenth-inch rods, was placed in brine for six months in order to determine the effect of this solution on the embedded steel, having in mind the design of a certain building in which brine or salt water was used very freely. We made this test to determine the advisability of this form of construction. When the cube was broken open, the rods showed no trace of rust and were as bright as the day they were embedded in the concrete. This is only another demonstration of the protection afforded the reinforcement by the concrete, and is especially interesting, as all the rods were placed within an inch of one face of the prism and the ends of some were as close as three-eighths of an inch to the end of the prism. These ends were as bright as when the rods were inserted.

We had another series of tests, made by Riehle Bros., to obtain the values for the adhesion of plain steel rods to the concrete, which is as follows:

Laboratory No. of Test 19,998—20,001

PHILADELPHIA, Feb. 20, 1904.

BALLINGER & PERROT, Philadelphia, Pa.

We have this day tested for you four tests of rods embedded in concrete for adhesion, and beg to submit the following report:

Note.—Tests made to ascertain adhesion between steel rods and 1, 3, 5 mixture of concrete seven months old.

One-fourth, five-sixteenth, and nine-sixteenth-inch rods, embedded in one prism and rusted before insertion.

Three-quarter-inch rod, embedded in a second concrete prism and entirely free from rust before insertion in prism.

Each prism 12 inches long, giving a 12-inch length of contact to all rods.

Diam. and Circum. of rods in inches.	Area of Rod in Contract (square inch).		Total Pressure in Pounds		Pressure in pounds per square inch:	
			Release.	Friction.	Release.	Friction.
One-fourth	.785	9.425	2670	2000	283	212
Five-sixteenths	.982	11.78	2560	1200	217	102
Nine-sixteenths	1.77	21.2	2960	1350	140	64
Three-fourths	2.356	28.27	5660	3200	200	113

The average pressure per square inch for release was, therefore, 210 pounds, and the average friction per square inch was 122 3-4 pounds. The result of these tests shows that rusted iron rods adhere as firmly as perfectly clean rods. Although the number of tests was not large, we are led to believe that, even though these values appear rather low, they give sufficient information upon which to base our calculations.

DISCUSSION.

CHARLES M. MILLS.—I would be pleased to learn from Mr. Perrot whether, in the construction of reinforced concrete, he has had an opportunity to observe the effect of a dry and artificially heated atmosphere in the interior of buildings; upon the tendency of concrete to shrink or crack, and if he has noticed such tendency, whether he has preference for any particular proportions of the concrete materials which he thinks would best resist it. I would also be very glad to have him describe a little more fully the expansion joint placed on the sides of the buildings, as exhibited on the screen.

MR. PERROT.—Answering the first question: the buildings which we have designed have not been erected long enough to determine the action of dry artificial atmosphere on the concrete. On similar buildings, erected in Europe and in other countries, and from data on the subject, we have no fear as to the results or behavior of these buildings. The fire tests show the behavior under different conditions of temperature. I would say that, with my partner, I visited Baltimore last Monday, with the view of observing the fire-resisting qualities of concrete, and I was very glad to see that there was one building in the conflagration at Baltimore which stood up, being the only one in the block. All the others fell down. That happened to have a reinforced concrete interior, supported entirely on independent wall columns of concrete. I estimate that the distance between party walls was about 20 feet, and the depth of the building about 80 feet. It was a four-story structure, built with arched floor slabs, about three inches at the crown. The concrete was intact. Some of the party walls had fallen down because they were not properly built, and part of the front had fallen out. This was an old building with the interior

reconstructed of concrete. Here is an example of an actual fire test; the concrete being exposed to a high degree of heat. Part of the side wall of the fourth story had fallen down and left the construction exposed, and I understand from the contractors that the concrete is in perfect condition. Samples of concrete which have gone through a fire test show a pinkish tinge. After it comes from the fire it appears to be more or less vitrified. There was another concrete building which fell down, but from what cause I do not know. If there had been higher buildings alongside of this four-story structure and they had collapsed, nothing could have saved it, because it was of light construction.

In reply to other questions, Mr. Perrot made the following statements:

The arched slab is a characteristic form of the Hennebique system. I understand this form of slab was used in connection with the flat slab in the J. L. Mott Iron Works Company's building at Trenton, which failed last December (sketching on the board).

We are building a mill at Bristol in which we are going to have a concrete floor. The distance between girders is 8 feet, and we have a five-inch slab. Now, we intend to carry only 150 pounds per square foot. The concrete floor of the Mott building was designed for 250 pounds per square foot, and I do not believe the slab is anything near that thickness. It is altogether a matter of safety. It does not make much difference what system of construction is used; they will all lead to failure if lacking in strength. It is all a matter of design and workmanship.

The vertical rods in the columns take up the bending, which causes compression on one side and tension on the other. In Philadelphia, the Bureau of Building Inspection does not allow the use of a unit strain of more than five hundred pounds per square inch in compression. The rods, therefore, do not count for much except to keep the concrete from cracking. I do not believe in building concrete walls without rods, because they are bound to crack.

It is our custom to leave floor forms in place two weeks. In constructing the Forrest Laundry we had two sets of forms. The first set was used in the basement to support the first floor, and was left in two weeks. After the concrete was laid on the first floor they built up the forms to support the second floor and by the time the concrete for the second floor was in place, that of the first was sufficiently hardened to use the forms for the third floor, with the necessary alterations, so we took the forms out, and so made good time.

Armored concrete construction may be executed as fast as the material can be put in place. A good many contractors use only one-inch material for the forms. Better contractors use two-inch. Another thing about the forms: they should be put together in such a manner that they can be taken down easily. This is facilitated by not driving the nails as far as the head. There is a waste of material, of course, in transferring forms from one story to another. The loss is about five to ten per cent.

Attempts to color exterior concrete walls by mixing the coloring matter in the concrete have been unsuccessful. The cement acts as a chemical on the color. I would not advocate it. It is better to paint the concrete afterward. I do not see any good reason for painting it. If you want to get a color scheme, try to use sand which has some kind of color, red or yellow.

WALTER F. BALLINGER.—There are just two points I wish to mention. Mr. Perrot's remark might have been misunderstood as to a wooden building of our design having fallen down. A portion of a wooden saw-tooth roof construction fell down while in the contractor's hands, before any attempt was made to complete it, due to insufficient shoring. Answering the question that one gentleman asked about the cost compared with other construction, I might add to the examples which Mr. Perrot has mentioned, that a certain cottage building in connection with this orphanage, which he showed on the screen, which cost about \$15,000 in the ordinary construction, would have cost \$2,100 more had the floors been of reinforced concrete, with wire lath and cement plaster partitions. You see there is a difference in that case of about fifteen per cent. In the case of the Methodist Hospital Dispensary, for which the contract is just let, the cost in joist construction was \$18,000, and the alternate bids showed \$3,600 additional for reinforced concrete construction. That would be about twenty per cent. greater for the concrete construction. In a certain factory we had an estimate of \$56,000, for slow-burning mill construction, which would have cost \$6,000 additional, or \$62,000, for concrete, which is an advance, in that case, of about eleven per cent. over slow-burning mill construction. In another building it was found that the omission of the tank with its supports, necessary for a sprinkler system, and the sprinkler system itself, just evened up the cost of a building of concrete reinforcement and one of slow-burning mill construction.

That is, it was found that a lower insurance rate would be obtained on a building of reinforced concrete without sprinklers than on a slow-burning mill construction with sprinklers—about one-half the rate—and the cost appeared to be about equal.

MR. SOUDER.—There is one point that is interesting to me. I understood Mr. Perrot to say that the concrete is plastered. Was this plastering applied while the concrete was still green or damp, shortly after the forms were moved, or after it became hard? In my experience, plastering concrete work after it has become hard does not give satisfactory results. The plaster does not adhere.

In the case of some of the early concrete bridges built by the city of Philadelphia, a plaster surface was laid on after the concrete had hardened. I have inspected all of these structures and found in many cases that the plaster coating was hollow and in some cases had fallen off. Plastering was also tried on a small house which I built of concrete, but the result was not good.

We used liquid cement. Possibly the surfaces we applied it to were too dry. It was never satisfactory to me. My practice is to apply the cement plaster against the forms, just before the cement is laid, the whole being compacted by ramming. In this way the plaster is well bonded with the concrete mass. This method was specified for some concrete bridges which I designed for the city of Philadelphia and which gave good results.

MR. PERROT.—On the interior of a building, we put on the plaster the same as you plaster a brick wall, and that is the way we treated the concrete. Plaster the concrete at the same time you plaster the wall. The plasterers were very particular to use a special mixture which consisted of plaster of paris mixed with a large proportion of lime—really what you would call a white coat. The cement will not discolor the white coat, when painted, if the wall is dry. We have had paint disfigured on a brick wall which was plastered. If the wall is not dry, it makes no difference whether it is cement or what it is, it is going to discolor the paint. That is simply a matter of experience with every kind of construction. With this construction we have used only a white coat, and so far it has been very good. Under vibrating loads the plastering remains in position. Whether it will remain in position ten years from now is a question.

HENRY H. QUIMBY.—When you use the floor slab as part of a beam, how much of the slab in width do you figure on for compression?

MR. PERROT.—That is the important point. We have compiled a number of tables and formulas to determine that very thing. We have a system of tables which shows at a glance how far we must place the beams apart in order to have sufficient width of slab. The formula I gave on the board will tell you that. We solve the equation for that particular quantity, namely W , or the width of the slab. Each case has to be worked out, and we have made tables so that they would not have to be worked out a second time.

H. WILMERDING.—I hardly know what to say, except that I have been very much interested in the discussion. Unfortunately I got here too late to hear all of Mr. Perrot's paper. I have just come from Baltimore, where I saw the building which Mr. Perrot described. I understood just before I left Baltimore that the upper floors of that building had softened to such an extent that they probably would have to come down. I would like to ask Mr. Perrot what, in his opinion, would be the cause of that? There was probably no water thrown. Would it be from the heat disintegrating the concrete?

MR. PERROT.—I think it would. Moreover, I might mention this: we all know that limestone, when it is calcined and water is placed upon it, will expand, as we see every day in making ordinary mortar. If we use limestone in concrete it is simply worthless as a fireproof material. There happened to be a small piece of limestone in the slab on the test house at Nicetown, and during the test that piece swelled and broke out of the slab. It did not do any harm to the floor. The behavior was just the same as that of a piece of limestone in a brick. When the brick is laid up in the wall and absorbs water from the mortar, the calcined limestone will expand and crack the brick. If you use limestone for reinforced concrete it is not fireproof. It would disintegrate under heat and water. If there was anything in the sand or stone in this building of that nature, it would tend to cause disintegration.

J. O. ELLINGER.—I have attended a great many meetings at which the subject of reinforced concrete was under discussion, and I think the impression usually left on the minds of the hearers was very much like that of the judge who said, when he addressed the jury, "Gentlemen: If you feel like me you won't

believe what either side has said." So much in the way of successful reinforced concrete work has now been done that to attempt to consider this subject as in any way at all mysterious, is vitally wrong. The whole theory of reinforced concrete is just as susceptible of careful analysis and of correct deduction as is the theory of steel or any other construction with which we are familiar.

The attempt on the part of the companies who do concrete work, to make the outside world believe that they alone possess the secrets of this art, is wrong. The calculations, after all, reduce themselves to very simple formulas, with which the engineer in his ordinary everyday work is familiar. It seems to me the following is a good example illustrating this.

Some time ago, last summer, Mr. Mills, whom I believe is somewhere in this room now, sent for me and told me that he worked out his sections for the Philadelphia Subway, using two formulas, which if I am not mistaken were those of Johnson and Thatcher. In addition to this, he also employed an approximate one. After Mr. Mills gave me the conditions of load and span, he requested me to work out the amount of steel and concrete which would be required, and entirely independent of Mr. Mills, I did work out the sections, using the method of Ritter of Zurich, and I think that the determinations, based upon these various formulas, came out within one or two per cent. Such being the case, I do not see that there is anything mysterious about the subject, and I see no reason why any intelligent engineer cannot work out the required sections. On the other hand, I do feel that the best care is necessary in the execution of the work, which should be entrusted only to workmen who are familiar therewith, through experience.

Mr. Perrot in his subject has spoken of the failures which have taken place within the last year in reinforced concrete constructions. Being engaged in this business, I have been and am, of course, vitally interested in the matter and have tried to analyze these failures. In carefully studying the subject, I have found that the general cause of trouble was due to taking down the forms before the concrete was set.

The failure that took place at Binghampton in a concrete construction was due to the lack of inspection on the part of the architects, who permitted reinforced concrete walls to be built, without any reinforcement.

So far as the Trenton failure was concerned, if my understanding be correct, this was due to faulty design, faulty material, and faulty execution. The lesson to be learned from these failures is very simple, and, as I see from my own work, expert help must be had to carry on reinforced concrete constructions. The engineer may design excellently, but if he has not got good aids in the shape of good material and expert workmen to execute his work, I fear he will have poor results. If, on the other hand, his designs be good and the execution entrusted to good men, the results obtained in reinforced concrete construction will be as good as those obtained by any other method. So far as the empiricism of reinforced concrete construction is concerned, as I said at the beginning, I do not think it is more general than the empiricism of steel construction, and the results which are obtained justify this conclusion.

Answering the question as to how much of the floor slab it is usual to take in compression as forming the top part of the beam, I want to say, that the New York Building Department permits the designer to take, for this purpose, a slab five times the width on either side of the beam.

MR. QUIMBY.—In regard to the slab width used as part of the beam—it depends in a measure upon the shearing value of the concrete, and any formula for determining the available width must be based upon an assumed shearing value, and include the area for horizontal shear which is the increment whose accumulation produces the flange stress, and must not be lost sight of. Mr. Ellinger stated in effect that calculations of designs of composite construction are as scientific as those used in steel construction. I feel like quareling with that statement, because of the uncertain strength of concrete. I think that the claim is a little enthusiastic. The most liberal specifications for steel—those issued by the manufacturers themselves—allow a range of only ten thousand pounds, where the mean ultimate is say sixty thousand—a variation of about eight per cent. Concrete cubes put up for test—not the concrete as put into the work, but the cubes put up for the purpose of testing—vary from 500 pounds to 4,000 pounds per square inch in crushing strength. Surely what is put together in the field by workmen, often with no special interest in their work, is likely to have in places even less value.

MR. PERROT.—I have said a great deal and the hour is growing late. The question of the reliability of concrete was one of the topics in the first part of my paper, and I do not think that in practice the uniformity of the mixture is as high as we should

like it. That is the reason I think the values we use for reinforced concrete should be somewhat lower than what the carefully made tests give us. The formula used in figuring the strength of floors is based on a certain age of the concrete. We count on the concrete to develop the strength we want it to, according to formula, in six months. In other words, we won't say that before the six months it is as strong as we claim, but in six months' time it will develop that strength. It may develop that strength before—in two or three months—but we are sure it is going to be the required strength in six. As Mr. Ellinger said, the variation of any particular brand is sufficient to make a wide variation in the ultimate strength. In the cement for a particular building we designed there were two carloads from the same manufacturer rejected. The cement that came from the works was uniform one week but not the next. Mr. Taylor knows that they have often rejected carloads of cement from the same brand. There should be a safeguard as to what cement should go in the work. As to the stone and sand, there is not so much danger, because that does not figure very largely in the binding quality. The cement is the vital point. If you get cement uniform, you generally have a concrete which will stand the loads which you want it to stand in practice. I know we have made mixtures for foundation work which have been very high in stone—as much as eight of stone, that is, 1, 4, and 8, also 1, 5, and 9, which have been perfectly satisfactory. We have made foundations 1, 2, and 4 which have been very rich. On an average, if you use 1, 3, and 5, I do not think you need have any fear, provided the cement will pass the test. There is a quantity of free lime in cement frequently, and if allowed to remain the cement will not meet the required test.

EXPLORATION AT EHNASYA.

One of the few remaining places at which there was a probability of filling a blank space in Egyptian history was the town of Heracleopolis, now known as Ehnasya (or Ahnas), about sixty miles south of Cairo. That site had been the home of the ninth and tenth dynasties, of whom scarcely anything is known; and there, if anywhere, some monuments of that age might be found. About ten years ago Dr. Naville had uncovered the upper layer of the foundations of a hall of the temple, and removed six large granite columns which lay before that; but no plans or measurements had been taken, no part of the building was searched to the base, and most of the temple yet remained covered over. As the Archaeological Committee in Cairo has so far declined to let the Fund work at Sakkara on any terms, we had to fall back on Ehnasya for last winter's work.

The uncovering of the temple site showed that the building had been altogether over 215 feet long and 110 feet wide, or between the size of the temple of Qurneh and that of Medinet Habu at Thebes. Of the front court the length was traced for 90 feet; it had columns along each of the sides, and before each column stood a colossus of Rameses II., about twenty-four feet high, forming an avenue of seven pairs of these huge statues. At the back of this court had been the six columns which were recently removed. From this the way led into a great hall, 60 feet wide and 50 feet long, with a roof supported by twenty-four large columns. Behind this, again, were the sanctuary and surrounding chambers, occupying a space of over 40 feet by 60 feet. Such was the general aspect of the temple in the Ramesside times.

The history of the temple had to be traced out by the various indications of re-use of the site at different levels, and re-use of the materials. From these we learned that there were two re-buildings after Rameses II., probably in the twenty-third and twenty-fourth dynasties; and there were two buildings before his age, perhaps of the eighteenth dynasty, and certainly of the twelfth. But there was no trace of a temple here earlier than that; and immediately below the foundations of the twelfth dynasty were irregular brick walls and scattered burials, which can be dated to the eleventh or twelfth dynasty by the objects found with them. It seems, then, that the temple of the earlier ages, during which this was an important religious centre, must have been on other ground.

The objects found were not numerous, but two of them more than repay the cost of work. An exquisite statuette of the local god Hershefi, of the finest anatomical execution, bears on the base a dedication by Pef-dudu-bast, a king of the twenty-fourth dynasty, of whom not a single object was yet known, and it gives his throne name Nefer-ka-ra. This is in England, and will be exhibited in the usual July collection at University College. It was exchanged against some very valuable jewelry, left at the Cairo Museum from a past year's work. Beside this a great group of figures in red granite was found, over eleven feet high and eight feet wide, representing Rameses II between the gods Hershefi and Ptah.

In another line some solid work has also been done. Many burnt houses of Roman age were cleared, and can be exactly dated by the coins found in them. They are of various periods from the third to the seventh century A. D. And in them were found dozens of terra-cotta figures and lamps, which thus have an historic value. Beside these hundreds of figures and lamps were obtained on this site, and also from the neighboring Fayum province. From all these I made a complete study of the varieties of Romano-Egyptian lamps, and photographed the series of each type—over 1,000 varieties in all—for publication.

At the close of the season Mr. Currelly made some trials at the great site of Buto, in the delta. But when I examined the ground it was evident that the whole region had sunk like Alexandria, so that there is nothing before Greek times above water level now. In Roman days the site had been exhaustively worked for stone and we found pieces of the porphyry bowls of the early monarchy strewn on the top of the Roman town, showing what had been destroyed.

Year by year it is more difficult to recover any fresh history; partly because we have now filled up so much that was unknown, partly from the fewness of remaining sites of historic importance. This is seen on all hands; none of the excavators of various parties and nationalities at work have added anything serious to historic knowledge last winter, or, indeed, for some time past, excepting the Fund work at Abydos. The two or three places where fresh light might be obtained are all reserved to other nationalities, and it is hard to see where any reasonable prospect of more historic discoveries is open.—(W. M. Flinders Petrie, in *London Times*.)



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

NEW REREDOS FOR CHELTENHAM COLLEGE CHAPEL, CHELTENHAM, ENGLAND; MR. H. A. PROTHERO, ARCHITECT.

The new reredos, which forms part of the memorial to Old Collegians who fell in the South African war, is not so interesting because of its architectural treatment, which follows largely that of the altar-screens at Winchester and Saint Albans, as for the interesting and sensible selection of the subjects for the figures which fill the several niches. In place of being devoted entirely to the saints and fathers of the Church, the committee, consisting of the Principal of the College, the Rector of Lincoln College, Oxford, and the architect, having in mind the influence it was desirable to effect on the minds of the young men educated at the College, set aside ecclesiastical in favor of intellectual, moral and practical greatness. The representatives of ecclesiastical greatness were distributed among the "Fathers and Champions of the Church," the "Builders of the Church and State," the "Makers of the English Bible and Prayer Book" and the "Leaders of Great Movements."

Beginning at the left, as one faces the reredos, and reading downwards, the small figures in the niches of the four counter-forts are found to represent, in their order: Chantrey, Wren, Caxton, Reynolds, Handel and Newton; Lawrence, Arnold, Gordon, Montfort, Wykeham and King Alfred; Butler, Bunyan, Milton, Walton, Sir Walter Scott and Shakespeare; George Herbert, More, Gresham, Livingstone, Jenner and Franklin.

Beginning again at the left, the figures in the larger niches are found to represent, still reading downwards: St. Alban, St. Columbia, King Arthur, St. Augustine, St. Edmund the King and St. Aidan; Becket, St. Dunstan, Bishop Langton and St. Anselm. The figures at the foot of the crucifix are the Virgin and St. John. Next, we have the venerable Bede, Wycliffe, Cranmer and Bishop Tyndale; Wesley, Keble, Raikes, Colet, Howard and Wilberforce.

The small figures on the left of the bas-relief of the Magi, over the altar table, are: St. David, St. Patrick, St. Andrew and St. George, while those upon the right are St. Michael, St. Gabriel, St. Raphael and St. Uriel.

The plate is copied from the *Builder*.

STUDY FOR A BRICK CHURCH. MR. ALEXANDER A. JENNEY, ARCHITECT, BOSTON, MASS.

THE E. & R. LAUNDRY BUILDING, CAMBRIDGE, MASS. MR. C. H. MCCLARE, ARCHITECT, CAMBRIDGE, MASS.

ISOMETRIC VIEW OF REINFORCED CONCRETE CONSTRUCTION.

For description see article elsewhere in this issue.

A COMPETITIVE DESIGN FOR THE NEW YORK HISTORICAL SOCIETY'S BUILDING.

Additional Illustrations in the International Edition.

HOUSE ON THE BOULEVARD WATTEAU, VALENCIENNES, FRANCE. M. EDOUARD LEMAIRE, ARCHITECT.

This plate is copied from *l'Architecture dans le Nord*.

PALACE OF EDUCATION: LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

HALF-TIMBER HOUSE IN THE AUGUSTINERSTRASSE, WURZBURG.

This plate is copied from *Zeitschrift für Bauwesen*.

THE PALACES OF ELECTRICITY, EDUCATION AND MINES: LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO.



[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

HERE'S RICHNESS!

DETROIT, MICH., May 31st, 1904.

To the Editors of the AMERICAN ARCHITECT:

Dear Sirs:—Under "Building Intelligence," in a recent issue, is a report from Detroit that "seven two-story houses will be erected by Messrs. A. & B., from plans by X. & Y.; cost, \$25,000."

I have it direct from the owner that he is paying \$70 for the drawings of these seven houses, all of which are different in design and plan. When the general public becomes educated up to an understanding of the princely commissions some of our able artist-architects receive for work, they will the more readily understand how it is that there are so many millionaires among architects. Truly, he whose lot falls within the charmed-artist-circle is blessed far beyond and above his fellow-mortals.

Yours,

ONE.



HOW IVY DESTROYED CHINGFORD CHURCH.—Careful guardians of American churches—especially the few old ones, like St. Paul's, that are worth preserving indefinitely—should find a suggestion in the story of the destruction of an ancient English church. At Chingford, in Essex, stood the fine old parish church of All Saints' with some evidences that its construction dated as far back as 1300. Though not extraordinary in architectural pretensions, it was above the average of parish churches in design; and to the student it was of exceptional interest. In 1845 a new church was built, less happy in design but more commodious. The old edifice was abandoned in part, but "even before its partial abandonment," according to the *Athenaeum*, "the grievous mistake was made of encouraging ivy, and after 1845 it was suffered to wanton after an unrestrained fashion, wherever it listed, over roofs as well as walls. Yet the foolish custodians had no intention of giving up the fabric to decay; a certain pride was taken in the old building, and the churchyard was still used; it stood close to an important highway, and a mere ruin was by no means desired. From time to time money was spent on propping up the roof and windows and doorways with deals. The size of the ivy stems and the luxuriance of its growth were considered to be subjects of congratulation. The old church was constantly being photographed. A minority of intelligent folk prophesied for several years that the ivy would soon master the fabric; but the ivy trunks were held to be sacred, and the more rank the roof vegetation the 'prettier' was the building considered."

In February of this year this 600-year-old fabric yielded to the crowding and undermining of the immense ivy vines, and the whole roof of the nave and one aisle collapsed. The walls, of course, were much shaken by the wrecking of the roof, and they are bound soon to follow the roof to the scrap-heap. "The widespread ivy trunk against a buttress on the north side of the nave clings too close to admit of a tape or rule passing behind it, but it measures thirty-three inches from one side to the other." On the south side of the old church is a red brick porch, added probably about 1500, which has been shattered by two ivy stems that have girths of twenty-seven inches and twenty-four inches. The ordinary observer of an ivy-covered structure would be inclined to agree with the verderer of Epping Forest, who spoke, in reference to this Chingford church, of "the extraordinary trees of ivy, of great age and girth, which hide and protect (sic) the mouldering walls and roof." But an example of this sort is likely to disturb our belief in the "clinging" quality of ivy as compared to

upstanding strength of the oak. It is a lusty parasite that can crumble a sturdy old Norman church; and church guardians would do well to watch their ivy-covered walls.—*N. Y. Evening Post.*

BUENOS AIRES.—The history of the city of Buenos Aires is exceedingly interesting and full of trouble. Founded in 1535, destroyed and rebuilt; and then, from 1650, when there were 400 houses, it grew slowly under the old Spanish regime; and later, under dictators and bad rulers, it slowly advanced in spite of an unstable Government. In 1852, when the noted Rosas was turned out, it had 76,000 inhabitants; in 1864, 140,000; in 1869, 178,000; in 1887, 400,000, and there are at present about 880,000. It is destined to reach the million mark by the year 1906. It is now the largest city in the world, south of Philadelphia, if we except Chinese cities. Comparing its present rate of growth per decade with some other cities, we find the following: Greater London, 20 per cent; New York, 37 per cent; Chicago, 54 per cent; Philadelphia, 23 per cent; Greater Berlin, 19 per cent; Buenos Aires, 40 per cent. The city is on the right bank of the River Plata, a sloping bank, fifty or sixty feet above the water level, rising up to considerably greater elevations in the centre of the city. It is about 120 miles from the sea at Montevideo. Its area is one of the greatest in the world—44,830 acres. Paris has only 19,280; Berlin, 15,625; Hamburg, 15,681, and Vienna, 13,690. It would be a good day's journey to go around the city, as its perimeter measures thirty-nine miles. As far as the natural conditions permit, the streets are laid out in the form of a chessboard, and are generally about 360 feet apart from centre to centre. In the central part of the city the streets are narrow; it is difficult for three carriages to pass. There are, however, a few thirty-three feet wide, and one or two avenues about 100 feet. The finest and said to be the best-lighted street in the world is the Avenida de Mayo, which is in the centre of the city as to the numbering of the houses north and south. It has a fine asphalt pavement and double electric lights in the centre. It was cut through the blocks a few years ago from the Casa de Gobierno (Government House), near the port, to the thirteenth street, somewhat less than a mile. At the other end there is being built a beautiful capitol building that will cost about \$5,000,000 (gold). There are seventy-two parks and small areas outside the main streets, with a combined area of about 1,400 acres. These parks are more tastefully laid out and more neatly kept than can be found in any other country in the world, Paris excepted. In fact, in many respects the city, in its streets, lights, parks and structures, resembles Paris, except that there are more one-story residences than in Paris. The prevailing style is Spanish, with a patio (an open area), and the rooms all facing it, and in this patio a garden and fountain, when the proprietor is able to have it; if not, pots of flowers very much like the ordinary city house in Mexico. The style of the houses of the wealthy may be seen on Avenida Alvea. The pavements are wood (nearly all hard, suitable wood of the country), asphalt, granite blocks, macadam and rubble. No city has better pavements in the central part. In the outskirts, however, much of the pavement is very bad and uneven, merely rubble, but immense sums are being expended in substituting for rubble granite blocks and asphalt. There is no city anywhere with more lines of street cars; in fact, with the exception of two streets, there is a line in every one of the principal thoroughfares. And leading out to the pleasant suburban towns, Belgrano, Palermo and Florest, there are electric lines similar to those in American cities, using the overhead trolley. In fact, all the equipment, from rails to trolley, comes from the United States. Very extensive changes are being made in all parts of the city, substituting horse cars for electric. There are now 275 miles of street-car lines, which carried, in 1900, 116,447,982 passengers.—*E. L. Corthell before the Boston Soc., C. E.*

THE KAISER'S APPROVAL OF MONREALE.—It is current gossip in the well-informed artistic circles of Italy that when, on his recent visit to Italy, the Kaiser cruising in the Mediterranean landed in Palermo and visited the noble abbey of Monreale, accompanied by several officials of the Italian Government, after considering attentively the beautiful monument, he turned to the inspector of the Fine Arts Office, who accompanied him, and somewhat bluntly remarked, "If we had such a beautiful thing in Germany, it would be better kept." Whereupon that gentleman suavely retorted: "Quite so, your majesty; if we did not have so many of them we might afford to keep them better." For once the incorrigible Kaiser was outwitted. And the trouble, the glorious and welcome trouble, is that not only does Italy "have so many of them," but they keep constantly increasing and teeming from the sacred ground that has still treasures to give forth, after centuries of plunder and decades of research.—*Amy A. Bernardy in the Boston Transcript.*

LIDIUM.—Lidium is the name of a new substance made of compressed cork. It is used for making furniture, vases, picture frames, etc.—*Exchange.*

PISTOLS AND LEAKY ROOFS AT ST. LOUIS.—A correspondent of the *Boston Transcript* tells of this ingenious way of stopping the leaks which abound in the roofs of the exposition. Workmen

sent upon the roof could not find the places where the leaks occurred. Expert marksmen from beneath, with pistols, located them by sending bullets, which tore through the thin boards and paper forming the roof and then the holes were easily found from above.

A QUESTION IN THE ETHICS OF OWNERSHIP.—A rather perplexing question, which may have to be submitted to a jury of art experts, has arisen in connection with the visit of Albert Neuhuis, the famous Dutch painter, to this city. He dropped in one day at the school of art conducted under the auspices of the Corcoran Gallery foundation, and became very much interested in the live model work, in which he found one of the classes immersed. Passing from easel to easel among the pupils, he suddenly stopped at one, where a young woman had laid the groundwork on her canvas, and seizing her pallet and brushes, with a few deft strokes finished the picture. The trustees of the Corcoran Gallery, on seeing this clever sketch, insisted that it should go into the gallery as a specimen of Mr. Neuhuis's method. The pupil concerned declined to surrender it, on the ground that the canvas was her own property, and that the artist had undoubtedly chosen it because he found her painting at the right stage to enable him to do precisely what he had in mind. It is argued in response to this that the opportunity of being in Mr. Neuhuis's path, and the honor of having her work completed by him, would never have come to her but for the circumstance that the Corcoran foundation was furnishing her with free tuition in its school. Thus far the controversy is said to have been entirely friendly in spirit, but on just what lines it can be settled remains to be seen.—*Washington Correspondence of the N. Y. Evening Post.*

FRANZ JOSEF AND GOOD ROADS.—They are telling a story in Vienna of the manner in which a Government official was called to account the other day for the disgraceful conditions of the roads leading to Lainz, the suburban palace built for the late Empress of Austria, and now the home of her younger daughter, Archduchess Valerie. The Emperor makes a point of driving out to see his daughter, her children and her husband, Archduke Francis Salvador, almost every afternoon, either from Vienna or from Schoenbrunn. About a fortnight ago the official in question received an imperial command to go to the castle at Lainz, with an intimation that the court carriage would be sent to bring him to the palace. Amazed by this token, as he believed it, of imperial favor and distinction, and with all sorts of golden visions dancing before his eyes, he hastily donned his finest gold embroidered uniform, and took his seat in the open carriage which had been sent for him.

The coachman, who evidently had received special instructions, made a point of driving in such a fashion as to splash the occupant of the carriage with mud. Indeed, when the equipage reached the palace, horses, vehicle and the dignitary in question were alike covered with mud. Before he could rearrange his attire he was hurried into the presence of Archduke Francis Salvador, who cut short his profuse apologies for his appearance with a curt remark to the effect:

"My father-in-law, the Emperor, wished me to let you know that each time he comes out to see us here he arrives in very much the same condition as you are now, thanks to the condition of the roads. That's all." And with that he indicated to him that the audience was at an end. The official retired profoundly crestfallen, and made his way home as best he could. It is needless to remark that since then the roads have been put into such apple-pie condition that there is no longer the slightest pretext for complaint.—*Marquise de Fontenoy in N. Y. Tribune.*

PROPOSED AMERICAN EXCAVATION OF CARTHAGE.—It is stated on high authority that the excavation of the site of ancient Carthage will probably be undertaken by the American School of Classical Studies at Rome. A Western capitalist, it is stated, is ready to supply a very large fund for the purpose and permission to excavate has been obtained from the French Government, which owns the territory that includes the site of the ancient city.—*N. Y. Evening Post.*

LORD GRIMTHORPE.—Lord Grimthorpe, peer, clockmaker, church restorer, and in one sense Father of the British Bar, has just celebrated his eighty-eighth birthday. It was as Mr. Beckett-Denison that he crowned his fame as a clockmaker by designing and superintending the construction of the great clock at Westminster, known as "Big Ben," which is not only one of the largest in the world, but a most accurate timekeeper. His caustic criticisms of all architects when he was Sir Edmund Beckett were only less amusing than his attempts, as Lord Grimthorpe, to justify them in his restoration of St. Alban's Abbey.

A HUGE LOCOMOTIVE.—Builders of locomotive engines are steadily exceeding past achievements and constructing titans of the rails that excite the amazement of every beholder. At Schenectady a colossus has been turned out for the Baltimore & Ohio Railroad, which surpasses anything and everything seen before. This giant weighs 320,000 pounds, has six pairs of driving-wheels and a boiler thirty-eight feet in length and seven feet in diameter. It is estimated that this locomotive will be 50 per cent more powerful than any other ever put together.—*N. Y. Tribune.*



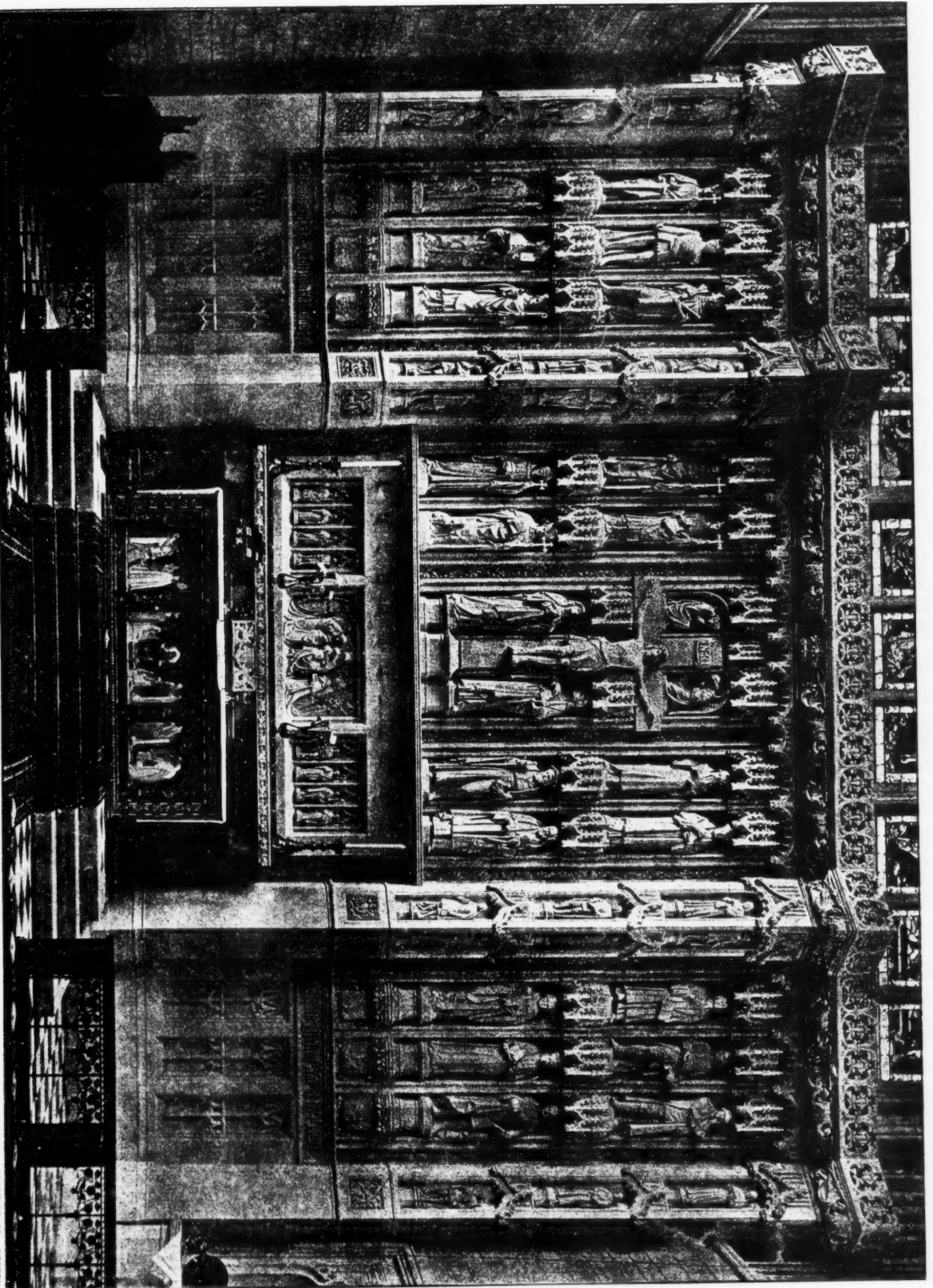
STUDY FOR A BRICK CHURCH.
ALEXANDER S. JENNEY, ARCHITECT.

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NEW REREDOS: CHELTENHAM COLLEGE CHAPEL, ENGLAND.
H. A. PROTHERO, ARCHITECT.

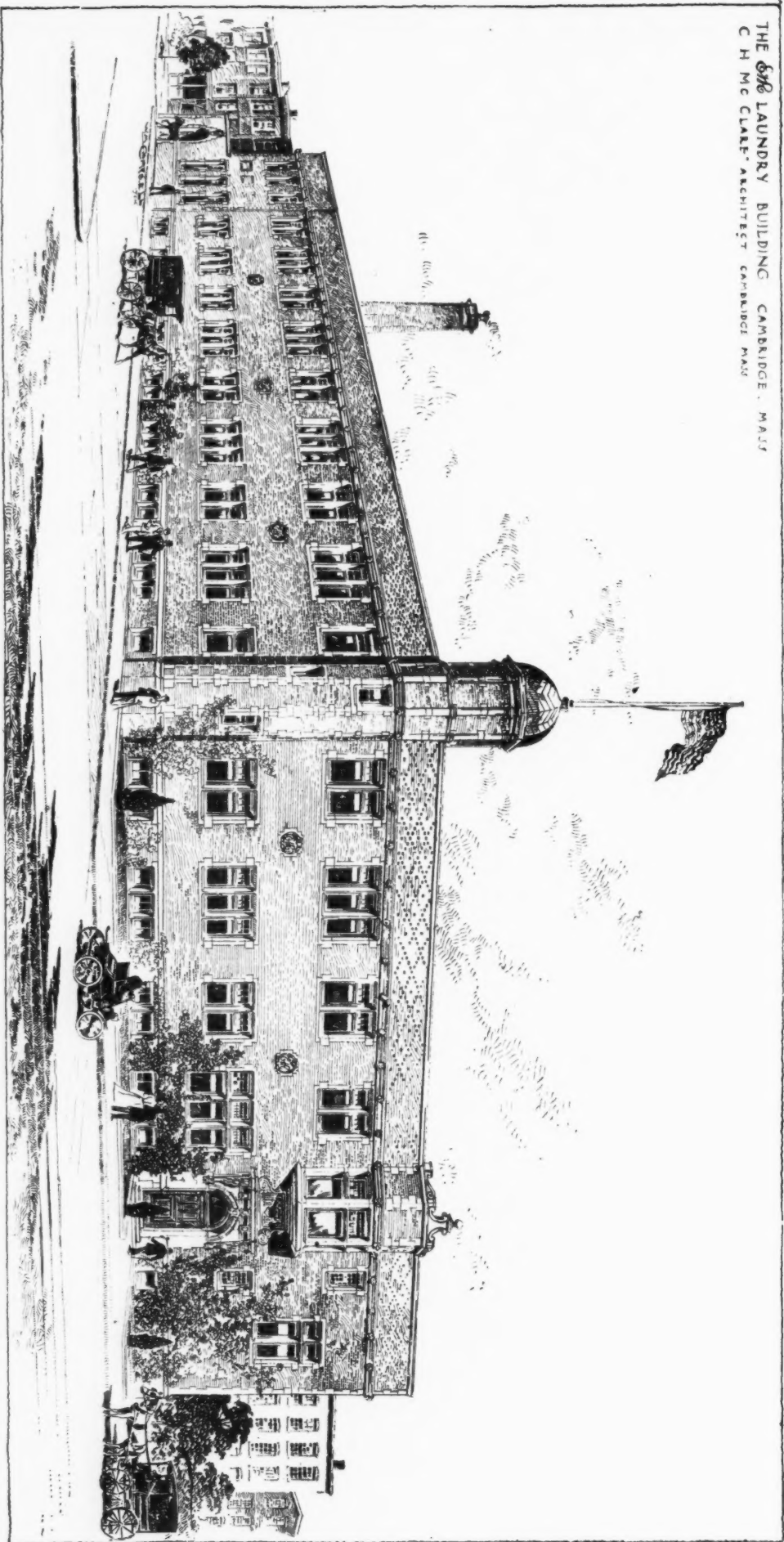
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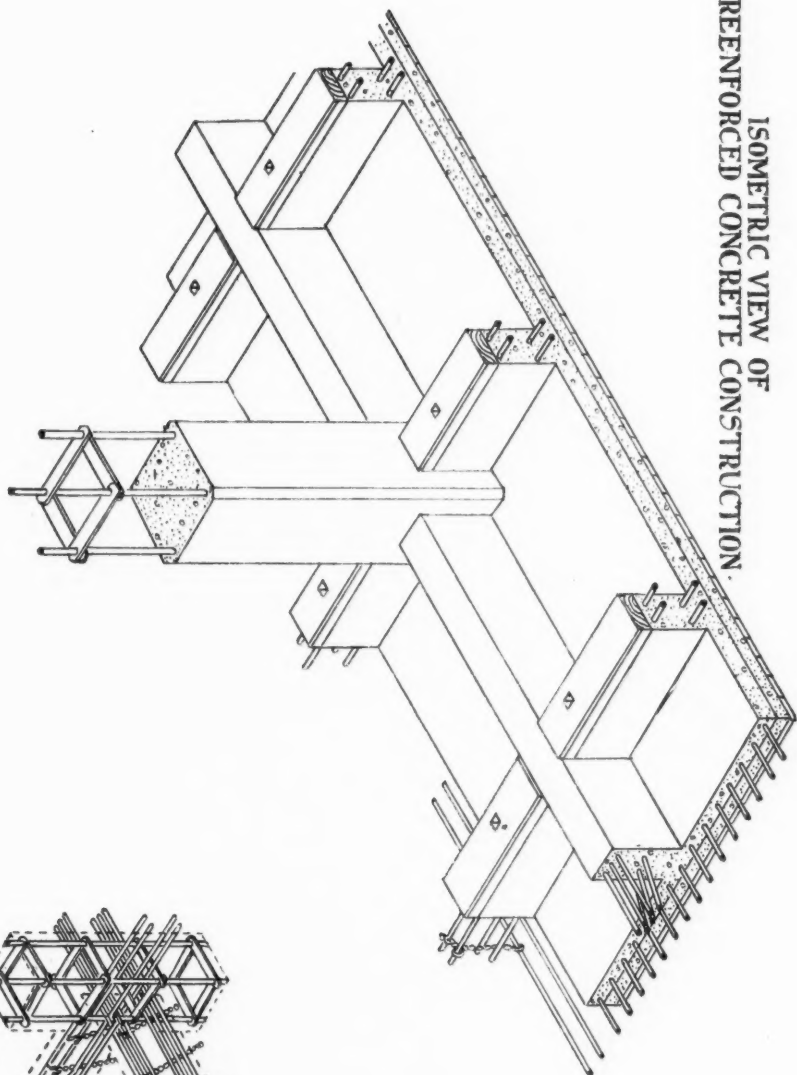
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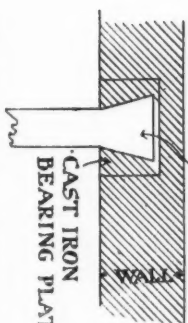
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The American Architect
June 4, 1904
No. 1484

ISOMETRIC VIEW OF
REINFORCED CONCRETE CONSTRUCTION



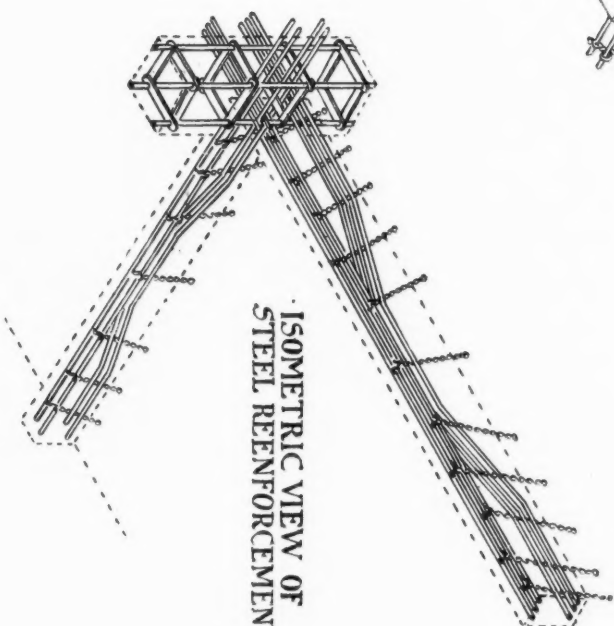
CONCRETE BEAM.

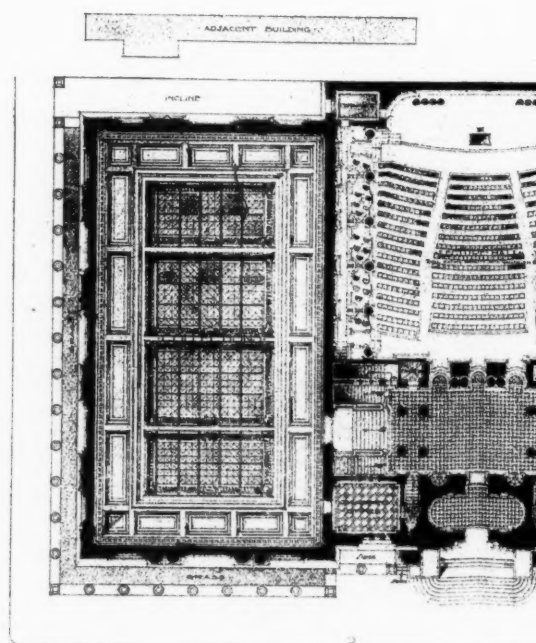
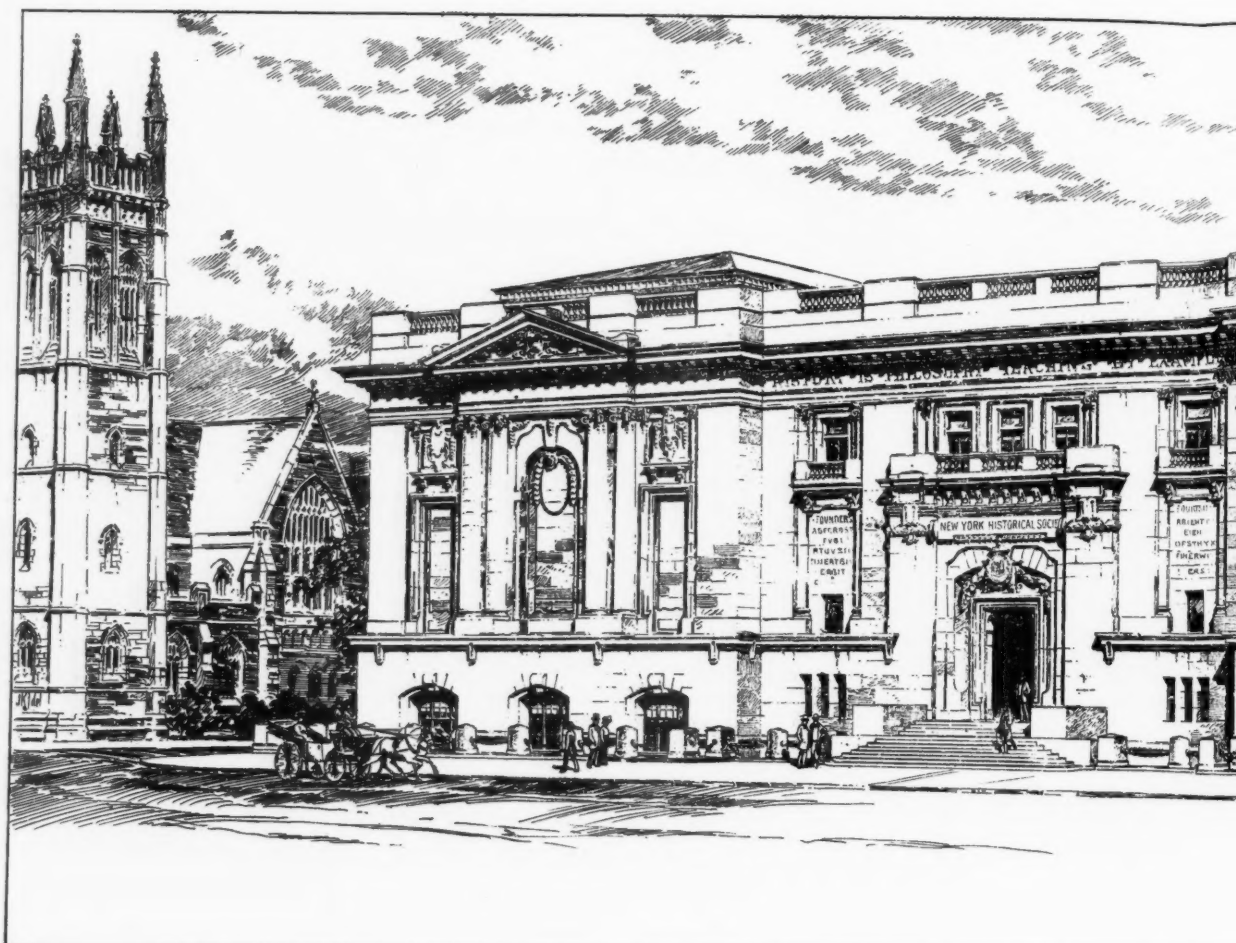


CAST IRON
BEARING PLATE.

PLAN OF WALL BEAKING.

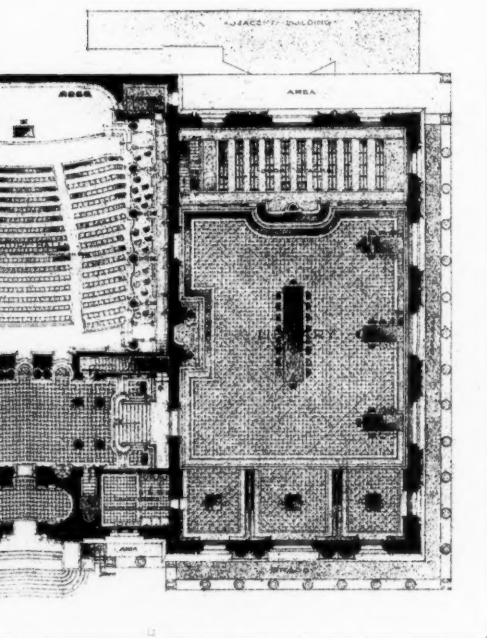
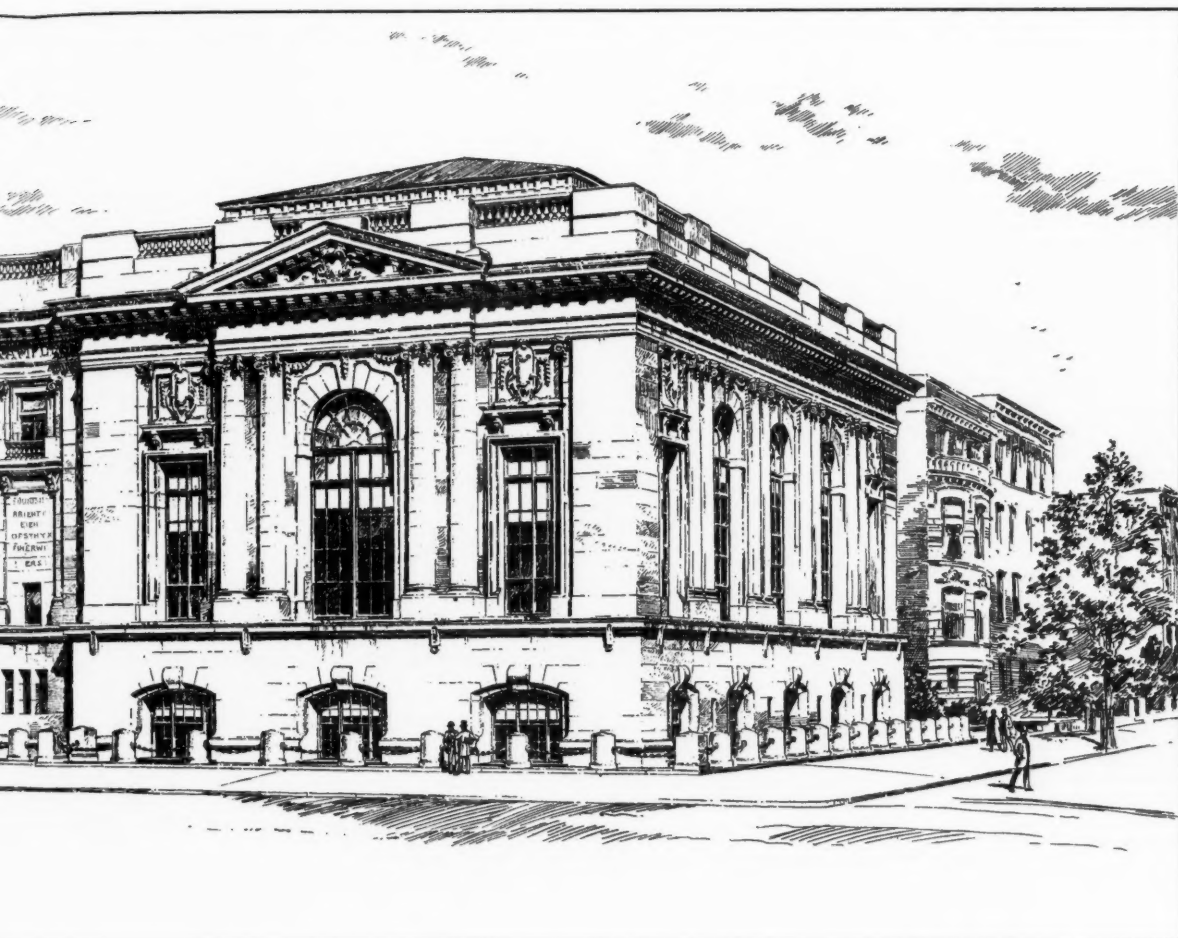
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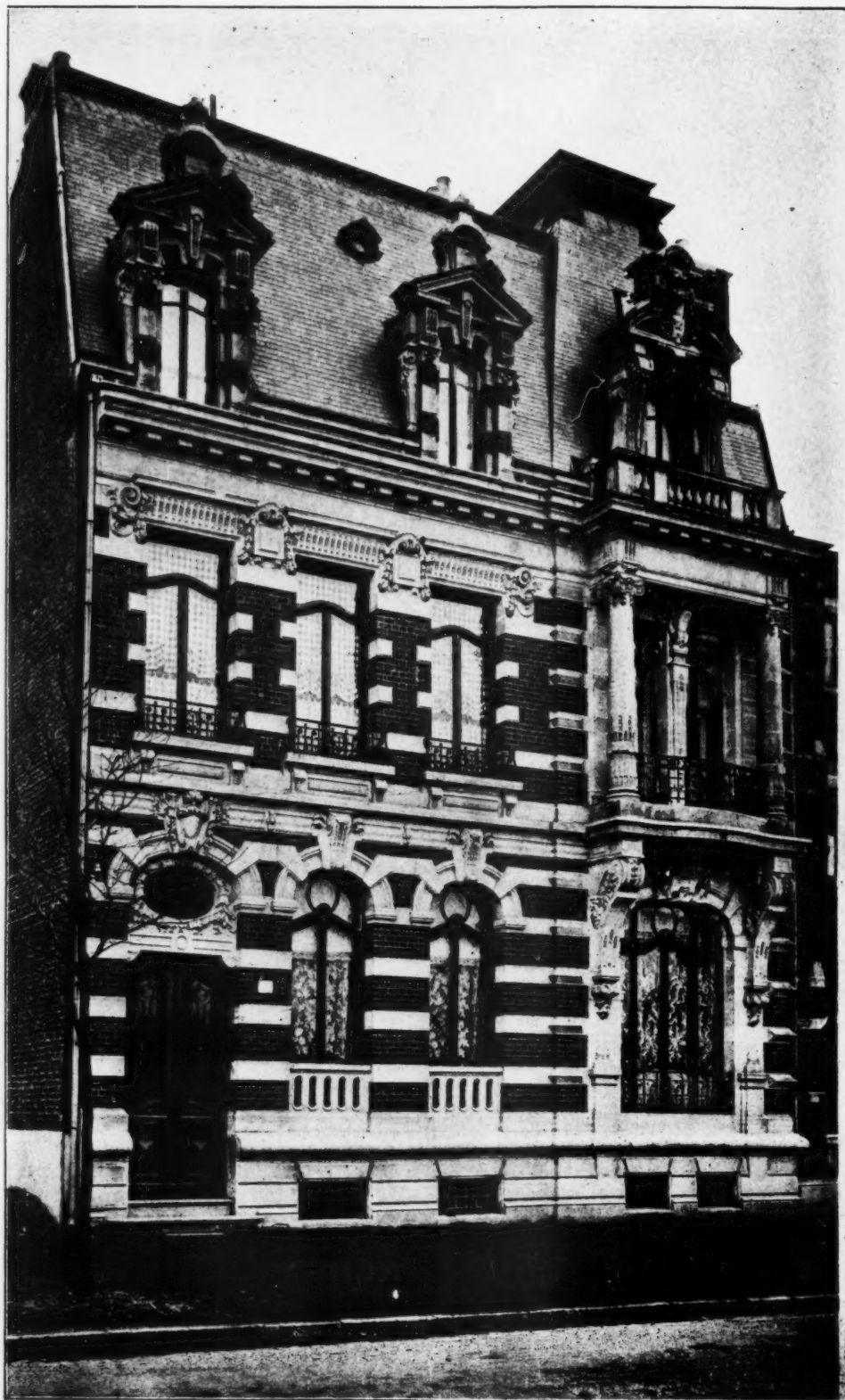


FLOOR PLAN

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From l'Architecture dans le Nord.

House on the Boulevard Watteau, Valenciennes, France.

Edouard Lemaire, Architect.

The American Architect

June 4, 1904

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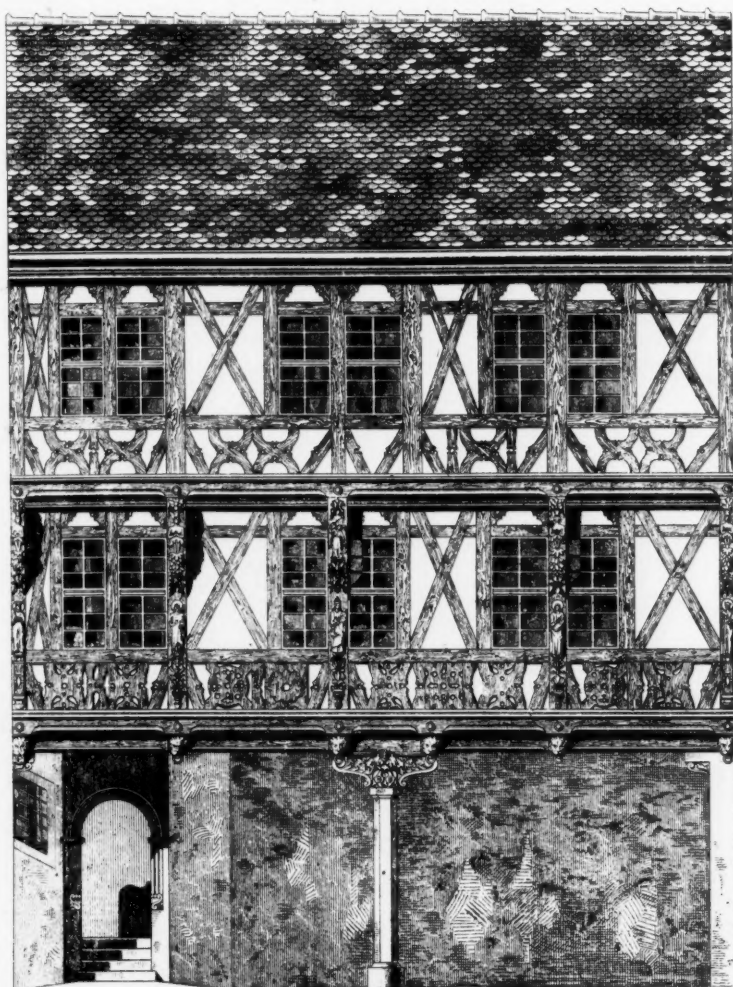


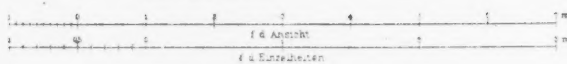
Abb 1 Hofansicht



Abb 2 Schnitt durch die Front



Abb 6 Fachwerkpfosten.



1 & Ansicht
6 & Entdecken

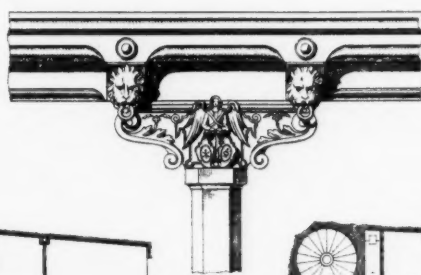


Abb 3
Sattelholz
über dem Pfosten

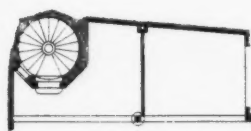


Abb 4 Erdgeschoss

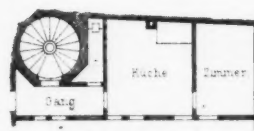
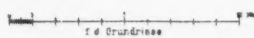


Abb 5 Erster Stock

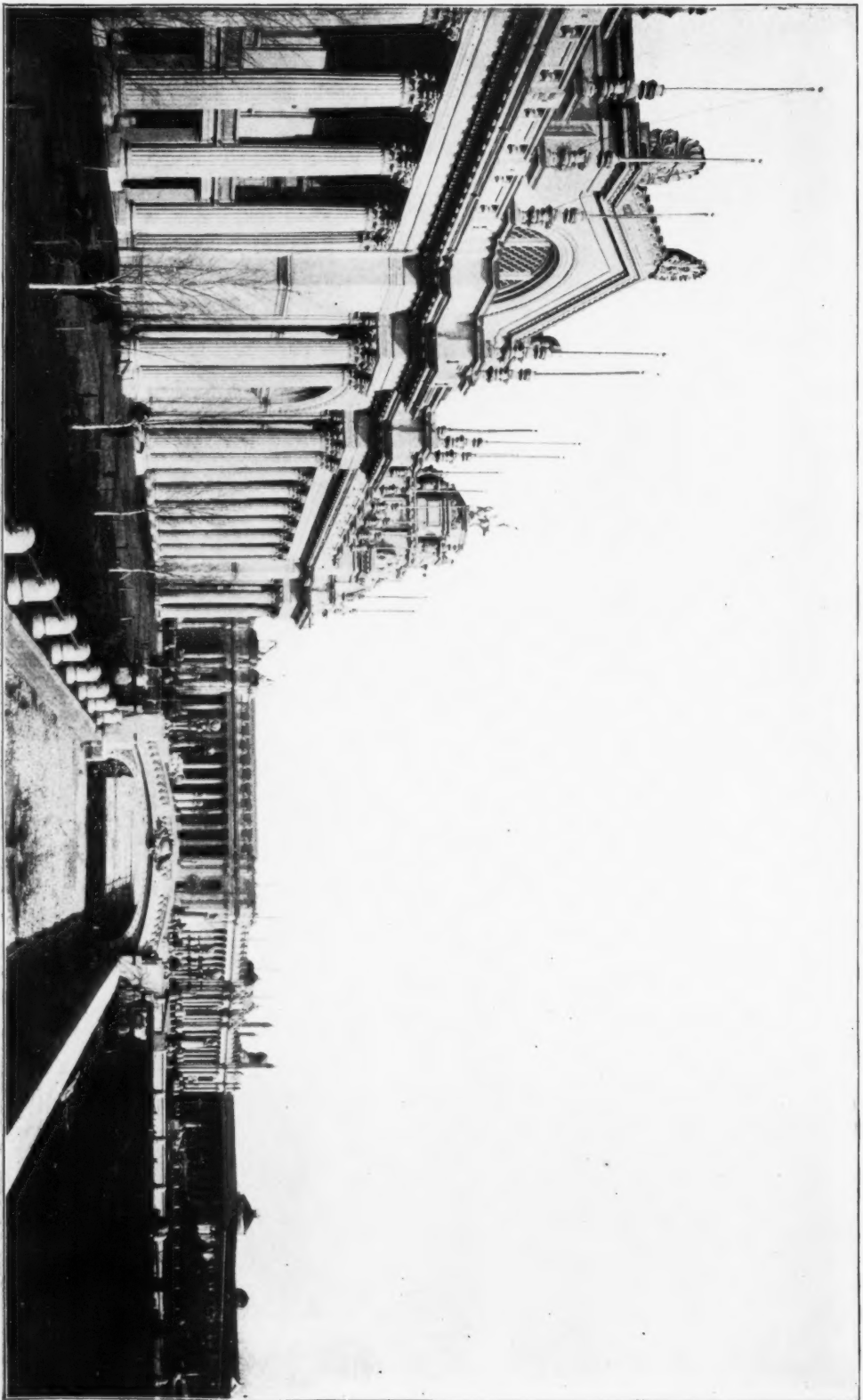


1 & Grundriss



Abb 7 Mittelständer

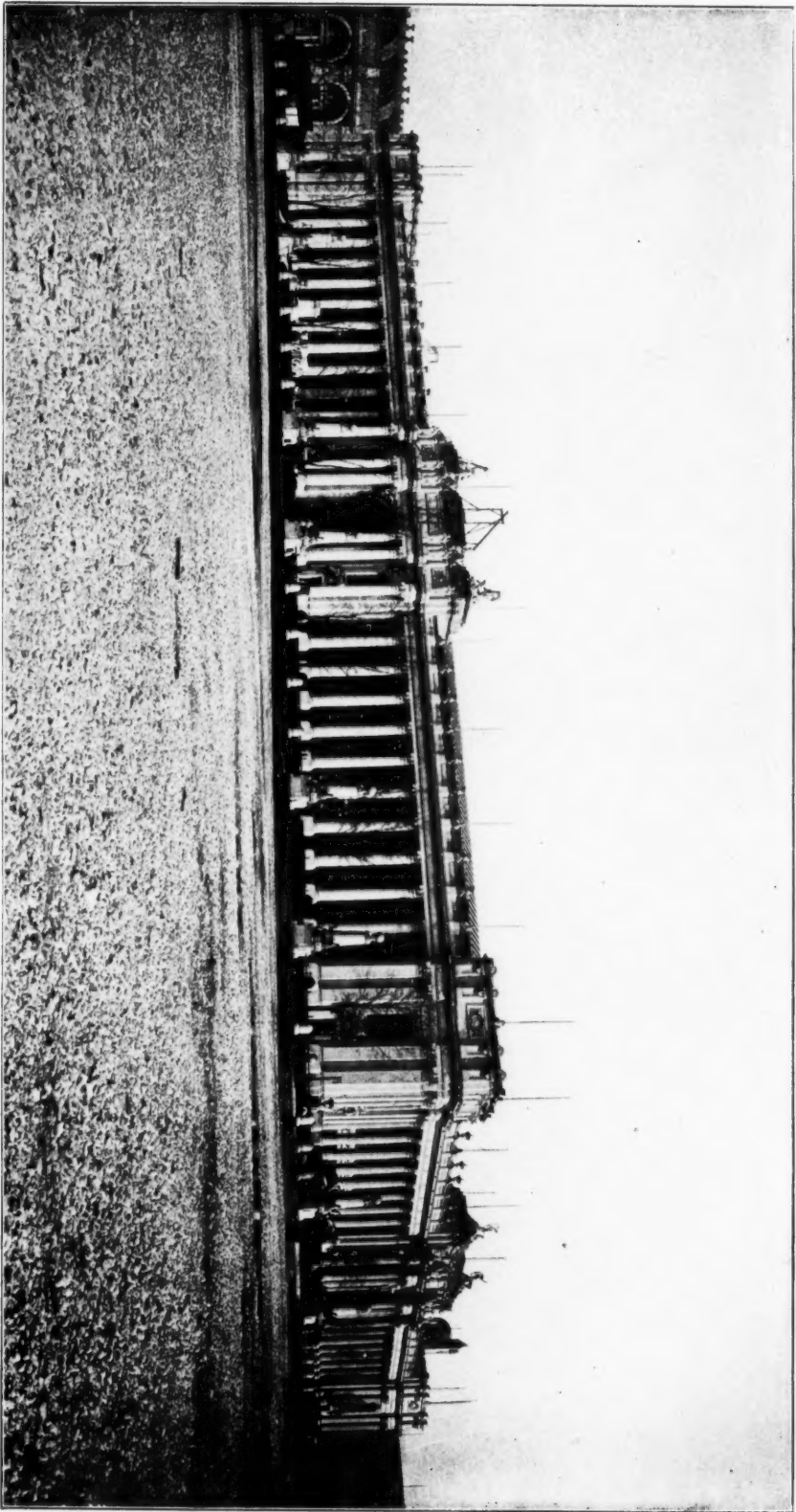
Half-timber House in the Augustinerstrasse, Würzburg.



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The Palaces of Electricity, Education and Mines: Louisiana Purchase Exposition, St. Louis, Mo.

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*The Palace of Education: Louisiana Purchase Exposition, St. Louis, Mo.
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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT

No. 263

SATURDAY, JUNE 4, 1904

VOLUME LXXXIV
No. 1484

COAL TAR PITCH WATERPROOFING

A VERY interesting demonstration of the permanency of coal-tar pitch for waterproofing underground structures was made a few weeks ago in tearing out a portion of the Old Park Avenue Tunnel, north of the Grand Central Station, New York, where the new terminal improvements are now going on.

This waterproofing of coal-tar pitch and tarred felt was laid thirty-two years ago, using less material and less skill than is employed in similar work by contractors who now make a specialty of waterproofing.

It is the rule to-day, of the modern architect and engineer, to waterproof all foundation walls and cellars of important buildings, subways, etc., while twenty-five or thirty years ago it was the exception to do so.

Owing to the recent increased demand for waterproofing, much interest is shown in the various methods and materials advocated for this purpose, and careful examination of the coal-tar pitch used in the Park Avenue Tunnel work, above referred to, shows the material to be absolutely unchanged.

Since that particular work was done, many competing methods have been tried. Trinidad Asphalt has been used, but was found to disintegrate under the action of water, owing to the presence of soluble salts and earthy matter contained therein. Petroleum products have also been employed for saturating felts and fabrics, but have failed to show the permanent water-resisting qualities which coal-tar pitch and coal-tar-saturated felt are so well known to possess, and as is evidenced by the demonstration referred to.

That coal-tar pitch of the proper consistency, applied hot, with alternating layers of tarred felt, is to-day the only reliable method of waterproofing, is further evidenced by the fact that experienced responsible contractors who have been engaged in this business for twenty-five to thirty years, use nothing else. Plain straight run coal-tar pitch being the purest of bitumens, is the simplest explanation of its great permanency for this purpose.

The benefits derived by waterproofing foundation walls and cellars, from a sanitary standpoint, are fully recognized by the new Tenement House Commission, which now requires all tenement house walls below the ground level, and all cellar or lower floors, to be water and damp proofed.

Large quantities of this material are annually consumed in this city, and the application of the same is now a trade in itself, requiring great skill on the part of the workman and no little engineering ability and judgement on the part of the contractors. Among other things, the source of the water to be resisted must be thoroughly understood, as in many cases a pressure of several feet must be successfully overcome, whether caused by the action of tide, surface water, springs or hidden streams.

As land value increases in populous centres, the commercial value of the lower floors of buildings for business and other purposes increases in the same ratio. The art of thorough and permanent waterproofing of such structures is comparatively new, and there are but few contractors of long experience engaged in this business; hence, many expensive mistakes are made by novices in this line.

The tarred felt and pitch employed for this purpose is the same material as is used for gravel and slag roofing, and the workmen employed are of the same class, as a rule. The application of this material for waterproofing, however, is essentially different from that in roofing, inasmuch as it requires the most skilled of the workmen and most intelligent direction; for a leak in a roof can be easily reached and repaired, whereas a leak in waterproofing, supposed to be complete underground, can only be successfully repaired at great expense for excavation and masonry connected with the work.

Hence, the importance of securing first, the most suitable material for this purpose; and, secondly, the execution of the work by an experienced and responsible contractor.

SOME ROOFS AND OTHERS.

"AFTER you have been thinking of 'Taylor Old Style' tin as against other tin, stop and think how many other kinds of things are used on a roof, and how foolish some of them are.

"There are a lot of roofs known in a general way as composition roofs. These patent roofs are made out of everything, from a sheet of burlap smeared with tar and dusted with broken stones up to a first-rate roof bedquilt with enough asbestos in it to warrant the use of asbestos in the name.

"Now, I don't want to waste any time discussing as to which patent roof is the

best. Such roofs have their uses. A whole lot of roofs on the buildings at the World's Fair are covered with them. They are very good roofs for a temporary purpose. Such buildings are intended to be folded up like the tent of the Arab as soon as the show is over.

"But the more civilized a man gets, the more permanent he is. The Arab goes chasing around like a red Indian, and a tent is good enough for him. The white man, most of whose property has roofs over it, wants something more permanent over his head than canvas, even if it has a whole lot of pitch and tar on it.

"When you get to talking about permanent roofs, then you are talking about tin roofs, and never forget that roofs with tar in them are more inflammatory than an anarchistic speech. The gravel composition roof ain't pay gravel. Pitch was good enough for the roof on the Ark, as it rained all the time she was in commission.

"The net experience of people who make and use roofs has decided that tin is the best roofing that can be made, and then it comes right down to a choice of tins.

"Maybe I haven't been saying enough lately about this idea of making a good roof while you are about it, because, you see, I have been so busy putting on good roofs. And this sort of reminds me of the time that Abner Markenfield got his first job. Abner was young and small of his age, but he got a place in a knitting factory to mind a machine. Abner minded his machine for about three weeks with an intentness which arrested the attention even of the foreman, who was used to new boys and acted accordingly. Well, one day the foreman looked up and saw Abner standing by his desk.

"'Well,' he said, 'what do you want?'

"'I want a rise of pay,' replied Abner.

"'What do you get now?'

"'Three dollars.'

"'What do you want?'

"'Four dollars.'

"'Oh! So you think you are earning four dollars a week, do you?'

"'Yessir,' replied Abner, 'I do. I have been thinking so for several weeks, but I have been too busy to come and tell you.'

"That's the way it is with me. I have been so busy putting on roofs for the kind of people that know they want 'Taylor Old Style' that I have not had time to say much to the people that are still waiting to argufy about it."—*Rufus the Roofer, in the May "Arrow."*

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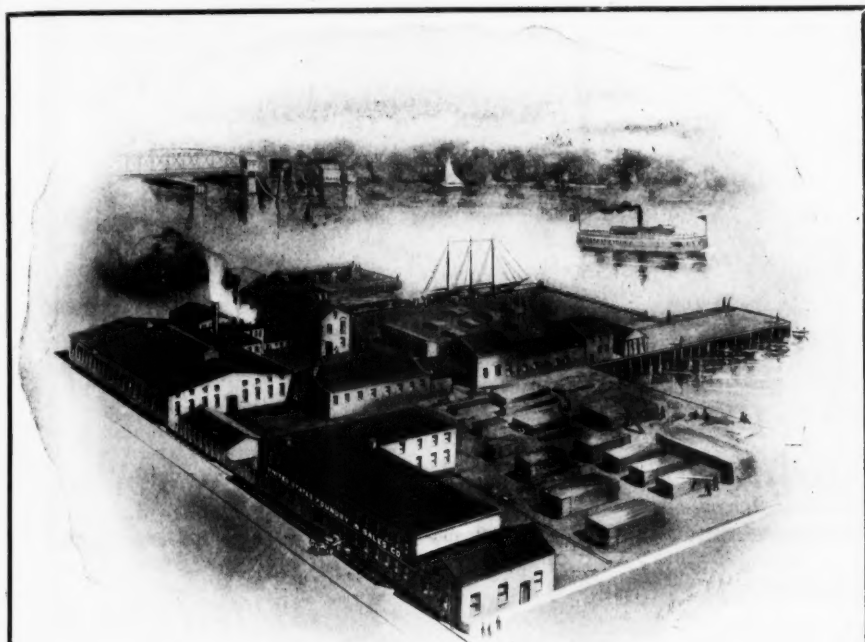
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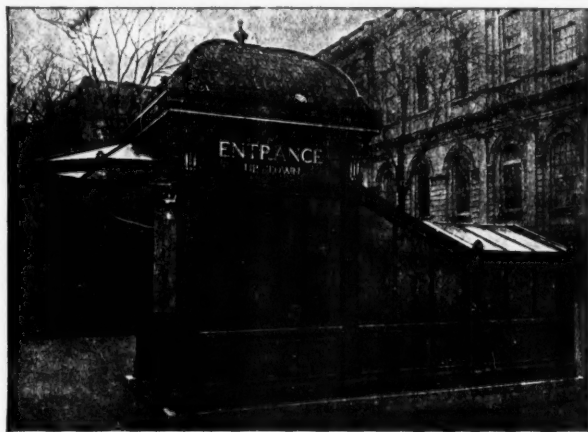
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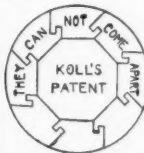
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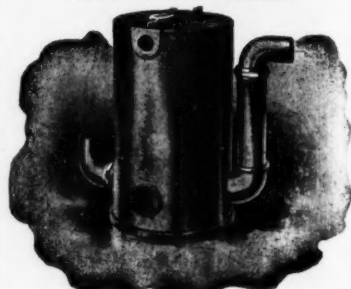
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ATWATER, MINN.—The Atwater Hotel Company has adopted the plans of Omeyer & Thorl, St. Paul, for a modern hotel.

BALTIMORE, MD.—The plans for a new five-story building for Eichengreen & Co., at 113 West Baltimore street, are being prepared by Architect Louis Levi. The building will be 20x130 feet and will cost \$20,000.

Work on the building to be erected at 15 and 17 South Gay street for Mr. Napoleon B. Lobe will be commenced at once. Wade & Bell, architects, will have supervision of the work.

A large number of local architects have submitted plans for the new building to be erected for the National Exchange Bank on the old site, Hopkins place and German street, but none has as yet been approved. It is expected that work on the structure will begin very soon.

Oread Institute has purchased the old Filston estate near Baltimore, for the site of the new Oread. The estate comprises 1,300 acres of land.

A building is to be erected on the farm for the institute, costing about \$250,000, the work to begin early in June. Cottages will be provided for the students, instead of dormitories.

BOSTON, MASS.—Now that the Park Square Station has passed from the Providence management to that of the N. Y., N. H. & H. Railroad Company, there seems a possibility of a boom in that locality, as, if the company does not use the property for railroad purposes, as is rumored, it will probably be cut up and improved.

Hon. Redfield Proctor, United States Senator, has had plans drawn by Arthur H. Bowditch for a mercantile and stable building to be erected at Thacher and North Margin streets. The building will be six stories high, of brick and marble, steel and concrete. Its estimated cost above the land is between \$75,000 and \$80,000. Besides the stable accommodations there will be five stores in the building.

For the site of a new building the old structure at 14 North Russell street, West End, will be removed. Plans have been prepared by F. A. Norcross for a four-story tenement and store building to be erected thereon. It will be four stories high, 28x58 feet, and will be constructed of brick and stone.

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(Advance Rumors Continued.)

BROCKTON, MASS.—The erection of the new high-school building will begin the present year, and it will cost, when completed, \$200,000. Chas. A. Brigham has drawn the plans, which have been approved. The site is on Warren avenue, opposite High street, on what is known as the Goddard lot.

BROOKLINE, MASS.—A large tract of land on the corner of Reservoir avenue and Essex road, Chestnut Hill, has been sold to a purchaser who will improve by erecting a handsome house for occupancy.

The Unitarians are considering the purchase of a tract of land at the corner of Beacon and Charles streets, Coolidge's Corner, for the purpose of erecting a handsome edifice.

Simon Vorenberg has sold a lot of vacant land on the northerly side of Beacon street boulevard, near the corner of Carleton street, containing 6,268 square feet. The new owner buys for improvement.

CAMBRIDGE, MASS.—The new building which the Cambridgeport Savings Bank is soon to erect at the corner of Massachusetts avenue and Temple street will cost considerably over \$100,000. It is to be constructed of gray Tennessee marble, three stories high. The architects of the building are Clarence H. Blackall and William E. Chamberlin. The granite block now occupying the site is to be torn down at once.

CEDAR RAPIDS, IA.—Work has begun on the foundation work for the new Syndicate block to be erected on Second avenue and Fourth street. It will be 60x140, three-story, of pressed brick and cut stone, composition roof. Dieman & Fiske, architects. Cost complete, \$30,000.

CHICAGO, ILL.—Architects are revising



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

plans drawn some time ago for rebuilding the Union League Clubhouse, and will soon advertise for bids for construction of the first section. It will be erected on Custom House Court, in the rear of their present quarters. The building will be eight stories in height, of pressed brick and terra cotta, and will cost \$250,000.

Plans for the remodeling of the Iroquois Theatre as a vaudeville house have been completed by Architect Benjamin H. Marshall, who drew the original plans for the Iroquois. It is said that an expenditure of \$102,000 will be involved and that the theatre will be ready for opening in the early fall. The remodeled theatre interior will in every way comply with the city ordinances. The seating capacity is placed at 1,600. The steep pitch of the gallery is to be altered and fireproof walls are planned to the rear of the gallery, balcony and main floor.

James Gamble Rogers has completed revised plans for a church for the First Baptist congregation of Hyde Park. It is to be one story, of brick and stone, 95x76 feet and will be built on Fifty-fifth street near Woodlawn avenue. Cost, \$80,000.

The Central Park Presbyterian church is to receive material alterations and additions, making the remodeled building two stories and 65x90 feet. It is located at Sacramento and Warren avenues, and the cost of the work is estimated at \$25,000.

Joseph Molitor has designed a parochial school to be built at Central Park avenue and Twenty-seventh street, for St. Agnes' Roman Catholic parish. It will be two stories high, 60x80 feet, contain eight classrooms, and will cost \$25,000.

Hasckell Bros. have had plans prepared by Atchison & Edbrooke, 90 Washington street, for a new warehouse to be erected on the West Side. The building will be three stories, 75x100 feet, and of mill construction; estimated cost, \$40,000.

J. Youngsberg, 218 La Salle street, has completed plans for a three-story building containing twenty-four flats, to be built at Indiana avenue and Thirteenth street. Cost, \$50,000.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

J. F. and J. P. Doerr, 138 Washington street, have prepared plans for a three-story apartment building, to be erected in Sheridan Park. Cost, \$45,000.

Jas. Gamble Rogers, Clark and Randolph streets, have revised plans for a church for the First Baptist Congregation of Hyde Park. It is to be one-story, of brick and stone, 95x76 feet, and will be built on Fifty-fifth street, near Woodlawn avenue. Cost, \$80,000.

Alterations and additions are to be made at the Central Park Presbyterian Church, Sacramento and Warren avenues. Cost, \$25,000.

The board of directors of the Augustana Hospital has been authorized to borrow \$100,000, with which to erect an addition to the hospital.

John Duncan has completed plans for and is taking figures on thirty residences to be erected on Forty-ninth avenue near Fulton street. They will each be two stories high, 22x40 feet, alternating pressed brick with stone trimmings and stone fronts. Total cost, \$105,000.

W. L. Klewer has designed for Miss A. J. Connell a three-story apartment house, to be erected at 2262-2264 Kenmore avenue, to cost \$50,000.

J. F. and J. P. Doerr have designed for Mrs. K. L. Sorrow a three-story apartment house, to be erected at the southwest corner of Sheridan road and Wilton avenue, 50x150 feet, to cost \$42,000.

Benjamin Marshall has drawn plans for the West End Woman's Club building, to be built at the corner of Ashland avenue and Monroe street. It will be two stories, of pressed brick, stone trimmings, composition roof. Cost, \$16,000.

S. M. Seaton has designed for Hood & Tullgren a three-story apartment house, to be erected at 5001-5003 Madison avenue, 83x62 feet. Cost, \$35,000.

Architect John Youngberg is taking figures on a three-story apartment building, 75x163, to be erected on Indiana avenue, near Thirty-first street. Cost, \$60,000.

William G. Kreig has designed for H. W. Tice two three-story apartment houses,

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

to be erected at 2148-2156 Evanston avenue, to cost \$50,000.

DAYTON, O.—A large and modern building is to be erected by the Brothers at St. Mary Institute, at a cost of \$50,000. It will be located southeast of the institution proper, and will be three stories high, of brick and stone. Work will be started at once.

DEADWOOD, S. D.—The Catholic Sisters propose to build a \$20,000 addition to St. Joseph's Hospital.

W. H. Maxwell has been awarded the contract for the construction of the United States government building to be erected this year in Deadwood, costing over \$200,000.

DETROIT, MICH.—Architect Kamper has prepared plans for remodeling the building at 68-70 Miami avenue into a three-story brick for store purposes, for Charles Richter. The exterior will be of pressed brick and stone.

Architect Harry W. Chamberlain has prepared plans for an addition to Young Bros. & Co.'s sheet metal factory, at 313-325 Franklin street.

EL PASO, TEX.—A press report states that the final details for the new \$250,000 Union Depot have been decided upon, and bids called for. Material is on hand for the new \$250,000 steel bridge of the Southern Pacific over the Rio Grande and work starts at once.

DORCHESTER, MASS.—Ex-Alderman Joseph I. Stewart has purchased 65,000 feet of land on the two corners of Charles street and Geneva avenue. This land contains 17 surveyed lots. Mr. Stewart will improve each with a three-story brick apartment house. He intends to erect seven this summer.

EMMETTSBURG, IA.—It is reported that the late T. H. Tobin has left a bequest of \$50,000 to erect a Catholic church and school.

ERIE, PA.—William Ginther has completed plans for a \$54,000 church to be erected at the corner of Tenth street and East avenue, for St. Ann's Society.



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FAULKTON, S. D.—The erection of a \$40,000 to \$50,000 court house is being contemplated.

HARTFORD, CONN.—Silver Brothers, candy manufacturers, have received plans for a new block which they are to erect on Main street, next to Germania Hall. It will be 70 feet wide, 90 feet in depth and four stories in height, of yellow brick and Ohio limestone. Cost, \$60,000.

HAVRE, MONT.—A new hotel is to be erected here. It will be three-story and basement, brick and stone, containing 100 sleeping rooms. Cost, \$50,000.

KIMBERLY, WIS.—The Kimberly & Clark Co. will rebuild the paper mill here, recently damaged by fire. Cost complete, \$200,000 to \$300,000.

LA CROSSE, WIS.—The La Crosse National Bank is taking bids for foundation work for the new building. Cost, about \$50,000.

LAWRENCE, KAN.—State Architect John M. Stanton has submitted plans for the new \$50,000 law building on the campus of Kansas University this summer. The building is to be colonial style. The foundation will be of native stone and the superstructure of gray brick. There will be four terra cotta columns at the front and rear entrances. The roof will be either slate or red tile. The dimensions of the new building will be 120x60 feet. The new building will be located just north and west of Fraser hall, and will cost \$50,000.

LINGERWOOD, N. D.—Schuler Bros., architects, Wahpeton, have made plans for a Catholic church, 60x116. Cost, \$17,000. Contracts will be let June 20.

LINCOLN, NEB.—Bishop Bonacum contemplates the erection of a cathedral at Fourteenth and K streets, to cost \$200,000.

LYNN, MASS.—The Eastern Amusement Company is busily working on plans for a new theatre to replace the Lynn Theatre, destroyed by fire. Three sites are under consideration. Architect Maynard, of Boston, who planned Keith's, the Tremont, and Castle Square Theatres, in Boston, and has built over fifty theatres in various parts of the country, is drawing plans for this theatre, which will be finished early in September.

MAISONNEUVE, CAN.—The wardens of the Catholic parish of Maisonneuve have decided to spend \$125,000 on the erection of a new church.

MILWAUKEE, WIS.—The Standard Car Truck Company proposes the erection of a \$500,000 plant. It is possible that it will be located in Milwaukee.

MINNEAPOLIS, MINN.—The Board of Edu-

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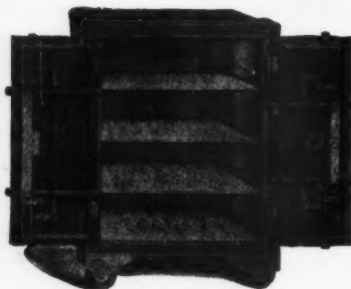
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(Advance Rumors Continued.)

cation will build a brick addition to the Adams school to cost \$42,386, and Stearn Brothers will build a two-story brick store and office building at First avenue N and Fourth street, to cost \$12,000.

MOSCOW, IND.—The Elks intend to erect a \$15,000 temple in the near future.

NEW HAVEN, CT.—W. J. Beatty, of New York City, has completed plans for the new metallurgical laboratory to be erected on Mansfield street, for which \$100,000 was recently donated by Prof. John Hays Hammond.

Plans have been drawn by Richard Williams for a four-story brick block to be erected on Collis street by Giacomo Apicello. It will be 53x68 feet, arranged for two stores on the first floor and twelve enements on the upper floors.

Samuel Flight has recently purchased a lot on Ivy street, upon which he will probably build in the near future.

The plans of Architects Tracy & Swartout, of New York City, have been received by C. E. Thompson & Sons, for remodeling the block, which they recently purchased on Chapel street. The building will have an entirely new front constructed of brick, with Indiana limestone trimmings, and the interior will be changed throughout. Estimates will be received at once and the work started as soon as possible.

Patrick McNulty contemplates building a new house on Park avenue. It will be arranged for two tenements of five rooms each, and will have all modern improvements.

NEW ORLEANS, LA.—A permit has been issued to the National Manufacturing Company for the erection of an enameling plant in S. Peters street, near Callopie street, to cost \$172,000. The building will be a brick structure, five stories high, with a composition roof.

NEWTON CENTER, MASS.—The property known as the Marshall Rice lot has been purchased by E. B. Bowen. The lot has an area of 81,300 square feet, and is situated on the brow of the hill, near the corner of Commonwealth avenue, and opposite the Episcopal church. It has a frontage on Centre street of about 300 feet. The pur-

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

chaser will cut the land into lots for improvements.

COMPETITIONS.

AUDITORIUM. (At St. Joseph, Mo)
Plans and specifications will be received until July 2 for an auditorium. Cost, \$200,000. HARRY BLOCK, Chmn. Bldg. Com. 1485

SCHOOL. (At Royal Centre, Ind.)
Bids will be received June 15 by the School Bld. for erecting a \$12,000 school. 1484

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 7th day of July, 1904, and then opened, for the construction (including heating apparatus, plumbing, electric wiring and conduits) of the U. S. Post-office at Sterling, Ill., in accordance with the drawings and specifications, copies of which may be had at this office or the office of the Postmaster at Sterling, Ill., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1485

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 11th day of July, 1904, and then opened, for the construction (including plumbing, heating apparatus, electric wiring and conduits) of the U. S. Post-office at Elkhart, Ind., in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Elkhart, Ind., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1485

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 31, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 6th day of July, 1904, and then opened, for the construction (except heating apparatus) of the U. S. Post-office and Court House at Charlottesville, Va., in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Charlottesville, Va., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1485

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 31, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 12th day of July, 1904, and then opened, for the construction (including heating apparatus, electric wiring and conduits) of the U. S. Post-office and Custom House at Perth Amboy, N. J., in accordance with the drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Perth Amboy, N. J., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1485

PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 23, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 18th day of June, 1904, and then opened, for the installation of an electric passenger elevator, in the U. S. Post office and Court House at Montgomery, Alabama, in accordance with the drawing and specification, copies of which may be obtained at this office at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 17th day of June, 1904, and then opened, for furnishing and delivering Post-office Lock Boxes in Public Buildings under control of the Treasury Department, during the fiscal year ending June 30th, 1905, in accordance with drawing and specification, copies of which may be had at the discretion of the Supervising Architect, by applying to this office. JAMES KNOX TAYLOR, Supervising Architect.

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 21, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 21st day of June, 1904, and then opened, for the low pressure steam heating apparatus, complete in place, for the U. S. Custom-house and Post-office and extension at Nashville, Tenn., in accordance with drawings and specification, copies of which may be had at this office or at the office of the Superintendent at Nashville, Tenn., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1484

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 23, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 30th day of June, 1904, and then opened, for the construction (including plumbing, heating apparatus, electric wiring and conduits) of the U. S. Post-office at Gainesville, Tex., in accordance with drawings and specification, copies of which may be had at this office, or at the office of the Postmaster at Gainesville, Tex., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1484

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 24, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 5th day of July, 1904, and then opened, for the construction (except heating apparatus) of the U. S. Post-office and Court-house at Evanston, Wyo., in accordance with the drawings and specification, copies of which may be had at this office or the office of the Postmaster at Evanston, Wyo., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1484

Treasury Department, Office of the Supervising Architect, Washington, D. C., May 23, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 21st day of June, 1904, and then opened, for the plumbing, heating and ventilating apparatus and electric wiring and conduits in work rooms under terrace at the U. S. Mint at Philadelphia, in accordance with drawing and specification, copies of which may be had at this office or at the office of the Custodian at Philadelphia, Pa., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1484

SCHOOL.

[At Bucyrus, O.]

Bids will be received June 10 by the Bd. Educ. for erecting a brick school in Sub-dis. No. 2 in Auburn Township. CHAS. MCCONNELL, Clk. Bd. Educ. 1484

BUILDINGS.

[At Fort Sheridan, Ill.]

Bids will be received until June 15 by Wm. Wegel, Constructing Quartermaster, for the construction of 14 brick buildings and one frame building, including heating, plumbing and lighting at this post. 1484

DORMITORY.

[At Oxford, O.]

Bids will be received June 13 by the Bd. Trus. of Miami Univ. for erecting and equipping a woman's dormitory, work to include masonry, cement floors, cut stone, structural ironwork, sewer, plumbing, gas fitting, ventilating, heating, electric light wiring and fixtures, etc. Probable cost, \$40,000. REV. GUY P. BENTON, Pres. 1484

QUARTERS.

[At Fort H. G. Wright, N. Y.]

Bids are wanted June 15 by the Constructing Quartermaster, New London, Conn., for constructing, plumbing and electric wiring 1 double set N. C. O. quarters and 1 fire apparatus house at this post. 1484

BUILDING.

[At Fort Myer, Va.]

Sealed proposals for a brick addition to band barracks and for a frame wagon shed will be received until June 14, 1904. Information furnished on application. CAPT. G. C. BARNHART, Quartermaster. 1484

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[At Boston, Mass.]

Depot Quartermaster's Office, 170 Summer St., Boston, Mass. Sealed proposals will be received here until June 13, 1904, for supplying 11,500 (subject to an increase or decrease of from 10 to 50 per cent) American white marble headstones, or slabs. Firms that may be unable to supply the entire quantity may submit bids for such number that they can furnish, and all bidders must state the average number of headstones, complete, which they propose to deliver weekly. Preference given to articles of domestic production or manufacture, conditions of quality and price (including in the price of foreign productions and manufactures the duty thereon) being equal. Deliveries to begin within 30 days after award of contract. Information furnished on application. CAPTAIN IRA L. FREDENALL, Depot Quartermaster, Boston, Mass. 1484

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Standard Sanitary Mfg. Co., Pitts-
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Winslow Bros. Co., The, Chicago, Ill.

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CEMENT (Portland).

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Craig, David, Boston.....

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Blodgett Clock Co., Boston.....

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Simpson Bros. Corporation, Boston..

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Hudson, N. Y.....

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Rutan, William L., Boston.....

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Rutan, William L., Boston.....

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Samson Cordage Works, Boston.....

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Kinnear Mfg. Co., The, Columbus, O.

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