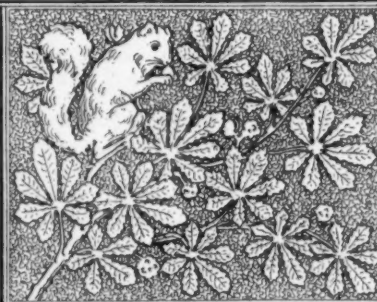
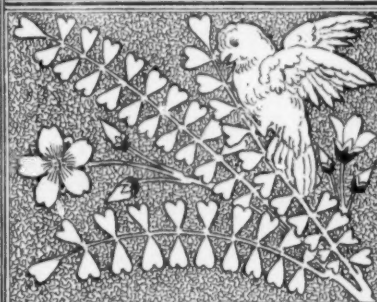


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AN amendment to the New York building law has been prepared, and is now under consideration, limiting the height of buildings to one hundred and fifty feet. Whether it will be adopted is a doubtful question, but the fact that it has been proposed is of importance. As the *Tribune* informs us, forty-nine new buildings are at this moment in process of construction in the city, ranging from nine to twenty-four stories in height, thirty-eight of which are eleven stories high or over. A uniform limit of one hundred and fifty feet would allow very comfortably of twelve stories, and this is not an unreasonable number for such a city as New York, but it would prevent the future erection of office-buildings three hundred feet high, which shade the streets, darken other buildings, and inflict damage of various kinds upon a whole neighborhood. While even one hundred and fifty feet is too liberal a limit for a city which aspires to be beautiful, the lower part of New York is too far gone in ugliness for reclamation, so that this consideration need not count for much; but darkness, dampness and chilling winds are also to be thought of, and common prudence suggests that lower Broadway and the adjacent streets, with a few more additions to the "sky-scrapers" with which they are lined, would become intolerable.

A VALUABLE suggestion is contained in the recent action of the New York Board of Education, notifying the contractor of a school-house at Astoria that his contract has been forfeited, on account of his failure to finish the work at the time agreed, and that another contract will be made for the completion of the building. As school-houses must be ready for occupancy at the beginning of the school year, to be of any use for the year, they have always been the favorite objects of attacks by the "champions of labor" and other mischief-makers, and it is quite time that those who have charge of them should show that they are not quite helpless. In the case of the Astoria School, the fault seems to have been mainly with the contractor, but this really makes no difference. The contractor and his men are equally bound to do their part in finishing a school-house, in the interest of the community of which they all form a part, at the time when it will be of use. Instead of doing so, however, the labor agitators very commonly concoct some pretended grievance in connection with a school-house which is nearly completed, solely for the purpose of showing their power of distressing the public by delaying the building. As the grievance is, naturally, laid to the account of the contractor, his summary dismissal is the best way of meeting the manoeuvre, whether it is executed with his collusion or not; and it may be hoped that those who draw up school-house contracts in future will see that ample provision is made for the use of this resource on occasion.

MUCH interest has been excited by the publication of an article in the foreign papers, indicating that some gross impositions have been practised of late upon the collectors of antiquities, including our own Mr. Morgan, one of the most

experienced and intelligent of amateurs. The only certain part of the story appears to be that, a few years ago, a dealer in antiquities appeared in Paris with some antique jewelry, including a tiara and other pieces. The collection was offered to the Louvre, and carefully examined. It is said that the smaller ornaments were undoubtedly genuine, and, as the tiara was, to all appearance, equally so, the Louvre purchased it, paying for it the sum of forty thousand dollars, which was advanced by two friends of the Museum. Not long afterwards, the same dealer, who is said to come from Vienna, appeared in London, where he offered other pieces of antique goldsmith's work to the curator of antiquities of the British Museum, who declined them, declaring them to be forgeries. They were, however, placed in the hands of a London jeweller for sale, and are said to have been sold to Mr. Morgan. Meanwhile, a Russian archaeologist, who had carefully studied the Louvre tiara, made up his mind that it was not genuine, and published an account of it, declaring that the different parts were imitated from antiques of various periods, and that the Greek inscription which it bore was in a language differing materially from the Greek current at the time and place to which the tiara was attributed. This paper, by an expert of distinction, attracted the attention of the French authorities, who have now withdrawn the tiara from public exhibition, until it can be critically examined by the "Council of the Museums." If the Council should come to a conclusion unfavorable to the authenticity of the tiara, suspicion will, of course, be thrown upon Mr. Morgan's purchase.

IT is unnecessary to say that no reflection would, in any case, be cast upon the discrimination of an amateur who failed to detect imposition in the work of a forger who could deceive the authorities of the Louvre; and Mr. Morgan, who is a good judge of men, as well as of works of art, would have been less likely to suspect forgery in an object offered by a noted London house than if it had been brought to him by the dealer himself; but every one must regret, supposing the forgery to be proved, the waste of money on scoundrels and thieves which the purchase of their productions involves. Of late years, as is well known, the business of manufacturing spurious antiquities and works of art has become very extensive and profitable, and it would be a benefit to civilization to invent some method of suppressing it. No doubt, the main source of its prosperity is the rivalry of museums, which are constantly growing richer and more numerous, and, in too many instances, suffer from the vanity of their curators, who pervert, we might almost say, the funds entrusted to them for the purchase of instructive and beautiful objects to the acquisition of things neither beautiful nor instructive in themselves, but endowed, through their rarity, with a factitious value which makes them coveted by the few people who know anything about them. We remember once visiting a library in a manufacturing town, built and endowed by some public-spirited citizens, the librarian of which showed us, with much pride, a collection of Aldine and Elzevir editions, beautiful and costly, no doubt, but perfectly useless for the purpose for which the library was intended. It is becoming more and more doubtful whether public galleries of painting and sculpture do anything for art, and whether public libraries have accomplished anything in improving literary taste; and, to our mind, it will not be many years before the whole system of museums and libraries, so far, at least, as it is supported by public money, and amenable to public opinion, will have to be radically reformed, if it is to be worth to the community what it costs.

THE number of "non-union men's unions," as they are called, composed of men who organize for common defence against "any and all attempts by any person or combination of persons to abridge the inalienable right of all mankind to work for such wages as shall be mutually satisfactory to the individual workman and his employer," grows rapidly. In Anderson, Ind., an organization of this sort, composed exclusively of building workmen, has gained in four months a membership of two hundred and thirty, which is equal to that of all the regular unions in the same city combined. We can imagine the alarm of the politicians, who have knowingly abetted and encouraged for so many years, under the pretence of "favoring organized labor," the cruel tyranny of the meanest

and most treacherous scoundrels who ever abused mankind, at the discovery that their victims are escaping them, and that the eighty-five per cent of the working community which does not belong to unions is on the verge of emancipating itself from the slavery in which the other fifteen per cent, through the support of politicians, combined with brutal terrorism, has so long held it.

IT is a satisfaction to find that twenty-five independent contractors have joined the association of "Independent American Mechanics," as the Anderson organization calls itself. This miscegenation of Labor and Capital, although it will disturb the classifications of the professors of political economy, has, to the layman's eye, certain important advantages. Every architect knows that a large part of the labor in building operations is thrown away, owing to the lack of understanding between employers and employed. Building mechanics are, as a rule, intelligent men, interested in their work, and honestly desirous to do it well. Unfortunately, the view of the modern political economist requires them to look upon their employers as enemies, filled with "greed," and desirous of "exploiting" them, instead of being, in general, poor men, dependent upon faithful service for the profits which will enable them to employ further labor. In pursuance of this view, they are taught to pay no attention to the wishes or interests of the "greedy capitalist" who employs them, but, instead, to follow with blind submission the orders of some "champion," who defends them in some mysterious way, chiefly with his tongue, against certain "encroachments" of capital, not distinctly specified; and these orders, being framed, in most cases, for the private benefit of their "champion," or of a little ring of "champions," are usually incompatible with the smooth and mutually coöperative working of the different trades which is so essential in successful building operations. Architects, as experts in all the trades, and, we are glad to be able to say, as the trusted friends of mechanics in all the branches of building, have much to do as intermediaries in bringing the different portions of the labor together; and they are, in consequence, qualified to estimate the saving which a better understanding would secure. In the matter of wages, again, friendly discussion between contractors and workmen would be of incalculable value. To the former, it would mean a mutual understanding which would enable them to estimate with accuracy the cost of a given piece of work, and the time at which it would be completed, and thereby make a reasonable profit more certain, at the same time that it encouraged building among the public; while contractors, with their superior knowledge of real-estate and business matters, could be of equal service to the workmen in deciding what scale of wages the market would bear, and how, in times of depression, building could be encouraged by concessions in prices, so as to avoid, for employers and employed alike, those long periods of idleness which are the curse of American industry, and which, in the building trades, more than neutralize the advantage of the high wages nominally fixed by the unions.

THE New York *Tribune* has investigated the subject of the destruction of Niagara Falls, as a piece of natural scenery, by the utilization of the water as a source of power, and has obtained some interesting information. Perhaps the most valuable portion of this was supplied by a local photographer, who has studied the cataract, evidently with great care and intelligence, for many years. According to this authority, the American Fall shows no signs of having been affected by the abstraction of water for the power plant on the American side, a phenomenon which may probably be accounted for by the fact that the American Fall draws directly from the vast reserves of the Horseshoe Fall, so that any lowering of its level is at once supplied. It is, however, noticeable that the Horseshoe Fall itself, although no water is, as yet, drawn from it on the Canadian side, has diminished in volume, the main portion of the cascade tending to concentrate in the middle of the crescent, leaving the sides dry. The enormous power plant now in process of construction on the Canadian side, far exceeding in capacity that on the American side, will undoubtedly increase this effect. Besides the influence of the abstraction of water for the turbines, this observer, Mr. Thomas Smith, says, probably with reason, that the effect of the Chicago Drainage Canal in taking water from the lakes is, apparently, already visible at Niagara. It will be remembered that geologists believe the upper Mississippi Valley to be sinking, while the St. Lawrence Valley is rising; so that, in the course of ages, the Niagara River may be dry, and all the water of the lakes may flow through the Mississippi. This would affect the owners of the

power plants, as well as the public; and it is satisfactory to learn that the two Commissions having in charge, respectively, the public grounds on the American and Canadian sides of the river propose to study the whole question carefully.

THE United States Weather Bureau, the best in the world, ought to experiment with an invention of M. Turpain, who describes in *L'Eclairage Electrique* a new method for foretelling thunderstorms, by means of "coherers," similar to those used in wireless telegraphy, suspended to a mast, and connected to the signalling station by copper wires. The coherers are of various degrees of sensitiveness, some responding to a thunderstorm at a distance of two hundred and fifty miles, while others do not respond until the electrical disturbance has approached within fifty miles; and recording instruments are connected with them, so that the rate of approach of the storm is shown. Since the establishment of the experimental station, a few weeks ago, three thunderstorms have occurred, the approach of each of which was indicated some hours before it arrived.

ALTHOUGH the stock-market in London is said to be drooping, and consols are at the lowest price known for many years, industrial activity seems to be reviving all over Europe. While prices of iron remain nominally about the same, England, France, Belgium and Germany report that the mills and foundries are full of orders, so that, in some cases, particularly in Germany, there are long delays in filling them. In Germany, a commission of twelve members has been chosen to study the subject of uniting all the steel mills in one grand "trust," after the American pattern. It may be observed that the same rumor has appeared here, but with the addition that after the German trust had been formed, it was to be absorbed by the United States Steel Corporation. However that may be, the formation of trusts is a familiar process to the Germans, and it is not at all unlikely that some project for a steel trust may be considered, or even carried out. As immense quantities of German steel are now consumed in this country, some of the recent steel-frame buildings here having been entirely framed in Germany, and sent here ready for putting up, anything which is likely to affect the price of the material is of interest to the building community in this country. In any case, the renewed demand for German and Belgian iron at home, at increased cost, is tolerably certain to result in higher prices here, as the managers of the American mills maintain their rates very closely at the cost of importing foreign iron, with freight and duty added.

THE profession in England has lost a valued member in the death of Prof. T. Roger Smith. As an architect, Professor Smith was known principally by hospitals and similar public buildings, which he carried out with great intelligence and success. He was, however, active in other ways in professional matters. He was twice President of the Architectural Association, and for some time a member of the Council of the Royal Institute of British Architects, and was appointed upon innumerable commissions and committees. He was for many years Professor of Architecture and Building Construction at University College, London, and was the author of several technical works of great value, the one best known in this country being that on the "*Acoustics of Public Buildings*," still, perhaps, the most practically useful work on the subject in print.

THE work of securing the Palisades of the Hudson from destruction by buying up the ground, and making it a public park, goes on prosperously, and it is probable that about one hundred and fifty thousand dollars more will complete the purchase. The Interstate Park Commission proposes, after the ground is secured, to lay out a driveway along the foot of the cliff, with connecting paths ascending, we suppose in zigzags, to the top. Neglected as the place has been for many years, it might easily be made beautiful, as well as interesting. Twenty-five years ago, when Fort Lee stood at the edge of a forest, which extended, almost unbroken, to the Passaic River, the Palisades were the scene of several tragedies, and, probably, of a good many more romantic fictions. It is, however, certain that people were occasionally robbed and thrown over the cliff; and, with the help of a lively imagination, aided, perhaps, by some well-placed inscriptions, the highest precipice might be made to excite as delicious a shudder in future generations of New Yorkers as is produced at present in susceptible tourists by the sight of the cliffs of Capri, over which the wicked "Timberio" cast his apocryphal victims.

POINTS THAT SHOULD BE CONSIDERED IN SELECTING OR DESIGNING JOIST AND WALL HANGERS.¹

ALTHOUGH wrought-iron and steel stirrups have for a long time been used for the support of floor-beams, headers and girders in buildings, no complete tests to determine their carrying-capacity appear to have been made until about three years ago,

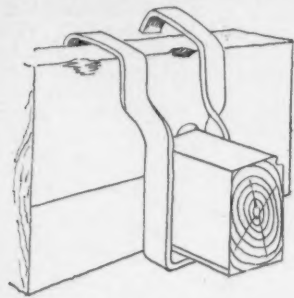


Fig. 1.

when a series of tests on a common stirrup, a Van Dorn hanger, and a Duplex hanger were made at the Massachusetts Institute of Technology. Since that time other comparative tests have been made, and last November a very serious accident occurred in a large warehouse in Minneapolis, due to the failure of a steel wall-hanger of the stirrup type. This accident and the tests above mentioned have led the writer to prepare this paper, with the view of calling attention to the danger of overlooking the tendency to fail by bending, and crushing of

the wood, in the case of hangers of the stirrup type, and, incidentally, to the comparative advantages and disadvantages of different hangers.

Before proceeding farther it will probably be well to describe the various styles of hangers now on the market.

The oldest, and, in this section, the most common style of hangers is the common stirrup, forged by hand from bar iron or steel.

The common shape of this hanger is shown by Figure 1. Wherever the beams to be supported come directly opposite each other, it is the common practice to use a double stirrup, formed by welding together two single stirrups.

Within the past ten or twelve years, several patented forms of

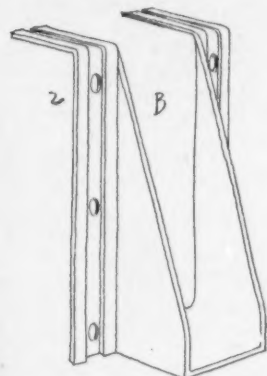


Fig. 2. The Van Dorn Hanger.

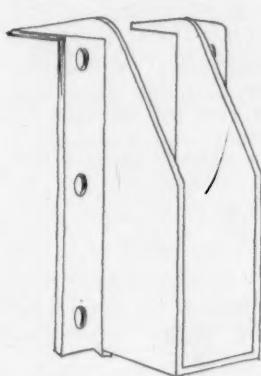


Fig. 3. The National Hanger.

stirrups have been placed on the market by different manufacturers. The first of these, in the point of time, I believe to be the Van Dorn steel hanger, shown by Figure 2. Following this came the National, Cleveland and Lane hangers (shown by Figures 3, 4 and 5), and possibly others. All of the above, as you will see, are of the stirrup type, but are bent and forged by machinery instead of by hand, the material used being a high grade of mild steel.

As a rule, they are neater in appearance than the ordinary stirrup, and are in many ways preferable to it, provided they are not made too light. With the single exception of the Cleveland hanger, none of these forms are made to turn down over the back of the carrying-beam, but are simply secured to the top and side of the beam by spikes.

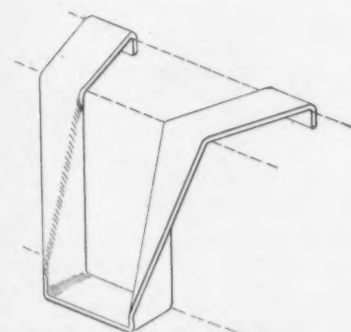


Fig. 4. The Cleveland Hanger.

Besides these, there are the Goetz, Rieseck and Duplex hangers (Figures 6, 7, 8 and 9), the first two being, in effect, a short stirrup, but made to let into holes bored in the side of the beam just above the neutral axis, while the last differs from all other joist-hangers, in that it is made of annealed cast-iron, and in an entirely different shape. These three styles of hangers possess, in common, two advantages over

all hangers of the stirrup type, in that the settlement of the floor and ceiling from the shrinkage of the carrying-beam is only about one-half what it is where the stirrup is supported from the top of the beam, and also that they offer no obstruction to the flooring.

¹ A paper read by F. E. Kidder, F. A. I. A., at a special meeting of the Colorado Chapter of the A. I. A., February 27, 1903.

The matter of shrinkage is an important consideration where the ceiling is to be plastered and decorated.

When used in pairs, all the patent stirrups are connected by riveting their top flanges to a steel plate.

The Van Dorn, National, Cleveland and Lane hangers, when used singly over steel beams, are bent around the top flange of the beam.

The Van Dorn and National hangers are made into wall-hangers

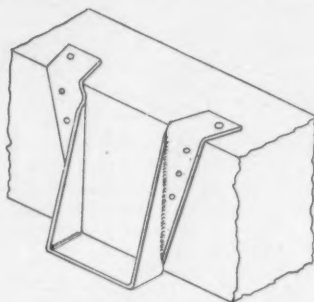


Fig. 5. The Lane Hanger.

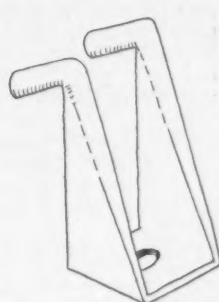


Fig. 6. The Goetz Hanger.

by riveting the top flanges to a steel plate, usually turned up at the back, so as to tie into the wall. The arms of the Lane and Cleveland wall-hangers are made long enough to build into the wall 8 inches and turn up at the back. The Rieseck wall-hanger is made to lie on a specially forged steel plate with the wall-end of the arms bent down into the brickwork. The Duplex wall-hangers, while made on the same principle as the joist-hangers, are of quite a different shape, three styles of the Duplex wall-hangers being shown by Figures 10, 11 and 12.

EFFECTS OF THE LOAD ON THE HANGER AND TIMBER.

The tests that have been made on single hangers of the stirrup type, *i. e.*, those which are supported from the top of the carrying-beam, show that the first effect of loading is to compress the timber under the top flanges. Thus, Mr. W. A. Tyrell, C. E., who made a test for Messrs. Mauran, Russel & Garden, Architects, of St. Louis, last April, says of the wrought-iron stirrup, made from 3" x 3/8" iron, that it began to fail very early by crushing the wood on the near side and rising on the far side, and that when the load on the hanger reached 3,500 pounds it had crushed into the wood about 1/8 inch and had risen 1 inch. Under this load, the tensile-stress in the sides of the stirrup was only 1,555 pounds per square inch, or only about one-eighth of the safe working strength of wrought-iron.

When the load reached 5,000 pounds the hanger had bent to such an extent that it was in danger of slipping over the carrying-beam, and the tail-beam was blocked up. At the time of practical failure, therefore, the stress in the sides of the hanger was but 2,222 pounds per square inch.

In the test made at the Massachusetts Institute of Technology in April, 1900, a common stirrup, made from 3/4" x 2 1/2" wrought-iron, bent and pulled over the trimmer at a load of 13,750 pounds or at a stress of 7,333 pounds per square inch. Figure 1 gives a pretty fair idea of the way in which the hanger bent, and of the extent to which it crushed into the carrying-beam. Of course the hanger settles with the crushing of the wood and the floor settles with it.

The stirrup tested at the Institute of Technology, although having a smaller sectional area, offered greater resistance to bending than the one tested by Mr. Tyrell, probably because the carrying-beam was only one-half as thick in the former case as in the latter.

Theoretically, the wider the carrying-beam, the greater will be the bending-moment on the top of the stirrup, but as soon as the iron lifts off from the back edge of the beam, then, of course, the bend-

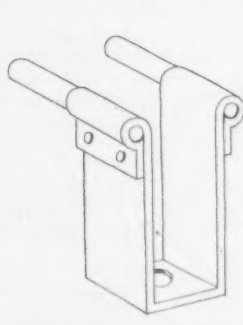


Fig. 7. The Rieseck Hanger.

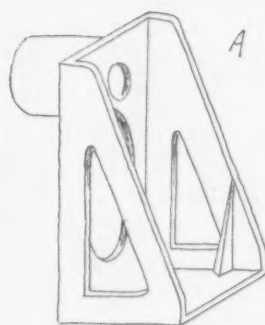


Fig. 8. The Duplex Hanger, up to 6" x 12".

ing-moment is concentrated near the front edge. The tests previously referred to show that the patent stirrups fail in the same manner as the common stirrups, *i. e.*, by the crushing of the wood and straightening out of the top flanges.

Thus, a 6" x 12" Van Dorn hanger began to straighten out at a load of 13,300 pounds and failed, *i. e.*, slipped off, at a load of 18,750

pounds, showing a little greater resistance to bending than the common stirrup. The Van Dorn hanger was spiked to the carrying-beam with two spikes in each top flange, and three in each side flange. In the test made by Mr. Tyrell, a 10" x 14" Van Dorn hanger crushed down the wood at the near side, and rose about $\frac{1}{4}$ inch at the ends, under a load of 5,500 pounds. This hanger was also spiked to the carrying-beam.

The Van Dorn Iron Works Company report a test in which 50,000 pounds were supported by four of their 8" x 14" hangers without the least observable effect on the hangers; but in this case the timbers

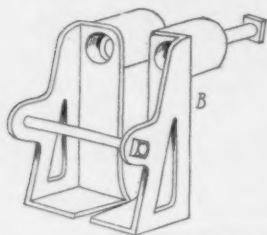


Fig. 9. The Duplex Hanger, for 8" x 12" and over.

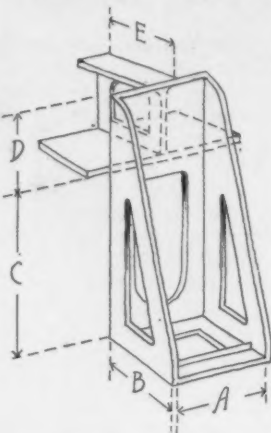


Fig. 10. A Duplex Wall-hanger.

were of oak, which offers the greatest resistance to crushing across the grain of all framing timber, and the load did not reach the point at which the hanger began to fail in the Massachusetts Institute of Technology test.

The hanger which failed in the Minneapolis warehouse was of the same shape as the National hanger, and appeared to have been made from a 2" x 4" x $\frac{1}{4}$ " steel angle, with the 4-inch flange sheared and bent to the shape shown in Figure 13, and the 2-inch flange entirely cut out under the seat for the beam. The top of the hanger was riveted to an 8" x 16" x $\frac{1}{4}$ " plate by four $\frac{3}{8}$ " rivets through the 2 inch flange. A small angle-bar was also riveted to the rear edge of the wall-plate.

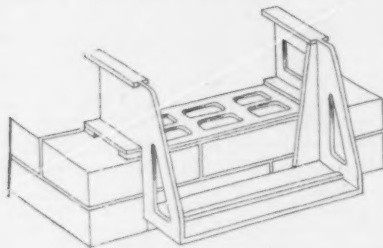


Fig. 11. A Duplex Wall-hanger.

According to figures and sketches prepared for the *Engineering News* by Mr. G. A. Turner, M. Am. Soc. C. E. of Minneapolis, the actual load on the hanger which failed was about 15,000 pounds and failure was due to crushing of the

inner edge of the brick wall under the hanger, and the bending of the latter until it was pulled out of the wall.

Figure 14 shows the appearance of the hanger after failure, and also the distortion in the wall-plate, which was too thin to distribute the load evenly over the wall.

Attention is also called to the manner in which the bottom of the hanger was bent, which illustrates another weak point to be guarded against in all stirrups, where the beam is 8, 10 or 12 inches wide. In this particular instance the beam was 12 inches wide, and was supported on a shelf 4 inches wide, $\frac{1}{4}$ inch thick and 12 inches between supports. The total load for which the beam was designed was 38,500 pounds, which would give a reaction on the hanger of 19,250 pounds. "Considered as a uniform distributed load, this reaction would produce a bending-stress in the shelf about ten times the ultimate strength

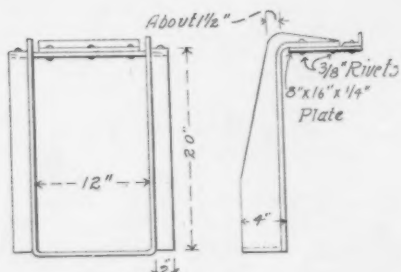


Fig. 13.

The Hanger that failed in the Bement-Darling Warehouse, Minneapolis.

of the steel. The shelf will, therefore, be bent down so that the joist bears only along the side edges, and these, in turn, will be crushed until the hanger becomes virtually a suspension-band. The stress in this band, practically pure tension, with a sag of 1 inch, would amount to nearly 30,000 pounds on a section of 1 square inch."¹

¹ *Engineering News*, November 20, 1902.

When a steel stirrup cannot fail by bending and slipping from the support, it is most likely to fail by breaking at one of the bottom angles. At this point the shear is equal to one-half of the load on the stirrup, and owing to the bend in the steel or iron, this is usually the weakest part of the metal.

In the warehouse at Minneapolis, the upper floor in falling carried with it the five floors below, and the hangers supporting these five floors failed at the junction of the bottom shelf with the bottom of the hanger; in most cases the bottom of the stirrup was straightened down vertically as though it were a strap, hinged to one side. These hangers were not as heavily loaded as those supporting the sixth-floor beams, and probably had not suffered any deformation at the

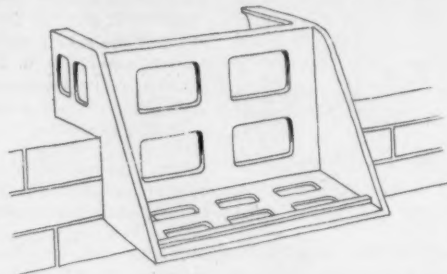


Fig. 12. A Duplex Wall-hanger.

time the failure occurred, and the sudden shock caused the hangers to break at the weakest point.

Strength of Double Stirrups.—While the bending effects in a double stirrup are similar to those in a single stirrup, particularly in the bottom shelf, yet because of their being double, they cannot slip over the carrying-beam, and the metal must necessarily break before the beams can fall. The only test on a double stirrup that has come to my knowledge is one made by the Otis Steel Company, of Cleveland, November 9, 1900. The stirrup in this case was made to receive two 8" x 12" timbers, and to set over a 12" x 14" girder. The metal was $\frac{3}{8}$ " x 2 $\frac{1}{2}$ ", bent and twisted in the usual way. At 57,650 pounds on both beams, the stirrups broke at one of the lower corners, showing that the weakest point is at these corners, as previously noted.

The girder was compressed $\frac{5}{16}$ inch where the stirrup was applied; the bottom of the stirrup bent $\frac{1}{2}$ inch and the top about the same as you can see (Figure 15).²

The tensile-stress in the sides of the stirrups at the time of failure was 15,732 pounds per square inch.

Strength of the Goetz Hanger.—I know of no definite tests of the strength of the Goetz stirrups, but have been told that the slanting hook has a more injurious effect on the carrying-timber than if it were at right angles to the face of the beam.

Owing to the hooks having a circular section, they are better adapted to resisting a bending strain than a flat section of the same area. Round pins also do not appear to crush into the timber as much as flat bars.

Strength of the Rieseck Hanger.—I know nothing of this hanger except what is stated in the manufacturer's circular, and no tests are quoted.

There is probably no question as to the strength of the strap, when the beams are not more than 8 inches thick. The only criticism that I have to make is the bending-moment on the arms and the leverage which they must exert on the top of the carrying-beam. If the arms

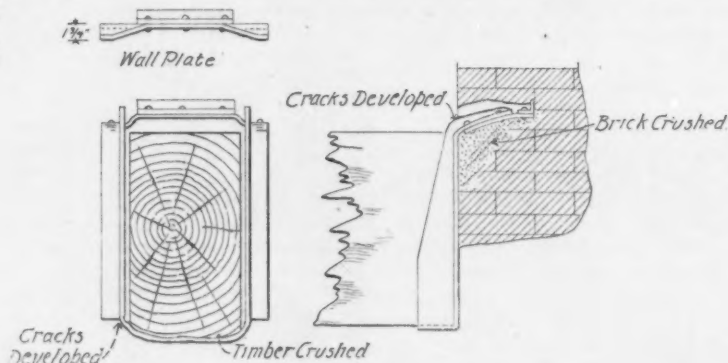


Fig. 14.

were solidly fixed in an unyielding material, the theoretical bending-moment on each arm would equal one-half of the load multiplied by one-half of the width of the strap. Practically, the bending of the floor-beam will naturally throw a large proportion of the weight on

² This stirrup and also the stirrup shown in Figure 1 were exhibited at the meeting.

the outer edge of the seat, which will increase the bending-moment, and the bending-moment will bring a considerable pressure on the outer fibres of the carrying-beam, and any crushing of the latter will still further increase the bending-moment. Without wishing to injure the reputation of the hanger, I do not think this is as good a pattern as the Goetz hanger.

Strength of Duplex Hangers.—When these hangers were first put on the market, many persons were afraid that, being of annealed cast-iron, they would be unreliable, and it was also feared that the holes bored into the carrying-timber would weaken it.

As to any possible danger resulting from imperfect annealing, there is this to be said, that many millions of these hangers are now in actual use in buildings, a great many of them having been in place from eight to ten years, and the only accident resulting from their use that is known to have occurred was at the Sear-Roebuck Building in Chicago, where a wall-hanger designed for 10" x 10" to 10" x 16" beams was used to support a 19" x 16" fitch-plate girder, loaded with pressed brick and cement to the neighborhood of 1,000 pounds per square foot.

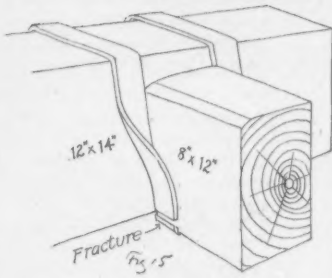


Fig. 15. Failure of a Double Stirrup.

I have also been assured by the manager of the Company that every hanger is thoroughly tested before it leaves the factory.

The strength of the Duplex hangers, as shown by carefully conducted tests, exceeds that of the stirrup hangers, when made of the usual thickness of metal, i. e., when the strength of the stirrup is measured by its resistance to bending. (They also crush the wood less than any other hanger.)

In the tests conducted by Charles E. Fuller at the Massachusetts Institute of Technology in April, 1900, one 4" x 12" Duplex hanger failed at a load of 13,600 pounds by the breaking out of the bottom of the hanger.

Another hanger of the same size failed under a load of 14,360 pounds by breaking off under the nipple.

As the safe distributed load for a Georgia pine beam 4" x 12", 12 feet long, is 9,600 pounds, the end reaction would be 4,800 pounds, so that the hangers have a safety-factor of about three for that length of beam, while for a white-pine beam of same length the safety-factor would be nearly five.

A No. 35, two-part Duplex hanger tested at the same time failed under a load of 39,550 pounds, one side breaking off short under the nipple.

In the test made by Mr. Tyrell, at St. Louis, a No. 75 Duplex hanger carried a load of 38,000 pounds without any apparent effect on the hanger.

I have the statement from the Duplex Hanger Company that they have tested their No. 75 hanger to over 60,000 pounds without a sign of fracture; this would be equivalent to a distributed load on the joist of 120,000 pounds, or over 600 pounds per square foot over an area 12' x 16'.

We will now look at the effect on the carrying-beam of the holes bored for the nipples.

In the case of the two 4" x 12" hangers tested, the load had no injurious effect on the header except to slightly compress the bottom of the hole. In the case of the No. 35 hanger a slight longitudinal crack appears to have been developed about opposite the centre of the holes and the bottom of the holes was compressed about $\frac{1}{8}$ inch.

During the test of the No. 75 hanger, at St. Louis, when the load reached 27,360 pounds a slight crack was developed in the girder between the spools, and extended a short distance on both sides. Under the final load of 38,000 pounds this crack had increased slightly in length and width, the washers on the far side having sunk about $\frac{1}{2}$ inch into the timber. The joist was crushed about $\frac{1}{2}$ inch where it rested on the hanger.

From these tests, and general observations where the hangers have been used in actual construction, the holes for the spools do not appear to have any injurious effect upon the carrying-beam, until the loads exceed the safe loads for the timber beams and girders.

The only case in which the weakening effect of these spools would need to be considered would be where a number of the larger hangers were used close together, in which case it would seem wise to increase the thickness of the carrying-timbers sufficiently to make good any weakening effect of the holes. This would also be true in regard to the Goetz and Rieseck hangers.

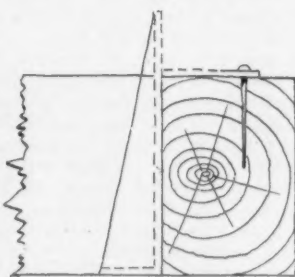


Fig. 16.

CONCLUSIONS.

The conclusions that may fairly be drawn from the preceding analysis are in part, at least, as follows:—

First.—That it is impossible to determine the safe carrying-capacity of a stirrup hanger directly from the tensile-strength of the steel or iron, unless better provision is made for uniformly distributing the load over the top shelf. The ideal stirrup would be constructed with a bracket above the hooks, as in Figure 16, strong enough to prevent the latter from straightening, in which case the full stress would be thrown on the lower angles of the steel or iron. This has been attempted to some extent in the National hanger.

Second.—That it is not advisable to use less than $\frac{3}{8}$ -inch thickness of metal for common stirrups, except where light beams are to be supported.

Third.—That the patent stirrup hangers are, as a rule, made too thin.

Fourth.—Wherever a stirrup is used to support a heavily loaded timber, or the end of a truss or girder, the bearing of the metal on wood, the resistance to bending or straightening of the top hook, or flanges, and the shearing or tearing of the metal at the bottom corners should all be very carefully considered.

Fifth.—That the Duplex hangers give ample strength for the size of beams for which they are intended, except possibly where a very short beam is loaded to its full capacity, in which case the load on the hanger should be computed and compared with the data given above.

The advantage of the Duplex and Goetz hangers in lessening the settlement due to shrinkage in the carrying-timber has already been referred to.

In regard to wall-hangers, the same principles apply to them as to joist-hangers, the best hanger being that which is so designed as to most perfectly distribute the load over the bearing-surface of the masonry, while at the same time possessing the requisite tensile-strength in the sides and bottom. For distributing the weight on the wall, there is certainly no wall-hanger now on the market which approaches the Duplex, and if steel hangers could be economically made on the same pattern they would give the ideal construction.

EXHIBITION OF ARCHITECTURAL DRAWINGS AT PROVIDENCE.

THE Rhode Island Chapter of the American Institute of Architects has been holding an Exhibition of Architectural Drawings at the Rhode Island School of Design, which closed March 28. In collecting these drawings the attempt has been made to illustrate, as far as possible, the progress of a building through the architect's office, and in following out this idea many very effective series of drawings were represented. The exhibits, therefore, were not limited to perspective and show drawings, but included preliminary sketches, pencil-drawings, water-colors, pen-and-inks, working-drawings, scale-details, blue-prints and photographs of finished work. The Exhibition was further varied by a few academic drawings by members of the Chapter and an exhibit of photographs of the masterly-rendered drawings by Brune and other French draughtsmen copied from the collection of the Massachusetts Institute of Technology. Nineteen Chapter members entered the drawings which are briefly described in the following summary.

The exhibit by Angell & Swift included nineteen photographs and rendered drawings. The Industrial Trust Company Building at Pawtucket is perhaps the most interesting work in this group. The house on Waterman Street, the shingled house at Edgewood and the Golf Club at Fall River, Mass., are good examples of domestic work. This exhibit also included competitive drawings for the Central Fire Station, Providence, and three school-houses at Providence, Pawtucket and Crompton.

The exhibit by Clarke & Howe consisted of thirty-five drawings, water-colors and photographs. These are particularly interesting, because of the good design and artistic quality. Mr. Howe's brilliant water-colors added charm to the Exhibition. Of their large work, the Engineering Building for Brown University was shown by drawings at several scales. St. George's School, Newport, R. I., a quiet and formal piece of design, was shown by four photographs and by large scale detail-drawings. The photographs hardly do justice to the building, which is the first of the group shown in a well-drawn bird's-eye perspective. The designs for domestic architecture from this office seem to be particularly happy and appropriate. A half-timber house at Providence, a house at Bristol, R. I., and studies for a house at Greenwich, Conn., should be particularly mentioned. The group of stables and farm-buildings for Col. R. H. I. Goddard, at Pottowomut, R. I., is an excellent example of artistic arrangement. Among the water-colors in this exhibit the preliminary studies for the Savings Bank at Portsmouth, N. H., a sketch for a Masonic Lodge and a sketch for St. John's Church, East Boston, Mass., are particularly bright and effective.

Field & Slocum showed only a small exhibit of eleven drawings and photographs, consisting principally of the competition-drawings for a State Sanatorium and domestic work. The Tillinghast house, Angell Street, Providence, is a particularly good example of brick and shingled architecture. They also showed a complete set of working-drawings for the "Little Blue School" at Farmington, Maine.

Hilton & Jackson exhibited thirty-two drawings, pen-and-inks and photographs, including an elevation of the Hopeworth Sanitarium at

Bristol, elevations of an apartment-house at Providence, perspective of a small church, several houses and a study for an office-building. Mr. Hilton's small pencil-sketch of the Sanitarium is a particularly effective little drawing.

Eleazer B. Homer showed thirty-four drawings and photographs. In this exhibit the preliminary studies, scale-drawings and details of the brick and half-timber block at Belmont, Mass., was a good example of the artistic study of a difficult problem. In sharp contrast to this group was the collection of photographs of the steel construction and substantial brickwork of the Henry L. Pierce Building for the Massachusetts Institute of Technology. Mr. Homer also showed a view of the new cement-building for the Simplex Electrical Co., Cambridgeport, Mass., and two school-houses for the town of Belmont, Mass. In domestic work his principal exhibit consisted of the exterior and interior views of the modern brick Colonial house for A. J. Wellington, Newton, Mass.

Albert A. Humes showed two excellent designs of school-houses for the city of Pawtucket.

Hoppin & Ely were represented by thirty-three photographs and drawings. These consisted largely of the recently completed entrance-gates at Brown University, sketches for the proposed gates for the Butler Hospital and the gates for the M. B. I. Goddard Estate. In this exhibit the colored photographs of the Brown University gates were particularly effective. This office was also represented by the recently completed Weld House for Butler Hospital, by the President's house and the new dormitory for Brown University and by the alterations of the house of William Grosvenor, Aiken, S. C.

Wright & Isham showed a small exhibit of twelve drawings and groups of photographs consisting largely of domestic work. The house for Charles H. Tappan, Attleboro, Mass., and the alterations at Thorncliffe for Mrs. R. H. I. Goddard are to be particularly mentioned.

Edward I. Nickerson showed only one house, that for Mrs. Joshua Wilbour, at Bristol, R. I.

The largest space in the whole collection was occupied by the exhibit of seventy-six sketch-drawings and photographs from the office of Stone, Carpenter & Willson. Of these drawings the perspectives of the Providence Public Library and of the Union Trust Company Building show the largest and most important buildings recently erected in Providence. These buildings have been illustrated in the "*American Architect*," but many studies, scale-drawings and views that have not been published were shown. The beautifully modelled original study in plaster by Daniel C. French for the sculpture in the spandrels of the entrance-arch of the Union Trust Company Building is permanently placed in the vestibule of the School of Design, and should be considered as part of this exhibit. The building for the Providence Institutions for Savings is another good example of recent design in Providence. Among many large houses shown in this exhibit the spacious Colonial house for Robert Taft is particularly attractive and comfortable in appearance. Good drawings of Colonial details were also to be seen in the carefully designed alterations for the house in New York for Richard A. Canfield. The delightful suggestive studies in pencil by Mr. Willson are particularly delicate in treatment and strong in architectural composition. A series of these drawings is seen in the sketch for Robert Scoville's house at Chapinville, Conn. These are good illustrations of Mr. Willson's methods in design. The great variety and versatility in design that is necessary in the conduct of a large office is shown by the studies for the power-house and water-tower for the Scoville estate, the sketches for the Bolton Library, the Memorial Hall at Petersham, by the receiving-tomb at Swan Point Cemetery, the scheme for a combination chair and step-ladder and the drawing for a decorative garden sun-dial.

Altogether it was the most satisfactory and complete exhibition ever held by Rhode Island architects.

ST. SOPHIA, CONSTANTINOPLE.¹

ST. SOPHIA, the splendid cathedral, and now the great mosque of Constantinople, presented a particular attraction to the writer through the mystery veiling its former condition, and, especially, its inner division as a Christian church. From 1889 to 1893, he visited that celebrated shrine hundreds of times, and took accurate plans, sections and elevations of it, as well as a very large number of drawings of its appearance. These data have been further completed and checked by photography; so that the equipment for understanding the text of the Greek historians in the light of the present building was as satisfactory as could reasonably be expected. . . .

HISTORICAL NOTICES.

The foundation of a church dedicated to the Holy Wisdom, or to Christ himself, is attributed to Constantine the Great. It appears that the structure was begun towards 326 A. D., and that its dedication did not take place before 360, in the reign of Constantius. The form of the first church was that of the basilica type, probably with three naves covered with barrel-vaults, the central vault resting on two rows of columns. Burned partly by the partisans of St. John Chrysostom, who was banished from the city in 404, and again restored by Theodosius the Younger in 415, Constantine's church was at last totally destroyed by fire in the Nika riot of 532.

¹ Extracts from a paper by E. M. Antouadi, F. R. A. S., and printed in *Knowledge*, February, 1903.

The quelling of the rebellion raised Justinian to the acme of power. His ambition was to reconstruct the church in such splendor as to transcend anything ever achieved before; and the unrivalled genius of his architect, Anthemius of Tralles, enabled the Emperor to produce a building which, in originality of design, audacity of structure, and gorgeousness of decoration, has never since been equalled, or even approached. It was only thirty-nine days after the fire that Justinian undertook the reconstruction, and he pushed the work with such relentless activity, that the present building was completed and opened in the incredibly short space of not even six years, the dedication actually taking place on Christmas Day, 537.

The 1365 years separating us from the dedication saw vast changes in the appearance of the church. In the first place, the original dome, which was twenty feet flatter than the present one, fell in 558 through the effects of repeated earthquakes, and it was thought safer, in its reconstruction, to check somehow the thrust by raising the curve to a greater height. The second dedication under Justinian took place once more on Christmas Day, 563, seven years before the birth of Mohammed.

An adumbration of the subsequent history of St. Sophia may be given as follows:—

A. D. 620±. At the critical moment of the war between Heraclius and Chosroes the Church comes nobly forward and saves the State, by coining many of the treasures in its possession.

628. Heraclius lifts in triumph the wood of the True Cross before the altar of St. Sophia.

725. Leo the Isaurian issues his first edict against image worship.

741. Great Earthquake of Constantinople.

842. End of the Iconoclastic controversy; triumph of Orthodoxy.

865. Erection of a belfry near the west front of the church.

869. Earthquakes; the vaulting cracks in several places.

869-870. Eighth Ecumenical Synod, held in south aisle of first-floor level of St. Sophia.

875±. Basil the Macedonian consolidates the great arch to the west by an additional thickness.

975. A strong earthquake shock causes the western arch of St. Sophia to totter, and to drag the dome in its fall.

981. Basil II restores the fallen parts.

987. The ambassadors of Vladimir are so dazzled by the grandeur of the divine service in St. Sophia that they decide the conversion of the Russian nation to the Orthodox Greek Church.

1054. The envoys of Pope Leo IX excommunicate the Eastern Church on the great altar of St. Sophia.

1204. Capture of Constantinople by the Crusaders. Wanton profanation of the sanctuary by the soldiery. Baldwin, of Flanders, is crowned first Latin Emperor of Constantinople in St. Sophia, which is converted into a Roman Catholic church. The *Te Deum* resounds in the dome for fifty-seven years.

1261. Constantinople is reconquered by the Greeks and St. Sophia restored to the Orthodox faith.

1317. Andronicus Paleologos, the Elder, erects the huge buttress masses disfiguring the outside.

1346. Earthquakes. Collapse of the great eastern arch and of all that part of the dome resting on it.

1360±. Restoration of the vault by John V. Paleologos.

1452. A *Te Deum* is again sung in St. Sophia, by order of the last Constantine. But this alienates the sympathies of the people, who, from that day, avoid the church as a Jewish synagogue or a heathen temple.

1453. Fall of Constantinople. Mohammed II respects St. Sophia, which he solemnly dedicates to Islam.

A few words regarding the treatment of St. Sophia by the Turks would form a fitting conclusion to this brief historical sketch. Contrary to what is generally believed, the building did not suffer much from its new masters. The damage reduces itself to the partial scratching of the arms of some crosses in bas-relief and to the white-wash cover of the majority of the mosaics. Many mosaics have been removed as a measure of precaution, through the cracking and precariousness of the mortar in which they were fixed. This toleration for images whose representation is forbidden by the faith was attended with a pious zeal towards the preservation of the building. In 1573, Sultan Selim II repaired the eastern arch; in 1847-1849, Sultan Abdul Mesjid spent nearly a quarter of a million sterling for a general restoration, while the first care of his son H. I. M. Sultan Abdul Hamid II, after the earthquake of 1894, was to appoint a commission of architects in order to study the damage, and to at once order a general repair. It is only fair, therefore, to acknowledge the great debt of gratitude we owe to the Sultans of Turkey for having preserved to the archaeologist, practically intact, the grandest architectural conception the world has seen. . . .

Owing to the unrivalled audacity of its construction as well as to the formidable thrust of its dome, St. Sophia could never have been a really graceful building on the outside. It is even to be feared that, through the still greater flatness of the first cupola, the original form of the church was more disappointing than the present one. Evidently, the early Byzantines attached no great importance to the exterior view of their churches. Outer pomp had to be entirely subordinated to the requirements of inner harmony. All they seemed to have cared for was to have roofs of easy access; and it was doubtless to this end that steep outside curves were assiduously discarded.

At the same time, the combination of both outer and inner splendor in the self-same building is a question which the mediæval Greek architects did not attempt to decide. Nor has the problem received a satisfactory solution since their time.

The mortar which covers the brick walls of St. Sophia is doubtless less attractive than the fine naked stone walls of other churches. But while rain and the molecular work of heat and frost tend, in the long run, to decay any stone exposed to their action, the mortar, if only carefully repaired, plays the part of a garb against the disintegration of the active structure beyond. That is why the walls of St. Sophia are still young, though nearly fourteen centuries old; and if they failed at some points, it is to other causes, not to exposure, that the failure ought to be attributed. . . .

A careful synthesis of historical facts will enable us to undertake a fairly trustworthy restoration of the outer appearance of St. Sophia at one of the most flourishing periods of Byzantine history, at the time of Basil the Macedonian, in the ninth century. Adding the bell-tower erected here in 865 by the Emperor Michael in order to receive the bells presented to him by the Doge of Venice, and actually seen in position by Grelot towards 1679; restoring the steps of the atrium; liberating the western arch and semi-dome of their additional thicknesses; also giving the west wall¹ and the dome their original appearance, we unmistakably launch on something like Figure 2, where the only weak point lies in our ignorance as to the number of arched openings piercing the atrium wall on the west side. A similar treatment of the south façade, but for a more recent date, led the writer to the elevation shown on Figure 3. Apart from the omission of the buttress masses erected in 1317, this elevation differs from the present view of the mosque in some other particulars, such as the saddle roofs of the little chambers at the buttress tops; the restoration of a room at the top of the staircase on the southeast angle of the great platform; and the insertion of two buttress arches reaching up to the windows of the cupola. It was during the 1847-1849 restoration that the roofs of the chambers were rendered cylindrical; that the corner room and buttress arches were removed, the office of the latter being taken advantageously by a double cincture of iron round the base of the dome.

AN AMERICAN BUILDER ON FOREIGN LABOR.

AT the last convention in Washington of the National Association of Builders, Mr. Armstrong delivered an address in which he said:—

"It was my good fortune to spend practically the year of 1898 abroad, and the more I saw of the conditions of the laboring-men and mechanics there the more pleased I became with ours here, the more proud of this country of ours. Off in Palestine, at Jezreel, on the traditional site of the Palace of Ahab and his wicked wife, Jezebel, I saw a building being erected, not one of our 'skyscrapers,' however, nor yet a replica of the ivory palace of the king, but simply a one-story hut, such as the natives have. There was one mason working, and for hod-carriers and mortar-mixers there were two girls. The mortar was made of offal, mud and straw, formed into balls about the size of a croquet ball, and thrown up, one at a time, to a man on the wall, who caught it as we would a ball, spread it, and set the stones. For this these girls got a penny a day, and the man approximately five cents. These conditions surely would not suit us, either in the price of labor or the amount of work accomplished.

"At the Bergen (Norway) International Fisheries Exposition the United States had the largest and most complete exhibit, yet when I asked the representative of our Government there what part of our exhibit commanded the most attention, he took me to the photographs, exteriors and interiors of the homes of the Cape Cod fishermen, and said 'those unquestionably'; for the fact that in these little houses there were carpets, pianos and pictures complete impressed the natives more than all else; one of them only that day said to him, 'That is as good as our King has.' This is as it should be; a man who is honest, capable and willing to give a full day's work is entitled to enough wage to raise his family, educate them, have his own little home, his bath, his piano and all reasonable comforts, for these enumerated are not luxuries, but are necessities, if man is to be anything above an animal.

"But for this high wage must come the greatest possible effort. Limitation of labor must never be conceded. Unionism must be taught that the way for them to have work is not to limit the output nor to subdivide what is at hand, but that each should do the greatest day's work possible, that work makes work, otherwise every labor-saving device would be a public calamity. This, gentlemen, should be a principle from which we should never deviate a hair, for our own interests; yes, but higher still, as a patriotic duty, for if the limitation of labor should get the foothold here that it has in England our industrial supremacy will soon be a thing of the past, and we shall share the fate of England.

¹It was thought safe to buttress the dome on the west at an unknown period of the church's history, and this was done by lengthening radially thirteen of the piers between the upper windows. But there was not enough space between the edge of the central western piers and the edge of the west wall, so that the work entailed a thickening of the latter. This thickening is, therefore, not original, and it does not exist to the east, so that its representation in "original forms" of the church by M. Choisy, as well as by Messrs. Lethaby and Swainson, is doubtless attributable to some sort of error.

"It is beyond question that the primary cause in the decadence of England's industries has been the arbitrary exactions of the trade-unions.

"The London papers continue to call attention to the crisis of the British industries, and practically agree that British workmen, through their trade-unions, are ruining not only themselves, but the industry of the country.

"In travelling through England I found that many towns had practically been killed by trade-unions, and could never quite understand why the evil fruits of their exactions and the consequent loss to themselves did not teach them some valuable lessons, but apparently they did not.

"In conversation with our consul at Liverpool relative to this very matter he told me of an incident happening but a day or two previously, which illustrates well the limitation idea. He, in going through a large steamship lying at Liverpool wharves, happened across a carpenter whom he knew, and though it was but early in the afternoon, he there, apparently to work, was seated, doing nothing. Addressing him by name, he said, 'Well, John, you seem to be taking it easy.' 'Oh, yes,' was the reply, 'I have done my shift for the day,' and there he was waiting around for quitting time. Wrong, surely, is this in principle and fatal in practice to both industry and labor.

"Again, while staying in London, there was a strike on a near-by building. Upon inquiry I found that some one had been caught 'rushing it,' as my informant styled it, and they had therefore struck, had him brought before the local union and fined. I then asked him who set the pace. He said, 'the slow man.' If the 'slow man' is ever in position to set the pace in America it will be but the beginning of the end of our industrial preëminence."



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

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VIEWS OF ST. SOPHIA AT DIFFERENT EPOCHS.

SEE article elsewhere in this issue for references to these Illustrations, which are reproduced from *Knowledge*.

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A HOUSE ON 106TH ST. AND RIVERSIDE DRIVE, NEW YORK, N. Y.

INTERIOR ENTRANCE DETAIL: ST. SOPHIA, CONSTANTINOPLE.

DETAILS OF ST. SOPHIA, CONSTANTINOPLE: GALLERY ARCADE;—THE NARTHEX.

DETAILS FROM ST. SOPHIA, CONSTANTINOPLE: ENTRANCE TO THE TURBÉ, OR TOMB, OF SULTAN SELIM II, ETC.



[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.]

THE AMERICAN SCHOOL AT ATHENS NOT IN NEED OF AN ARCHITECT.

COLUMBIA UNIVERSITY, NEW YORK, N. Y., March 28, 1903.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—I understand that in your issue of March 20th, you speak of the School at Athens being in search of an architect for work on the excavations at Corinth. The exact terms of your notice I do not know, but from the applications for appointment which I am beginning to receive from architects, I infer that there has been a slight misunderstanding about the matter. We are not looking for an architect, but for the money (about \$2,500) with which to send one out.

Mr. E. L. Tilton, who did the architectural work for the publication of the excavations at the Heræum in Argos, can go out, if we are able to raise money for his expenses. His wide experience in Greece would, of course, be a great advantage to us, so that, if we are able to send any one, he is likely to be the man.

If you feel like giving a little further explanation of the matter in your paper, the Managing Committee of the School would be grateful to you; and in any case we are much obliged to you for the notice you have already taken of our needs.

Very truly yours,

J. R. WHEELER, Chairman of the Managing Committee.

P. S. — May I add the statement that the Managers of the School would be only too glad if, through coöperation with architects, they could develop more distinctly architectural study at the School.

J. R. W.

ARCHITECTURAL ENGINEERING.

NEW YORK, N. Y., March 30, 1903.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In reference to recent contributions to the New York Times of March 16, 22, and 29 concerning the carelessness of architects to the engineering features of their problems, and the consequential loss of work through the tendency of large contracting-concerns to employ their own professional help, architectural as well as engineering, there is unfortunately too often, as there pointed out, an indifference to the fitness of the men selected to carry out the engineering work. This indifference is often seen in the artistic designs themselves as carried out by some of our best designers. Consider the frequent use of the broken pediment over doors and windows, always irritating to one with structural conceptions. Other examples are numerous. In one of our large fine club-houses there is, apparently, a heavy vaulted ceiling resting on deep wooden pilasters with a stairway through the centre of each and bookcases on the sides. So this supposedly massive ceiling is supported by two seven-eighths boardings between the books and the stairway. Whereas the vaultings could have been carried over to the main walls and the bookcases treated as a special feature. Another example is the concert-hall of a large musical club, the principal roof-girders of which apparently rest on the head of an angel whose well-proportioned wings remind one that the roof may be left without support at any moment. Cut away the connection between the girders and the head, treat the statuary as decoration, and you have a much better treatment. Again, there is a down-town office-building with the main pilaster of the front façade cut directly off at the base by a door opening.

If we find such glaring engineering defects in the artistic design, how can we expect much consideration for the structural, the mechanical, the electrical, the heating and the sanitary details? As suggested by one of the Times correspondents, much of the trouble lies in the early training.

ALEX. RICE MCKIM.



BOSTON'S TOTAL FIRE LOSS FOR 1902. — To the insurance-companies to which it owes its support, the Boston Protective Department has just presented its annual report. The principal features of the document, as submitted by Samuel Abbott, Jr., the Superintendent, are as follows: On January 1, 1902, there were 27,032 brick, stone, iron, and 57,487 frame buildings in the city of Boston, making a total of 83,519 buildings; during the year there were 260 brick, stone, iron, and 571 frame buildings completed. Thirty-three frame buildings were totally destroyed by fire, 108 brick and 167 frame buildings were demolished in various parts of the city, making the total number of buildings at the end of the year 26,184 brick, stone, iron, and 57,858 frame; grand total 84,042 buildings. The total alarms during the year 1902 (January 1 to December 31 inclusive) were 1,985, of which 1,683 were for fires; of these 759 occurred in brick, stone and iron buildings, 716 in frame buildings and 208 outside. The number of fires to one thousand population was 3.54. The total loss on buildings and contents was \$1,570,533.25, total insurance \$18,986,710.95, and the total insurance loss was \$1,481,723.88. The loss per capita was \$2.80, which does not include the marine, fire and rent losses. — Exchange.

COMPUTATION OF THE STABILITY OF HIGH CHIMNEYS. — The Prussian Minister of Public Works has acted on a recommendation of the Building Academy and has issued a set of regulations governing the design of high chimneys. As reported by the *Deutsche Bauzeitung*, these regulations are essentially as follows: The regulations generally prescribe an assumed wind-pressure of about twenty-six pounds per square foot on a plane perpendicular to the direction of the wind. Any possible suction on the leeward side is assumed to be included in this pressure. The wind area of the chimney is taken to be its vertical section, and if the chimney is polygonal its greatest diametrical section is to be used. The point of application of the resultant of the wind-pressure is to be assumed to coincide with the centre-of-gravity of the section, which is equivalent to assuming a uniform distribution of

the wind-pressure over the full height of the chimney. For circular chimneys the total wind-pressure area is to be reduced to two-thirds, and for octagonal chimneys to seventy-one hundredths of the value for rectangular chimneys. To determine the greatest pressure at the edges the wind should be assumed to act in a diagonal direction. The specifications allow the theoretical opening of the joints to the centre-of-gravity of the section, thus neglecting the tensile stresses. The compressive stresses should be determined for wind-pressures of twenty-six and thirty-one pounds per square foot. The weight of the material per unit of volume should be that of the actual material used. The allowable unit-stresses were fixed as follows: For common brickwork laid in lime-mortar (1:3), one hundred pounds per square inch; for hard burned bricks, having a compressive strength of at least 3,160 pounds per square inch, laid in cement-lime mortar (one cement, two lime, six to eight sand), 171 to 214 pounds per square inch. For the stronger stones and mortar richer in cement, higher stresses are allowable, but a factor-of-safety of ten must always be provided for, and in no case should the greatest pressure exceed 316 pounds per square inch for a wind-pressure of twenty-six pounds per square foot. If higher unit-stresses be deemed allowable, they should be justified by tests on blocks of masonry. The allowable compressive stress on the foundation is, for unrammed concrete, eighty-five to 114, and for rammed concrete 142 to 214 pounds per square foot. The allowable bearing-pressure on the soil for the assumption of twenty-six to thirty-one pounds per square foot wind-pressure is, as a rule, sixty-one pounds and, exceptionally, eighty-two pounds per square inch, equal, respectively, to very nearly four and one-half and six tons per square foot. — *The Architect*.

THE TAFF-VALE RAILROAD DECISION. — In accordance with an arrangement arrived at between the parties to the suit, the Court awarded the Taff-Vale Railroad Company \$115,000 damages against the Amalgamated Society of Railroad Servants. The Taff-Vale case, which bids fair to be epoch-making in the history of labor-unions and the relations of labor and capital, arose from the great strike of 1900. At that time the Amalgamated Society of Railway Servants was on strike against the Taff-Vale Railroad Company, and in the conduct of the strike resorted to picketing and other means of preventing the employment of other hands by the Company. The Company complained that the Amalgamated Society had indulged in malicious molestation, intimidation and other unlawful acts, and had thus inflicted injuries upon it, for which it demanded damages in a suit at law. The suit was bitterly contested by the Amalgamated Society, backed by other trades-unions, it being recognized that a most important principle was involved. At last, after being fought through various courts, a final decision was made by the King's Bench Division of the High Court of Justice, late last year, to the effect that the Amalgamated Society was responsible for its acts or the acts of its agents, and was liable to be mulcted in damages for actual injury done, the amount of such indemnity being reserved for further judicial determination. The amount has now been determined, as stated in the foregoing dispatch. The net result of the whole long case is the establishment of the principle that trade-unions are legally responsible for their acts or the acts of their members, and that such responsibility can be legally enforced by levying upon the funds of the unions. If the unions are to enjoy power and authority they must suffer responsibility. If they can accumulate large funds and use them as "sinews of war" in fighting capitalists, those funds must be accessible and accountable through process of law as vouchers of the unions' responsibility, and as hostages for their good behavior. It is pretty confidently to be expected that this decision will have a powerful influence in restraining strikes hereafter within law-abiding limits. — *Exchange*.

STONE-CUTTING WITH PNEUMATIC TOOLS. — An industry in which pneumatic tools bid fair to effect a revolution is the working of granite. Up till a few years ago the granite tombstones which are to be seen in every cemetery, and the elaborately carved granite blocks which are now so popular for the fronts of banks and public houses, were dressed by hand with a hammer and chisel in much the same way as we may suppose the Egyptians carved the Sphinx. Now a jet of air is doing the mason's work, and instead of expending much time and muscle on his task the workman has simply to guide the pneumatic chisel over the surface of the stone. The saving in manual labor is very great. The work is done more rapidly and more cheaply by these tools than by hand, and, it might also be said, more efficiently, for a pneumatic chisel can be operated in recesses and out-of-the-way places in which there would not be room to strike a blow with an ordinary hammer. Aberdeen is the centre of the granite industry in this country, and there is no granite-working establishment there of any consequence which has not an equipment of pneumatic tools. The heart of a pneumatic plant is the compressor, or pump, which forces the air into a large tank or reservoir. From this central point the air is conveyed in pipes to all parts of the works, and the connection with the actual tool is made with a length of india-rubber hose, so that the workman can move the apparatus from place to place. Where a workman would have had a hammer and a chisel in his hands, now he has a pneumatic chisel, and he has simply to direct it in the required position. The number of blows that a tool like this strikes is marvellous. The jet of compressed air operates a piston, to which either a hammer or a chisel can be attached, and the admission of the air can be so regulated by valves as to give anything from two thousand to fifteen thousand strokes a minute. As might be supposed, the vibration caused by such a rapid movement as this is very great. A visitor to a granite yard is generally given one of these pneumatic tools to hold, and unless he grips it tight it is apt to jump out of his hand. One would think that the constant use of such tools would injure the workman's arms and lead to cramp. So far, however, there have been no instances of this. — *The Sphere*.

THE AMERICAN ARCHITECT

AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT

No. 251

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POWER PLANTS.

AMONG the electric-lighting and water-supply plants constructed last season by the firm of Lunt, Moss & Co., of Boston and Providence, were those for C. B. Corey, Great Island, Hyannis, Mass.; F. E. Snow, Buzzard's Bay, Mass.; H. H. Hammond, Baldwinville, Mass.; Edward Uhl, North Bradford, Mass.; North East Harbor Water Works, North East Harbor, Maine; Col. H. G. Jordan, of Marston Coal Co., at Hingham, Mass., and G. N. Proctor, of Fitchburg, Mass.

For the coming season this house has greatly enlarged its facilities for manufacturing the Lunt, Moss & Co.'s gasoline engines and for doing the necessary construction-work connected with the installation of electric-lighting and water services; also for supplying the Appleton-Goodhue windmills, for which they are general agents.

The Lunt-Moss Engines are the product of fifteen years' practical gas-engine experience. The designers have been associated with some of the leading builders of heavy engines for many years, which accounts for their present perfection.

It is claimed for this engine that it contains fewer pieces than any other on the market, hence being the simplest; that it is so designed as to make each part easily accessible, consequently easily cared for, and that the tools and facilities used in its manufacture, not being excelled by other builders of similar engines, enable them to produce a machine of perfect working qualities and of long life.

The cylinders are bored on a special machine made for this particular class of work and are finished exactly to size. The pistons are ground on a special machine. The connecting-rods and crank-shafts are drop-forged from solid bars of steel. The gears are cut by special machinery built by the leading gear manufacturer of the country.

By a course of rigid inspection of workmanship and material a perfect working engine is produced with all parts interchangeable.

Each engine is numbered and a record of same is filed, so that at any time parts may be obtained without delay.

These claims by the manufacturers seem to have been well established by the reputation which the engine has gained during the years this firm has produced it, and to any one seeking a power-plant for either electric-lighting or water service, or for both combined, we think a correspondence with this house would be profitable.

Although Messrs. Lunt, Moss & Co. make a leader of their gasoline engines and of the entire construction-work for isolated or central-station plants, their general agency for

were utilized for running the sheets through the bath, and the cost, time and labor of making were greatly reduced; so much so that the old process was practically abandoned. Acid was also used as a "flux" to make the tin alloy "amalgamate" properly with the black plate.

The objection to the use of rolls in the manufacture of roofing-tin lies in the fact that they produce an artificial surface, and squeeze off the greater part of the coating, on which depends the wearing life of the tin.

The use of acid as a flux is also objectionable, as it has a tendency to eat into the black plate and start a corrosive action which continues after the coating is applied, in time destroying the sheet.

No rolls or acid are employed in the manufacture of "Taylor Old Style."

Every sheet is dipped several times by hand in open pots of molten metal of different temperatures, pure palm-oil only being used as a flux. Only in this way can the maximum amount of coating be applied.

"Taylor Old Style" has been made in the same way for the past seventy years, and during all that time competition has not affected its quality, which remains always the same.

No other plate on the market is so richly and heavily coated.

When properly laid, a roof of this material will outlast the life of the

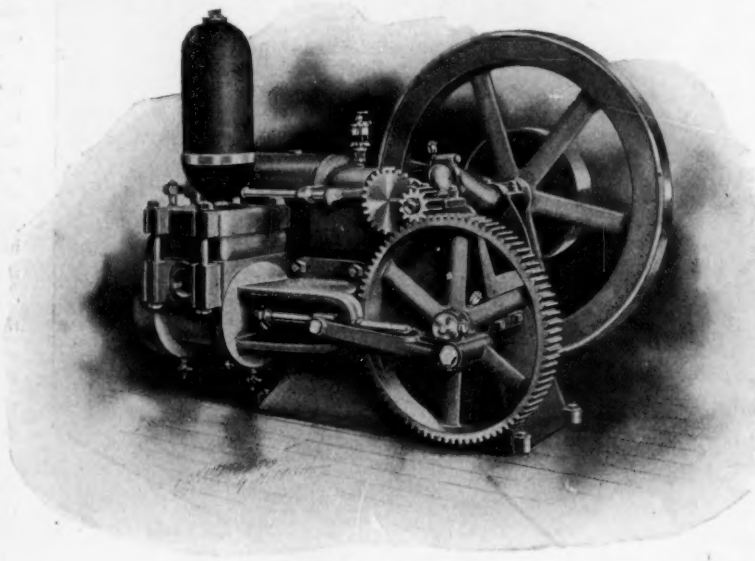
building itself. No acid should be used in soldering the seams, as it is apt to eat through the coating. Pure rosin only is the proper flux to use.

Tar-paper should not be used for the sheathing, as it has a corrosive action. Rosin-sized sheathing-paper is recommended for this purpose.

The tin should be painted with one coat on the under side before it is laid, and with one coat on the outer surface immediately after the roof is finished. After a month's time it should be painted again.

Additional painting once in every three or four years is all that is necessary to keep the roof in good condition.

Pure iron-oxide or metallic brown paint,



Lunt, Moss & Co.'s Gasoline Engine.

the Appleton-Goodhue windmills enables them to supply this motive power wherever it may be deemed advisable because of economy of first-cost or for other reasons. These mills have a national reputation for effective service.

HOW "TAYLOR OLD STYLE" IS MADE.

TIN-PLATE is made from dipping black plate into a bath of molten tin. In the case of roofing-tin the bath is a mixture of tin and lead, and the finished product is known as terne.

Before the introduction of labor-saving machinery, the black plates were dipped into the molten metal by hand, and by this process a very heavy coating was applied. Later, rolls

mixed with pure linseed-oil is the only paint that should be used.

N. & G. TAYLOR CO.,
PHILADELPHIA, PA.

CRAIG'S IMPROVED URINAL.

THE excellence, utility and beauty of the modern plumbing-fixture, especially the modern water-closet, is a source of pleasure and comfort to the student of hygiene, meeting, as it does, all or nearly all the ideal conditions required. This is not equally true, however, of the modern urinal; for, while great attention has been given to perfecting the water-closet, the urinal has been to a large extent neglected. And, while several commendable attempts have been made to improve this very essential fixture, it has not shown the marked improvements that have taken place in the water-closet. Of the improved forms of urinals now on the market almost all have gravely objectionable features, to a greater or less extent, when viewed from the standpoint of the architect and plumber.

Our illustration shows the latest attempt to overcome in a urinal the objectionable features heretofore so frequently found. Mr. David Craig, the inventor of this improved urinal, is well known in the business as a thoroughly practical plumber of advanced ideas in his line, and a description of this—his latest effort to supply a want long felt—will be appreciated by our readers.

In the illustration the Plate A is made of cast-iron and has the trap for the urinal cast on the back, and this is integral with the plate. This trap has syphonic action, which action serves to empty the bowl of the urinal when the bowl is flushed. The Plate A has pipe-legs E, which allow of adjustment of the height of the urinal and opening for waste-pipe D and trap-vent pipe F.

This plate is a new departure in the art of installing the urinal fixture, as it allows of adjustment of height, is labor-saving since the trap and vent-pipe are all ready to erect in one piece. In being tested at the foundry additional fixtures may be added, the plates being piped one to another, much the same as additional sections of a radiator. It allows of perfect alignment in a battery or singly; has a positive position determined from the wall to allow for the piping for supply, local-vent, trap-vent and waste. It does away with all the trouble arising from complexity of piping and affords a positive and permanent support for the urinal bowl.

The elbow B, with the double-ringed cup, being screwed into the Plate A at opening of the trap affords a strong arm to support the urinal bowl and to hold the mercury at C; enough mercury being used to allow the water in bowl to overflow over the rim before it

can break through the mercury held in the elbow at C. The elbow is rough cast-iron and the concentrating rings of the outlet in the earthenware fit into the spaces loosely between the rings of the iron elbows; the rings in both cases being about 2 inches deep, or of such diameter as will allow of a 2 inch outlet through the smallest interior earthen ring.

The supply connection at J is built on the same plan, but with more and deeper rings, the upper set being arranged around a central tube, which tube is made tight into the earthen-

varied in depth and increased in number to serve any condition that may arise in applying the principle to a urinal fixture. The nested joint J is made in a space back of the urinal which has the neck of the earthenware carried back and around the body, and which enlarges and forms a "skirt" below the urinal, thus hiding all the metal piping and connections, the said "skirt" being a new and practical device to protect the connections, and afford a pleasing and clean appearance to the earthenware, as no offensive bolts or metal parts are in sight, to become corroded, dirty and objectionable. This rim which projects beyond the back, as before stated, is $\frac{5}{8}$ -inch thick, and there being no projecting outlets or parts beyond it at right angles with the back it affords an easy and perfect joint for grinding, and the joint between the earthenware and marble back can be a hair-joint.

After putting in the mercury at C, the earthenware bowl with the upper part of J attached is pushed down over the lower part of J, and the earthen rings engage those of the outlet bend, and the urinal is ready for use without using a bolt, gasket, washer, putty, screw, or other appurtenance as used in other forms of urinals. The urinal bowl can be put in place in a few seconds, and removed in the same time. It is held in an upright position by B, joint J, and hugs the marble back closely.

The hood and opening H occur above the urinal proper; it is integral with the urinal bowl, yet can be increased in area to suit any requirements if directed when ordering. This hood comes out from the back and projects down over the bowl of the urinal to receive the odors arising from the bowl, which are carried away through the large pipe H, the whole scheme of local venting in this case being very generous and ample.

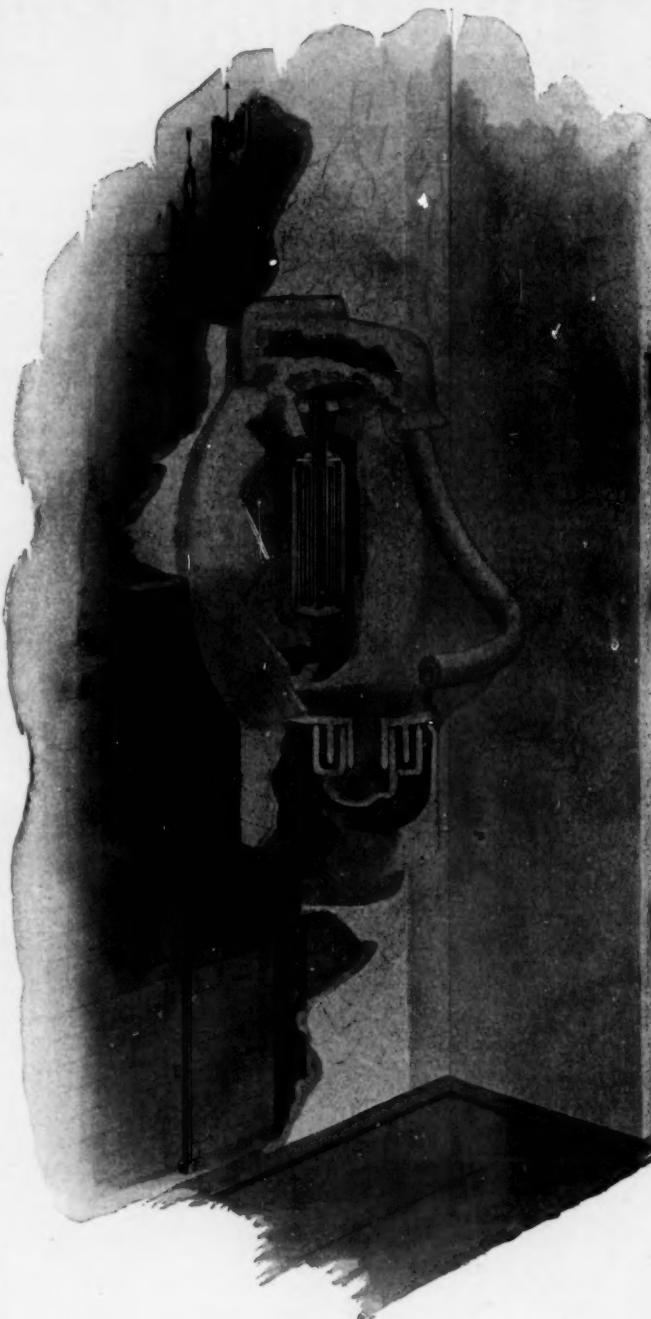
The pipe H can be of cheap material, as it receives no moisture or water, which is true of nearly every other form of wet urinal. It is generally true that a urinal fixture in a building can be located by the

sense of smell. It is intended by this improvement alone to remove this objectionable feature and to have ideal conditions contained in this fixture. A very essential and marked improvement has been made in the local vent, a feature that heretofore has been dwarfed in the making of urinals of the wet class.

The usual way that local venting is applied to a urinal is to take off the pipe below the flushing-rim at some point where visible, the opening of void-pipe being water-washed from the flush-pipe, the water in rushing by the opening destroying the velocity of the air and cutting off ventilation for the time

ware with an expanding rubber gasket, the lower rings, or tubes, being so arranged as to centralize around a tube, four in all, the upper three rings slipping into the space between the lower four, thus affording an air-lock at the top of two of the lower rings, the rings fitting loosely as in the outlet of the urinal. The resistance offered by this air-lock is then equal to the pressure exerted by the water from the flush-pipe. . . .

The nested joint J on the outlet is built upon the principle of the resistance offered by an air-lock; the water having to seek its way up and down over the alternating tubes from the centre out. These rings can be



Craig's Improved Urinal. (Patent applied for.)

Atlas PORTLAND CEMENT

The
Standard
American Brand.

Used Exclusively in the Following New York Buildings:

BROAD EXCHANGE

ST. PAUL BUILDING

AMERICAN SURETY BUILDING

BANK OF COMMERCE

HANOVER BANK

UNION CLUB

N. Y. LIFE INS. BUILDING

STANDARD OIL BUILDING

JOHNSTON and PRESBYTERIAN BUILDINGS

AND MANY OTHERS

Atlas Portland Cement Company

30 BROAD STREET
NEW YORK

being; this opening becomes foul from sediment and dust settling in it from the water and from the use of the bowl, and is generally very unsightly and inefficient, the local vent being limited to a comparatively small space within the area of the water-washed portion of the urinal. It is generally made of about 5-inch area or less and does not answer the purpose for which it was intended.

The advantages claimed for this improved form of urinal are as follows:—

The ease and quickness with which it is placed in position and removed, and therefore the accessibility of the trap in case of stoppage. The pleasing appearance of an all-earthenware bowl, without metal parts to corrode and become foul and unsightly. The large local vent with all the possibilities of this feature unlimited, making it possible to ventilate the room through or over the bowl. The labor saved in the assembling of the trap, waste and vent pipes in one piece. The opportunity for perfect alignment and additions in setting up the adjustment for height. These advantages leave very few, if any, needed features to make this urinal a perfect fixture.

WHY WIRE-GLASS WINDOWS ARE SUPPLANTING FIRE-SHUTTERS.

OUR windows, made of metal frames and sashes glazed with wire-glass, are supplanting fire-shutters everywhere for the following reasons:—

They always afford free access for light, at the same time offering a positive resistance against the spread of fire, not subject to the caprice of circumstances.

Fire-shutters require to be opened for light. When open they afford no protection against fire, and, as a matter of fact, they are generally open in case of fire.

Our windows require no attention, being always in position and sure to close automatically if left open in case of fire, thus affording a constant protection and being ready at all times to withstand the ravages of fire. The trouble of opening and closing shutters is also avoided.

Should a fire occur in a building with shutters, and they should happen to be closed at the time, no one on the outside would detect the fire until it had grown to such proportions as to declare itself, and great damage would be done before the firemen could get at the fire, owing to the difficulty of getting the shutters open from the outside.

But when our wire-glass windows are used, a fire in its very incipency can readily be detected from the outside and checked before

much damage results, as it is easy for the firemen to either break through the wire-glass with their axes, or our windows can be made to automatically open by a stream of water.

Our hollow-metal windows glazed with wire-glass in stone or brick walls make as impervious a fire-wall as though the wall was built solid. This important fact is gradually being recognized everywhere.

Owing to the difficulty of forcing wire-glass without making great noise these windows are practically burglar proof.

We make every known form of sliding, swinging or stationary windows, all movable sashes closing automatically under fire, the design and workmanship of our high-grade windows being neat and attractive enough for use in the fronts of the best class of office-buildings, hotels and residences; in fact, when they are painted the frames and sashes cannot be distinguished from the neatest wood-work.

We incorporate with this a copy of a letter dated February 26, 1903, from Thomas Roberts & Co., of Philadelphia, to Mr. E. S. Hand, of the Mississippi Wire Glass Co. The window frames and sashes in the Roberts & Co.'s building were manufactured and installed by us. While, of course, the wire-glass is the principal feature in such windows, it would be of no value without the metal frames and sashes. Aside from the letter from Messrs. Roberts & Co., we were told by eye-witnesses of the fire that it was very severe and gave the windows a crucial practical test which they withstood without any damage whatever to the frames and sashes.

[COPY.]

116 SOUTH FRONT STREET, PHILADELPHIA, PA.
February 26, 1903.

MR. E. S. HAND, CARE MISSISSIPPI WIRE GLASS CO., 277 BROADWAY, NEW YORK, N. Y.:—

Dear Sir,—In answer to your inquiry as to our experience with wire-glass windows, beg to say that, during the early part of 1901, we erected a six-story warehouse, adjoining our present plant at the above address. This new building, as also a part of the old building, abutted on both sides, on a 10-foot wide alley, on which were and are warehouses in the wool and yarn trade.

In order to obtain a decided reduction in the high rates of insurance then prevailing we had installed in both the new and old warehouses wire-glass windows, set in metal frames, in all windows opening on both the alleys, as a protection against fire. On July 2, 1902, a fire occurred in the wool and cotton warehouse of James F. Mitchell & Co., 120 Chestnut Street. This warehouse extends back to the alley alongside our buildings. This fire extended throughout the length of the Mitchell building, the flames shooting across the alley, and endangering our warehouse, which

was saved mainly by the wire-glass windows, which withstood the heat and flames, without damage to the glass except some cracking.

The use of wire-glass, aside from the annual saving in insurance, is a labor-saving device, doing away with shutters which require opening and closing twice a day. We have no hesitation in recommending wire-glass windows, believing them to be a safeguard in time of fire.

Very truly,
(Signed) THOMAS ROBERTS & Co.

We have recently installed some of the heaviest power-presses ever built for working sheet-metal for use in manufacturing our windows, and we are receiving orders from cities all over the country for windows to be used in office and hotel buildings, and, in fact, the better class of buildings.

In addition to the factories mentioned in the cities on our letter-head we have just concluded a manufacturing-agency contract with the Klauer Mfg. Co., of Dubuque, Iowa, covering the States of North Dakota, Minnesota, Wisconsin, Iowa, Nebraska and part of Missouri.

SMITH-WARREN CO.,
BOSTON, MASS.

BAIRD'S HAND-MADE SILVER-GLASS.

IN an article which appeared in our edition of November 7, 1902, we spoke at length concerning Baird's Hand-made Silver-glass, manufactured by Messrs. Redding, Baird & Co., of Boston, its utility and value "for the transmission, diffusion and deflection of light in mills, workshops, schoolrooms, offices, stores, basements, churches, libraries, dwellings, and in the many other places where such an appliance would be desirable."

Since that time we have had occasion to note its increasing popularity for these purposes. Then comparatively a new product in the market, now an acknowledged strong competitor for first place in demand. Why? This is a pertinent question. The manufacturers claim for it superiority in each needful essential, and if such superiority is measured by testimony from those who have adopted it they seem to have a valid claim. Its strongest partisans, apparently, are those who "have paid for their experience" by becoming its patrons.

In this connection we cheerfully give space to the following editorial article, entitled "Schoolroom Light," clipped from the *Journal of Education* of recent date. Coming, as it does, from a publication of such high standing in the educational field, published, we are assured, absolutely unsolicited by the manufacturers, it may fairly be considered an unusually strong endorsement.

ALSEN'S

AMERICAN PORTLAND CEMENT

An artificial Portland Cement of the highest character made under the supervision of Chemists and Engineers connected with the Alsen's Cement Works of Hamburg, Germany, superior to all other American Portland Cements, absolutely sound, uniform, and of great strength.

SINCLAIR & BABSON, Gen'l Agents, 45 Broadway, New York

Works at Alsen, N. Y., on Hudson River

"SCHOOLROOM LIGHT."

"Tardily school-authorities are awaking to the necessity of paying attention to the light of the schoolroom. We have been crying almost frantically for 'more light' without once asking as to the quality. Too bright light is almost as ruinous to the eyes as too little. We have had a campaign of several years in emphasizing the fact that the eyes of children suffer greatly from their school-life. We have goaded school-authorities into providing adequate window-glass in new school-houses, and now we discover that the quality of window-glass is almost as important as the quantity. Ordinary glass often overlights some desks and underlights others. An attempt to remedy this by various kinds of inside blinds or shades often makes a bad matter worse.

"A universal need is sure to be met sooner or later in this enterprising age, and in this case, science and art have combined to teach us that the wise use in part of translucent rather than transparent glass takes the edge off the dazzling direct light, and at the same time diffuses it equally over the entire room. Unless all signs fail and all expectations are falsely based, this silver-finished, translucent window-glass is to accomplish as much for the children's eyes and comfort as any one discovery or invention that has yet come into the school-architecture scheme. Every school-official, notably the superintendent and principals, should look into the merits of this invention and see what it is capable of for the schools. Bad eyes and poor light are ruinous to all school-work, and affect the results in every branch. The city does not begin to get or give so much for the money as it does when the light is right and the eyes good. Baird's Hand-made Silver-glass has rendered a greater service than even the makers suspect, since it is certain to challenge all authorities who adopt plans. It will have even greater effect than has the adjustable-desk idea, which the *Journal of Education* championed so earnestly."

IMPROVED LOCKERS.

SINCE the verdict of the officers of large and progressive corporations who have devoted thought and money to the welfare of their employes is to the effect that such a course not only pays in the kindly feeling which it produces, but is a matter of profit in actual dollars and cents, let us consider the first essentials — facilities for *personal cleanliness*.

A separate room should be fitted with an ample supply of wash-basins or shower-baths, and each person should have an individual clothes-closet or locker in which he can leave his street clothes during working-hours and his overalls while off duty. Such lockers were formerly made of wood, but had such serious disadvantages that many concerns hesitated about installing them. They lacked ventilation and were hard to keep clean; they could not be inspected without a great deal of trouble and were often used by dishonest

workmen to conceal tools or valuable materials until a convenient opportunity should permit these to be carried out of the building. Our improved lockers, which are made entirely of steel, are open to none of these objections, and have given entire satisfaction wherever they have been used. The bottom, as well as the front and sides, is of open mesh, and stands 6 inches above the floor, so that dust and dirt, instead of accumulating in the corners, drop through to the floor below, where they are readily swept away. The water from umbrellas and storm-coats drains away in the same manner, instead of rendering the lockers damp and musty. Insurance-companies were bitter opponents of wooden lockers, but endorse our steel lockers. The latter are in themselves incombustible and they are so entirely open to inspection that a fire, due to spontaneous combustion, or to the careless leaving of a lighted pipe in a pocket, is apparent in its early stages.

Each of our lockers is provided with a shelf and with three cast-brass hooks for clothes.

A booklet giving full particulars will be furnished upon application.

MERRITT & COMPANY,
PHILADELPHIA, PA.

ALMOST PERPETUAL MOTION.

PERFECTION in clock-work was supposed to have been reached years ago, when a heavy weight, hung by a cord, would furnish motive-power for running the clock an entire week.

The fine self-winding clocks made by Messrs. Blodgett Bros. & Co., 141 Franklin St., Boston, show as distinct an advance over that era as did those clocks over the hour-glass.

Any one interested in fine machinery can see at their factory some of the most marvellous precision tools ever invented, which may partially account for the good reputation of these clocks for accurate time.

Among their recent contracts are the new Court-house, Bangor, Me.; the Emerson, Lowell, Putnam and Normal Schools for the city of Boston, new High-school, Winchester; Mason and Auburndale Schools for the city of Newton; Reservoir Lane School, Brookline, and the great St. Alphonsus Buildings, at Roxbury, Mass.

PIER CONSTRUCTION.

THE pier terminals of the North German Lloyd Steamship Company nearing completion in Hoboken mark a new departure in the science of pier-construction. The plans of W. F. Whittemore, Chief Engineer, provide for absolutely fireproof buildings.

A solid sea-wall, 900 feet in length, has been built of granite and concrete. On this foundation a two-story bulkhead building 130' x 850' has been constructed of steel columns, filled

with and surrounded by concrete held in place by iron jackets. The same material is being used for surrounding the steel girders. Brick arches are used between girders, with concrete floors. The sides of the building are of granite and brick with iron doors.

The three piers extending from the terminal are 80' x 910', 80' x 894' and 90' x 874'. The foundation construction is necessarily of wood piling, on account of the great depth of soft mud and the impact of heavy ocean vessels, which render a rigid construction of stone impracticable. Concrete floors cover the deck of each pier. All steel columns and girders are enclosed with concrete and jackets, as in the bulkhead building. The floors of the piers are divided into three compartments by fireproof walls with double automatic fire-doors. The entire sides of the piers are made up of huge iron doors operated by an improved device for raising and lowering. Automatic sprinklers, to operate at a certain temperature, are installed, also an independent system of fire mains and hydrants. The Multiphase Cable System of automatic alarms, with loose coils of the same cable to lay over stored merchandise, will be used. Numerous improvements for the security and comfort of passengers are included in the terminal. The entire structural steel and metal work of bulkhead building and piers is protected with Dixon's Silica-Graphite Paint.

HOUSE-SERVICE PUMPS.

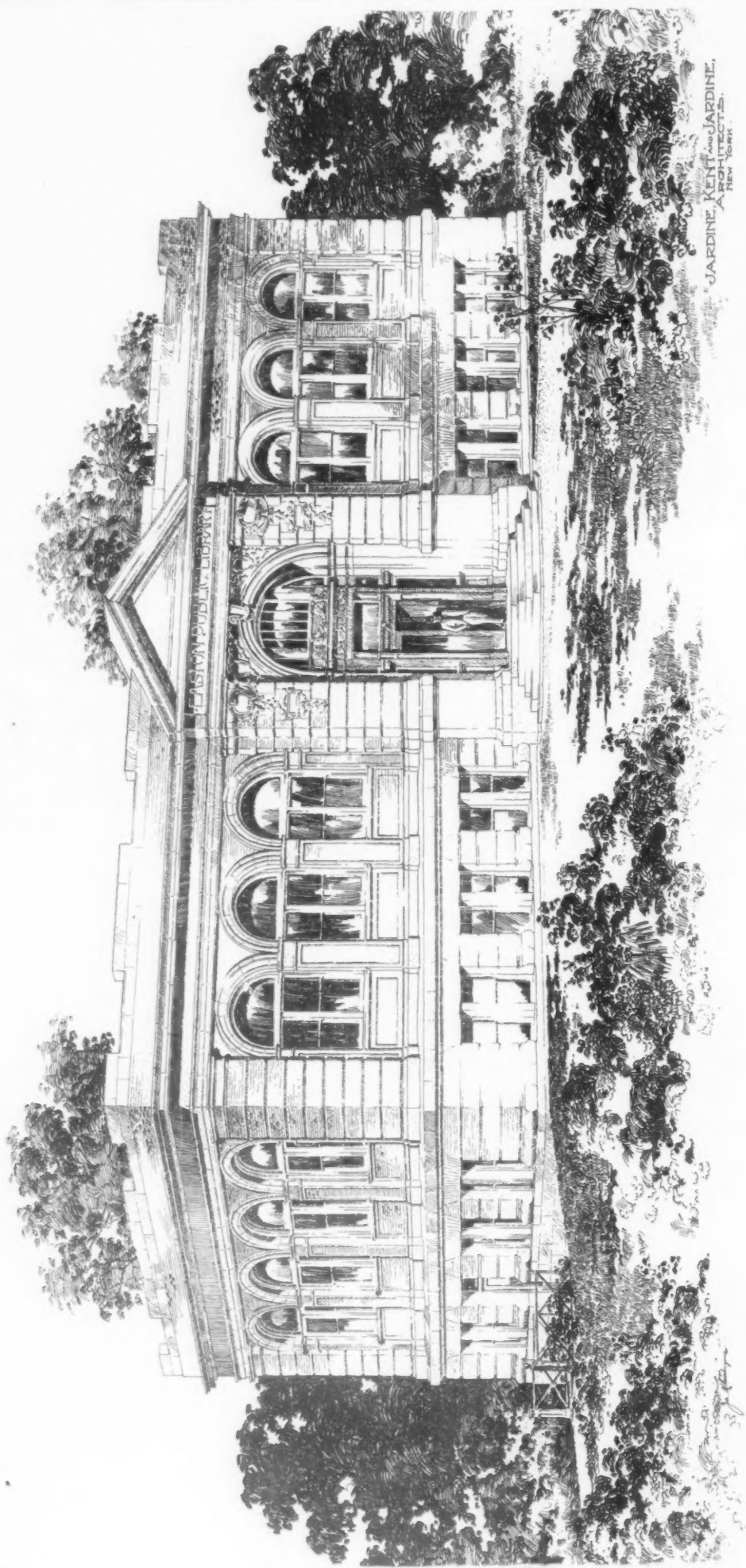
IN a pump for house-service the important requirements are that the pump shall be automatic, noiseless, require little attention and need no repairs.

The Quimby Electric-pump fulfils these requirements better than any pump heretofore put on the market. The automatic control is secured by means of a float in the tank. This tank-float operates a switch which starts the pump when water has been drawn from the tank and stops the pump when the tank has been filled.

The water is propelled through the pump by four screws. The action of the screws on the water is perfectly continuous, thus doing away with all pulsation and water-hammer effect in the delivery-pipes. As the pump has no valves or internal packing, noise will not be the result of wear in the pump. The pump and motor have a common shaft, thus doing away with intermediate connecting mechanism, which is always a source of noise and repairs.

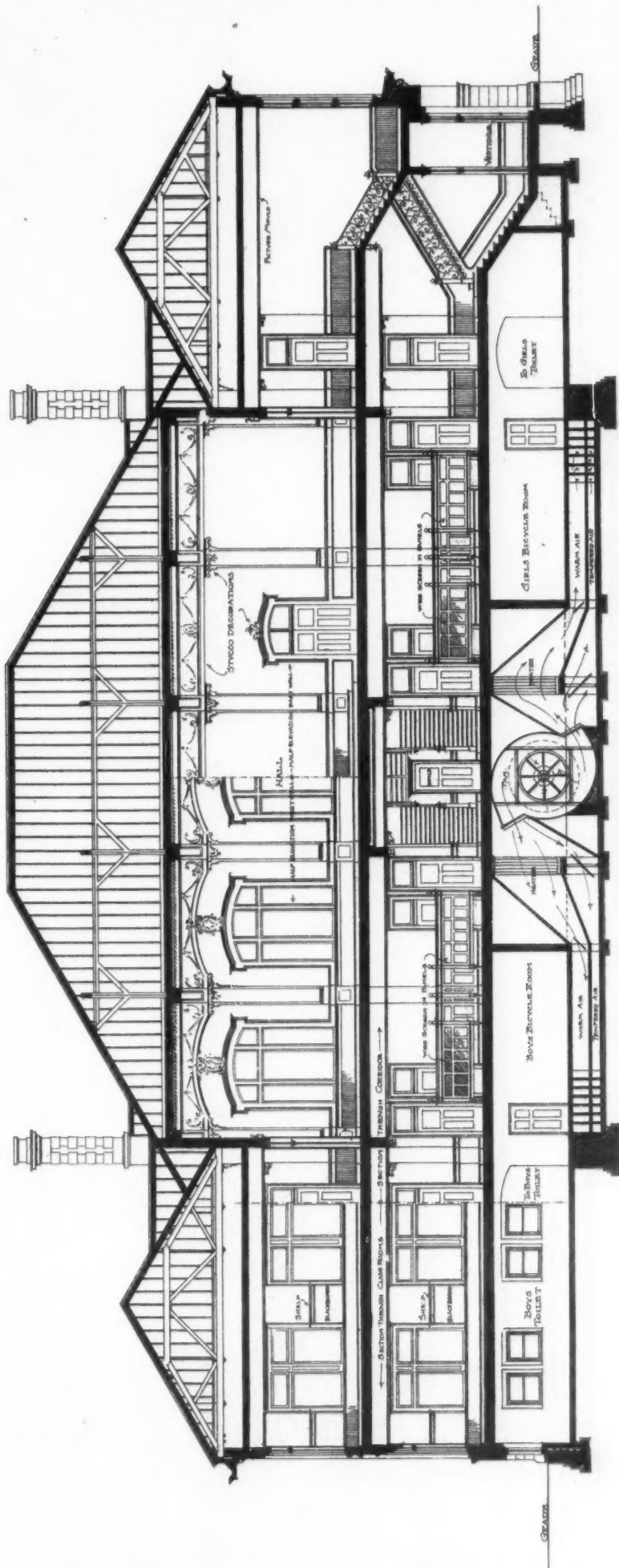
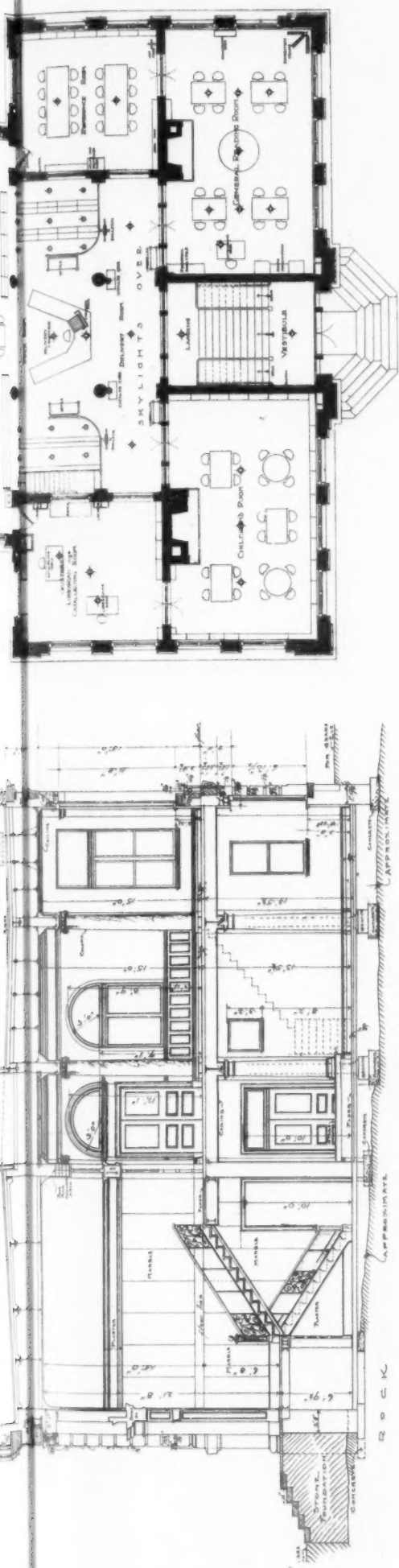
The next important requirement in a house-pump is that it shall not require expert attendance. These pumps when once properly set up have no parts that need adjusting, and the only attention that they require is to see that the commutator of the motor is kept clean and that the motor and pump are thoroughly oiled. The pump and motor both have self-oiling bearings and large oil receptacles, but for abundant caution it is well to examine them both thoroughly every day and give them the little attention that they require.

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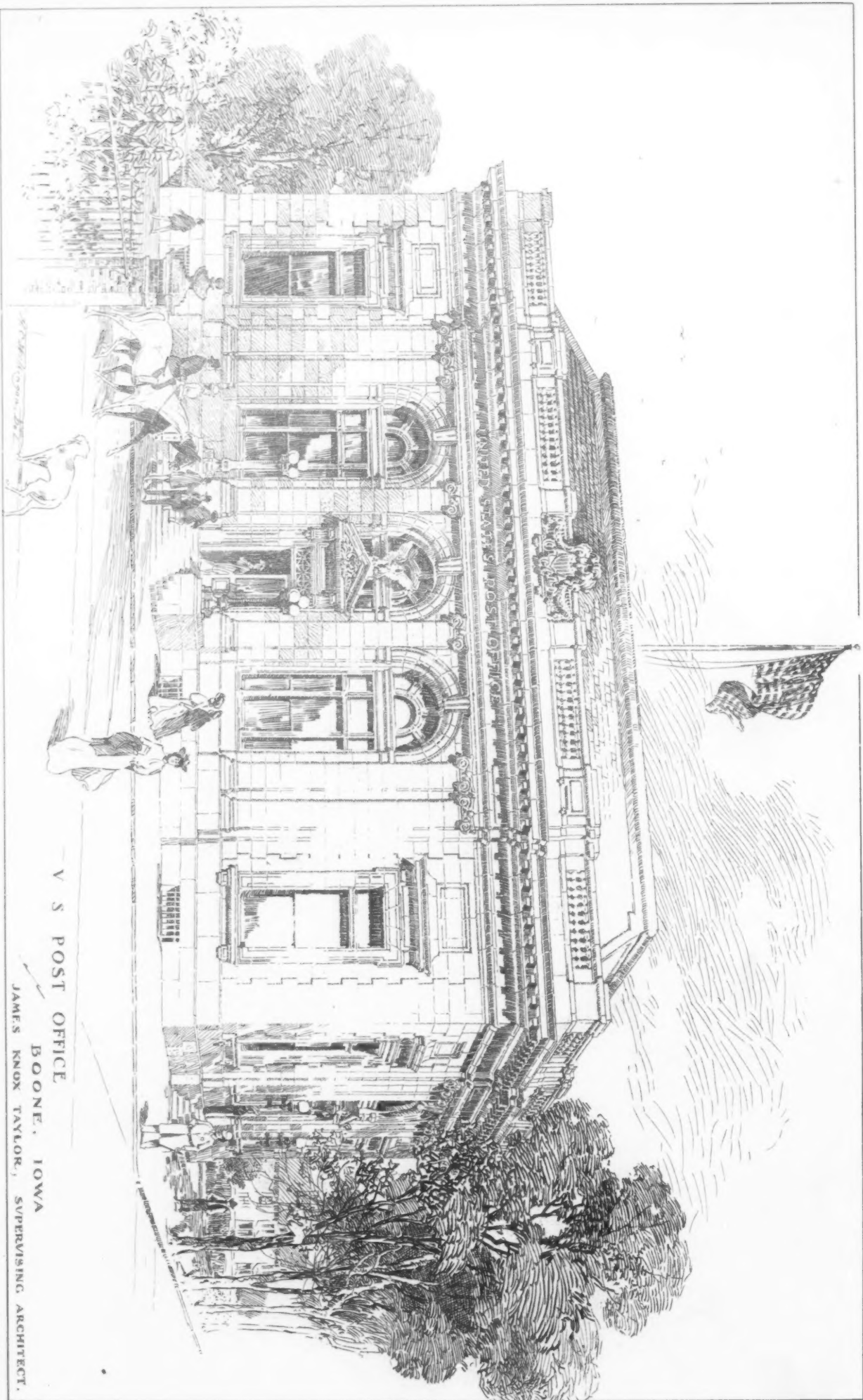




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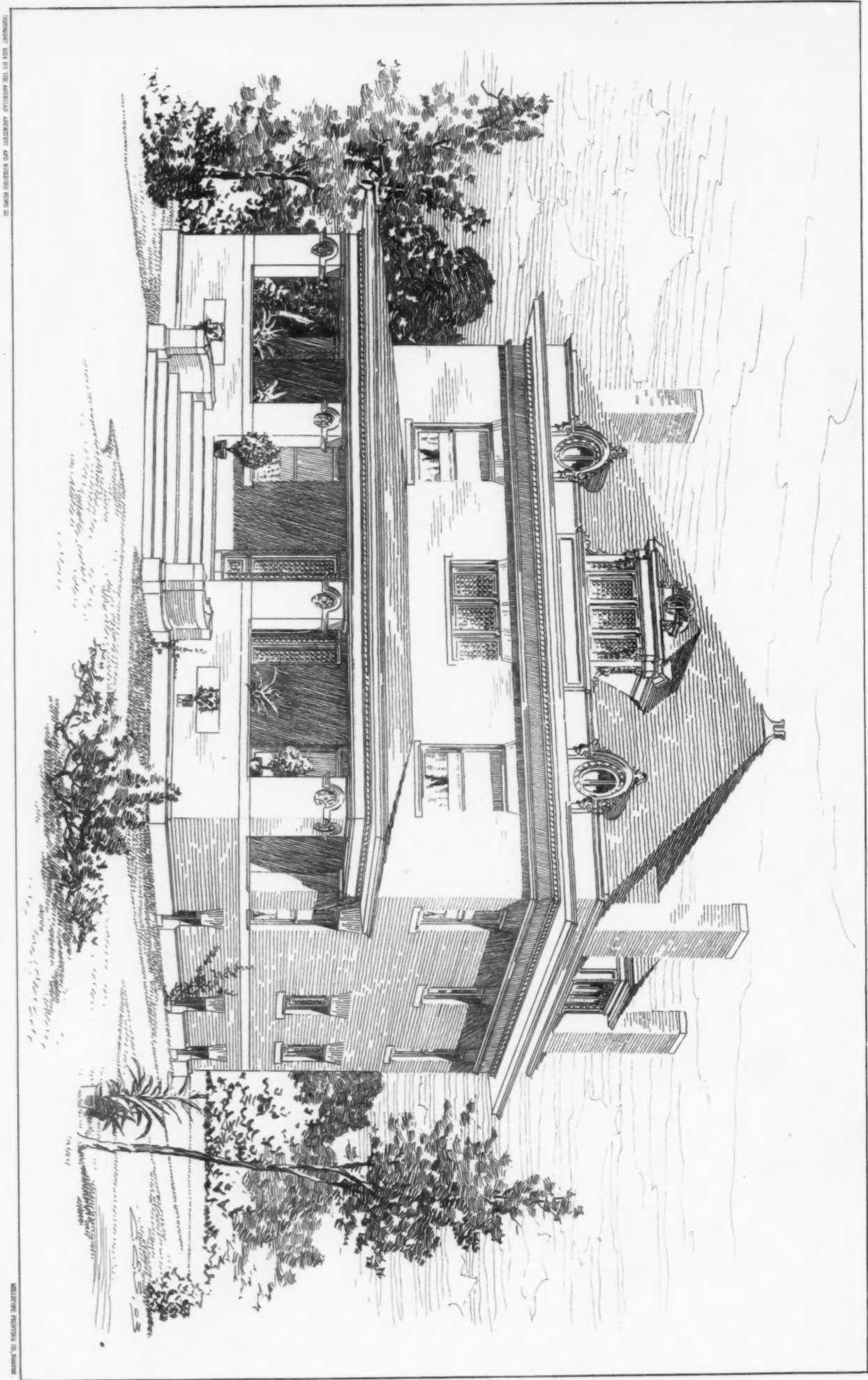
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FIG. 1.—St. Sophia at sunset, with light streaming through the Dome. (Appearance of the Mosque towards 1455, at the completion of the Minaret erected by Mohammed II.)

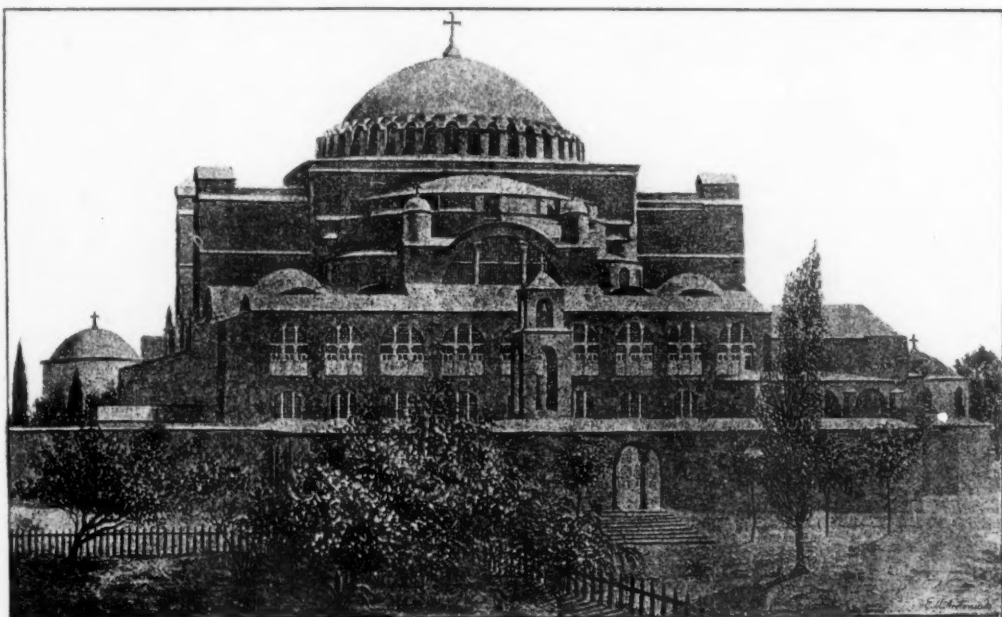


FIG. 2.—The West Front of St. Sophia, towards 870 A.D.

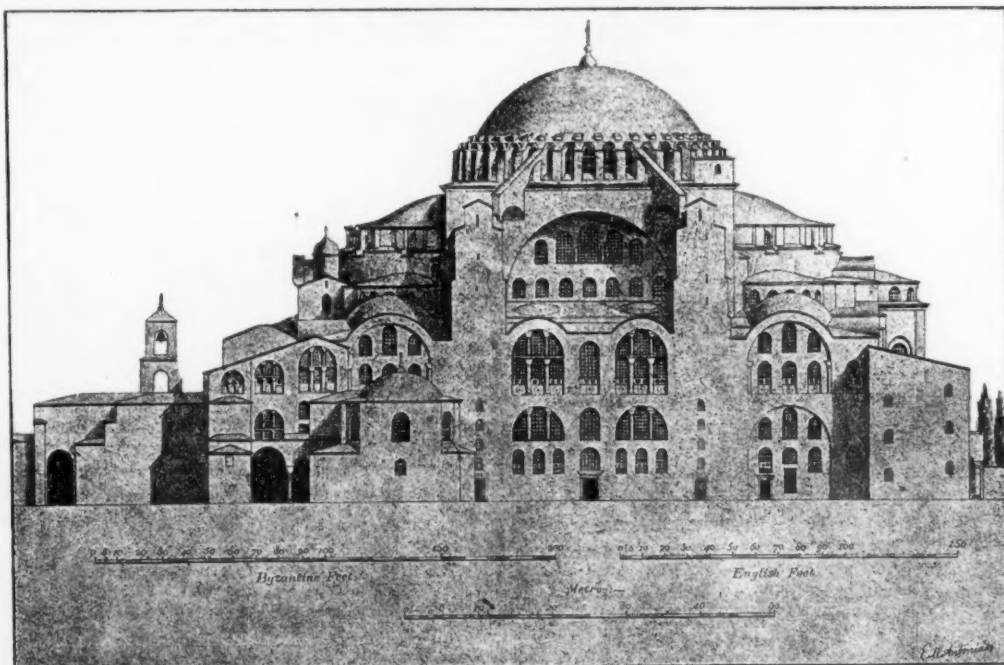


FIG. 3.—The South Elevation of the Great Church. Epoch: 1300 A.D.



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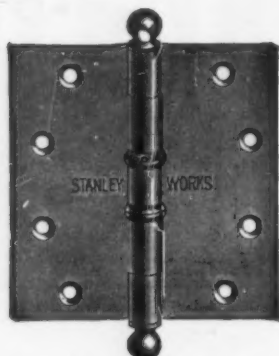
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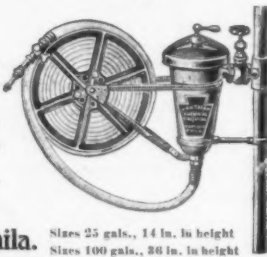
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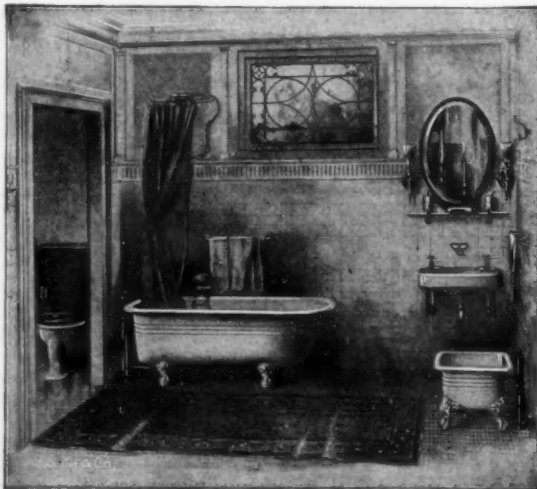
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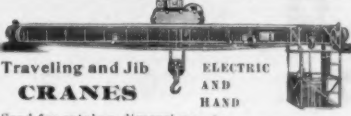
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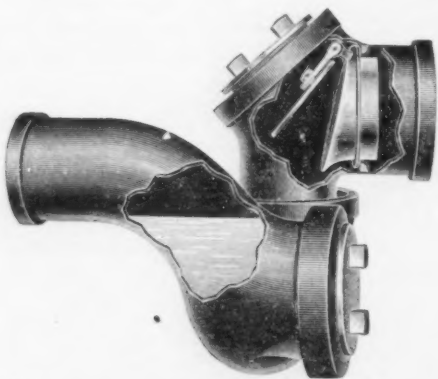
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A principal contractor is under obligation to treat upon an equal basis all estimates which he "receives" prior to putting in his own bid. Estimates must be considered as "received" when they come into a principal contractor's possession, either by his direct solicitation or by being accepted by him. The opening of a bid, knowing it to be such, constitutes receipt of the same.

A principal contractor is under no obligation to use a bid which he has not solicited, accepted, or received, but if he does not wish to use the estimate of a sub-bidder he should decline it, if proffered personally, or should return it unopened if sent to him by mail or otherwise. The retention of a bid should be construed as a receipt of the same.

A principal contractor, when making up his estimate, is not entitled to receive bids from sub-contractors if he is at the same time making himself their competitor by figuring their portion of the contemplated work. It is legitimate for a principal contractor to figure all portions of work, depending upon no one for what are usually known as sub-estimates, but it is not legitimate for him to receive bids from others for sub-work if he is himself figuring those portions independently.

ARTICLE II.

Award of Sub-Contracts.

The principal contractor having been awarded a general contract should immediately award the sub-contracts to the lowest bidder in each branch.

ARTICLE III.

Penalty for not Awarding Contract to Lowest Sub-Bidder.

A principal contractor failing to award a sub-contract to the lowest sub-bidder to whom he is under obligation as previously provided should be liable to pay damages to the said lowest bidder, in amount not less than ten per cent of the amount of the estimate.

Payment of such damages will not relieve the principal contractor from liability to discipline under provisions of Article X of the By-Laws of this Association.

ARTICLE V.

Payments to Sub-Contractors.

Unless the contracts made with sub-contractors otherwise provide, payments during the progress of the work should be made by the principal contractor to the sub-contractors upon the same basis of payment, in relation to amount of work performed, as is prescribed in the contract made by the principal contractor with the owner.

Final payment to a sub-contractor should be considered as due at the expiration of thirty days after the completion of his work and its approval by the architect or owner, unless otherwise provided by the sub-contract or agreement.

ARTICLE VII.

Obligation of Sub-Contractor to Principal Contractor.

Should a sub-contractor refuse to contract at the amount of the estimate he has given to a principal contractor who has used the said estimate in good faith, he then should be liable to the said principal contractor for damages in amount not less than the difference between the amount of the estimate which was submitted by him and the amount at which the principal contractor may be obliged to contract the work.

Payment of such damages will not relieve the sub-contractor from liability to discipline under provisions of Article X of the By-Laws of this Association.

ARTICLE X.

Bids to Architects or Owners.

When bids for separate departments of work on a building are solicited by the architect or the owner, they should be submitted with the understanding that they are direct estimates, for which direct contracts are to be made by the owner with the lowest bidder, and no other disposition of such bids should be permitted without consent of the bidder submitting the same.

Sub-bids should be given only to the principal contractors who are estimating the work in question, and should not be left with architects or owners for the inspection and information of principal contractors. Sub-contractors must understand that bids thus left with architects or owners are in great danger of losing their confidential character, and that if they so leave them they cannot claim protection or redress under the first article of this Code.

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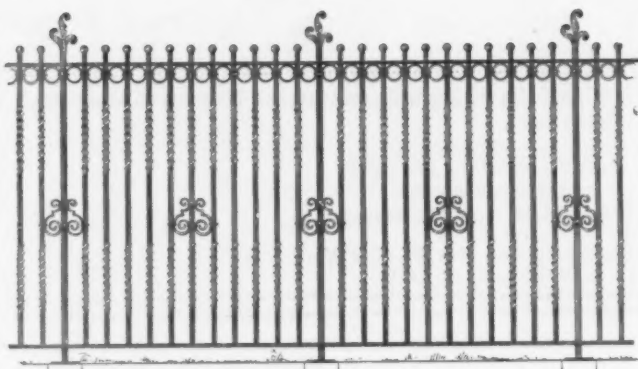
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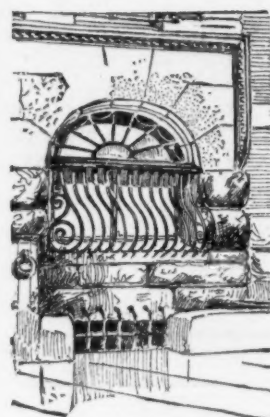
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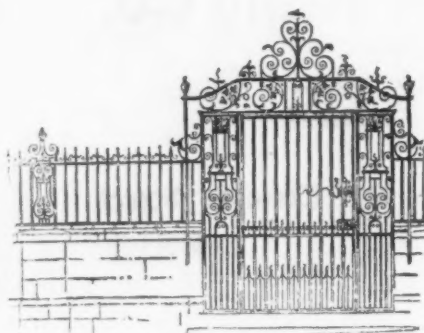
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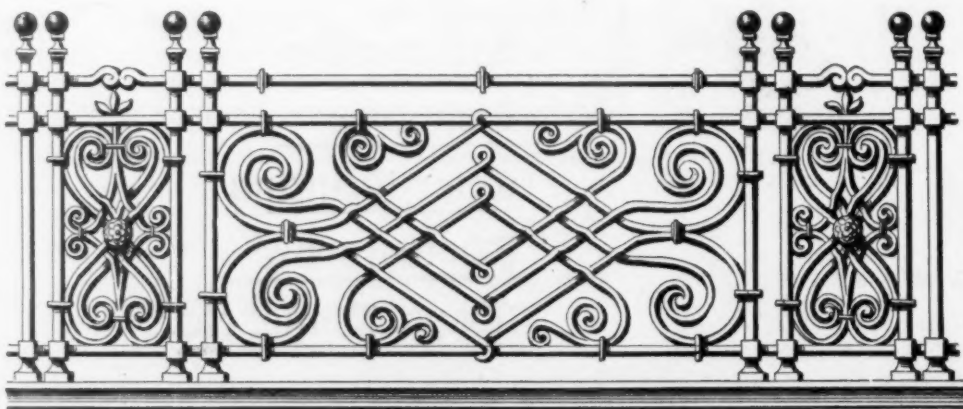


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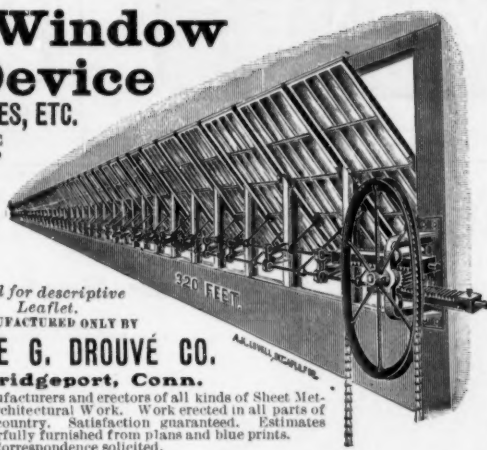


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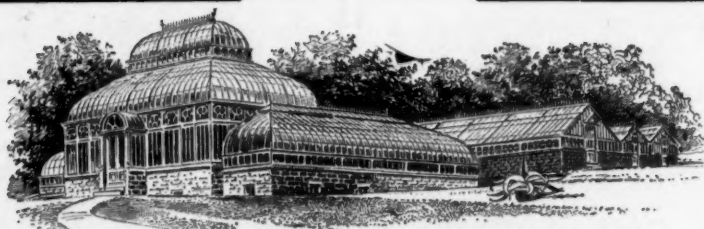
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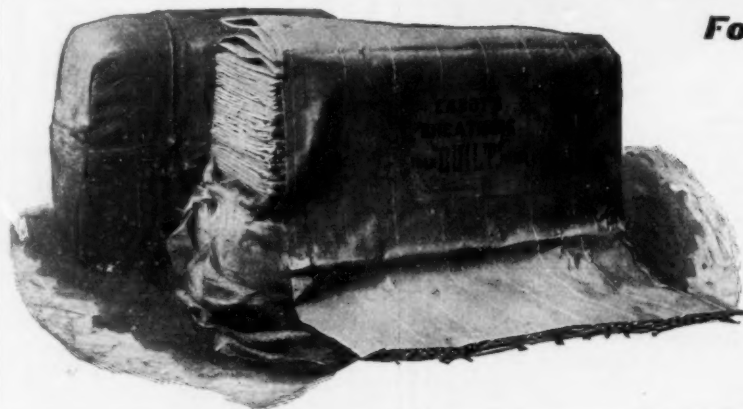


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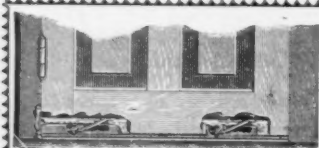
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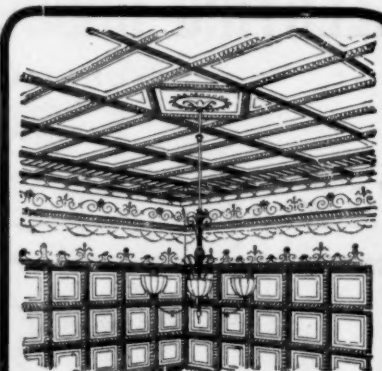
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THE KEASBEY & MATTISON CO., the owners of the patents for magnesia covering, have commenced a suit in the United States Circuit Court for the Southern District of New York against the Philip Carey Mfg. Co., George D. Crabbs, J. E. Breese, Schoellkopf, Hartford & Hanna Co., J. F. Schoellkopf, Jr., James Hartford, W. W. Hanna, C. P. Hugo Schoellkopf and Jesse W. Starr, to restrain the defendants from making and selling magnesia covering for boilers and steam pipes containing more than 50 per cent of magnesia, and especially coverings containing 85 per cent magnesia.

The Bill prays for a preliminary writ of injunction, to be continued during the pendency of the suit, and upon the final determination thereof to be made perpetual, and also demands an accounting and damages.

☞ All persons are respectfully requested to refrain from purchasing covering infringing these patents, as such purchasing must of necessity lead to suit. ☞

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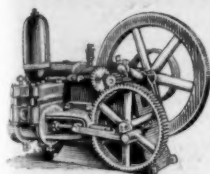
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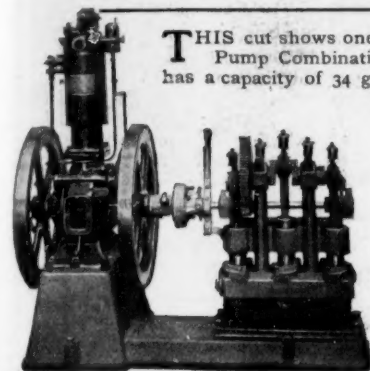
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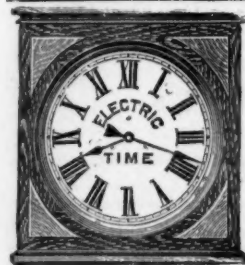


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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

be erected on Prospect St. near the New Centre, by a syndicate of local capitalists, at a cost of \$700,000, are being prepared by Architect F. C. Bate, 401 New England Building.

Edwardsville, Ill.—Madison County will erect a new court-house at a cost of \$85,000. A new jail building to cost \$25,000 will also be erected.

Eldora, Ia.—Mr. F. White has the contract for the new building at the State Industrial School, at \$25,500.

Fort Dodge, Ia.—It is reported that the Barbor Asphalt Co. will erect at once a \$50,000 plant here.

Franklin, La.—Plans for the \$110,000 court-house for St. Mary's parish have been prepared by Architect Stevens. Address R. E. Milling, chairman of committee.

Fresno, Cal.—Architects Bliss & Fayville, Crocker Building, San Francisco, have made plans for a \$150,000 four-story building to be erected at Tulare and J Sts. Captain W. A. Neville and Col. William Forsythe are interested.

Hough's Neck, Mass.—A two-story frame addition to the club-house of the Quincy Yacht Club has been planned by O. M. Higgins.

Howell, Ind.—The Louisville & Nashville Railroad Co. will construct a round-house at this place at an approximate cost of \$100,000, including machinery. R. Montfort, Louisville, Ky., chief engineer.

Indianapolis, Ind.—Thos. A. Winterrood has completed plans for the Garfield Park engine-house. Bids will soon be asked for its construction.

Johnson City, Tenn.—Managers of the Soldiers' Home have decided to enlarge the home by the erection of twenty additional buildings.

Langdon, N. D.—The Catholic Society will erect a brick and stone church, 57' x 117', from plans by E. J. Donohue, of St. Paul; cost, \$20,000.

Lincoln, Neb.—The Rumley Threshing Machine Co. will probably erect a \$50,000 warehouse.

Marquette, Mich.—St. Peter's parish will erect a new girls' parochial school to cost \$20,000. Plans will be secured at once.

McKeesport, Pa.—Dr. Jos. B. Clifford, president

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

of the McKeesport Board of Health, has purchased a site on 5th Ave., and will erect a new hospital building. Cost, \$200,000.

The St. Peter's Roman Catholic congregation will erect a new \$150,000 church, convent and school.

Melrose, Mass.—Work on the new station on the Western Division of the B. & M. Railroad will begin very soon. Land has just been purchased by the railroad at Melrose Highlands, and the structure will cost about \$30,000.

Menominee, Mich.—Augustus Spies has purchased property on which he will erect a public library to be donated to the city. It is probable the building will be constructed this spring.

Milwaukee, Wis.—Mrs. Helena Penshorn has let contracts for a building containing eight flats on Milwaukee St., near Juneau Ave., 45' x 78'. Cost, \$30,000.

Thomas P. Fitzsimmons will erect a flat building, 50' x 72', containing eight apartments, on 14th St., near Grand Ave. Leenhouts & Guthrie, architects. Cost, \$25,000.

A \$35,000 school-building will be erected in accordance with plans by Architects Van Ryn & De Gelcke, 211 Grand Ave.

The Milwaukee Downer College will erect a dormitory after plans by Howland Russel.

Minneapolis, Minn.—Harry W. Jones, architect, is preparing plans and specifications for a mausoleum to be erected at Lakewood Cemetery for Brooks Bros. It will be a handsome and very substantial building of large cut granite, the roof itself of one piece with heavy cut and polished granite columns, white marble interior finish, heavy iron and ornamental brasswork. Cost complete, \$25,000.

E. S. Stebbins is at work on plans for an eight-room brick addition to be made to the Whittier school building on 26th St. and Blaisdell Ave. It will be in general conformity with the present building. Cost, \$30,000.

Mitchell, Ind.—Work will shortly be commenced on a new \$600,000 plant for the Lehigh Portland Cement Co.

Moline, Ill.—It is stated the Rock Island has let



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

contracts for a locomotive plant here, to cost \$300,000. There will be twenty buildings.

Moosehead Lake, Me.—It is reported that C. L. Greenleaf, a Boston architect, has been here in the interests of a company which has been formed for the purpose of erecting a large hotel there this spring, to cost \$300,000.

New Bedford, Mass.—Foundations are being put in for a new one and one-half story club house, 60' x 100', to be erected for the Country Club of North Dartmouth. It will be constructed of wood, and will cost \$10,000.

New York, N. Y.—W. K. Aston, President of the Santos Co., has purchased, as the site of a seven-story office-building, the southeast corner of Pine and Front Sts. On May 1 the company will begin the work of construction.

Oceanic, N. J.—Rossiter & Wright, 95 Liberty St., New York City, have drawn plans for a \$175,000 twelve-story store and loft building for the Pannly estate. It will have gravel roofing, metal lathing, tile and marble work, plate and wired glass, electric wiring and steam heat.

Omaha, Neb.—The Val Blatz Brewing Co. will erect a \$60,000 building to include cold-storage warehouse.

The Methodist Hospital Association has raised \$40,000 for the erection of a hospital at 36th and Cuming Sts.

Pittsburgh, Pa.—A \$1,200,000 fifteen-story building, 84' x 88', will be erected by N. Holmes & Sons, Wood St. and 4th Ave., as soon as their present lease expires. It will be of steel construction and will have fireproofing, electric fixtures, plate glass, etc.

Sandusky, O.—Plans for the erection of a church for the Baptist congregation have been prepared by Architect Oliver W. Marble. Cost, \$25,000.

Sault Ste. Marie, Mich.—It is reported that the American Soo Pulp & Paper Co. will erect an immense plant here to cost \$3,000,000. There will be buildings, 200' x 1,000'. The power building will be 92' x 398'.

Seattle, Wash.—Dan Carmody will erect a six-story hotel building on 3d Ave. and Marion St., to cost \$200,000.

Stenbenville, O.—Plans for a \$150,000 seven-story brick and store bank building for the National Exchange Bank have been prepared by Architects Mowbray & Uffinger, 92 Liberty St., New York City.

St. Louis, Mo.—The property of the old St. Joseph's orphan home, at 16th St. and Clark Ave., has passed into the hands of a syndicate which will build a large cracker factory on the lot.

The Frisco Building Co. will erect a building at the southwest corner of 9th and Olive Sts. It is estimated to cost \$550,000.

A lot on the north side of Washington Boulevard, near Euclid Ave., has passed from the Wilson heirs to a Chicago client, who will improve with an elegant three-story brick structure costing \$40,000. The building will have all modern improvements in the way of plumbing, heating, etc. It is expected to be completed about September 1.

The Schwarzhild & Sulzberger Packing Co. will soon begin the erection of two large wholesale meat market buildings, one at Broadway and Montgomery St. and the other at 21st and Poplar Sts., to cost \$100,000.

The Star Building Co. has secured a permit for the erection of a building at the corner of 12th and Olive Sts.; cost, \$350,000.

ALTERATIONS AND ADDITIONS.

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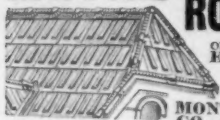
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New York, N. Y.—E. Fourth St., Nos. 155-157, six-sty bk. flat-house with stores, 50' x 83' 2"; \$45,000; o., L. Michelson; a., Horenburger & Straub.

FACTORIES.

Chicago, Ill.—Flournoy St., Nos. 380-388, four-sty bk. factory, 58' x 125', gravel roof; \$35,000; o., W. A. Jones; a., Thos. H. Mullay, 1601 Monadnock Block.

HOUSES.

Chicago, Ill.—Wabash Ave., No. 4909, two-sty bk. dwell., 23' x 42'; \$5,000; o., C. Naylor; b., W. S. Joslyn & Co., 803, 115 Dearborn St.

Farmell Ave., No. 1355, two-sty fr. dwell., 34' x 40'; \$6,000; o., A. J. Durand; a., J. A. Miller, 617, 59 Clark St.; b., H. G. Gilbert, 232 Lunt Ave.

Milwaukee, Wis.—Grand Ave., nr. 25th St., two-sty bk. dwell., 36' x 55', shingle roof, hot water; \$6,000; a., Fred Graf.

Minneapolis, Minn.—Clinton Ave., nr. 24th St., two-sty fr. dwell., 27' x 44', furnace; \$4,000; o., G. N. Hankins; a., Ernest C. Haley.

Twenty-seventh St. and Humboldt Ave., two-sty bk. & st. dwell.; \$5,000; o., C. H. Linsey; a., Kinney & Detweiler.

New York, N. Y.—Elm Pl., nr. Kingsbridge Road, two-sty & attic fr. dwell., 20' x 35'; \$6,000; o., Lisk & Roach; a., W. C. Dickerson.

Marion Ave., nr. Southern Boulevard, two-sty & attic bk. dwell., 35' x 40'; \$7,500; o., Caroline Gareise; a., The Bronx Architectural Co.

St. Paul, Minn.—Goodrich Ave., nr. Victoria St., two-sty fr. dwell., 28' x 36', hot water; \$5,500; o., O. S. Perfect; a., Louis Lockwood.

St. Peter, Minn.—Two-sty fr. dwell., 35' x 45', hot water; \$5,000; o., Chas. Carpenter; a., Fremont D. Orff.

STABLES.

Eacine, Wis.—Two-sty Spanish stable, 56' x 145'; \$20,000; o., Frank K. Bull; a., Guilbert & Rugh.

TENEMENT-HOUSES.

New York, N. Y.—Prospect Ave., nr. Macy Pl., 2 five-sty bk. tenements, 37' 6" x 99'; \$60,000; o., McCarthy & Macy, 1025 E. 162d St.; a., Bronx Architectural Co., 3307 Third Ave.

Fifteenth St., nr. 9th Ave., six-sty bk. tenement, 50' x 67'; \$52,000; o., Chaataqua Pl. Mill Co., 129 Fourth Ave.; a., G. Robinson & Son, 39 Hancock Pl.

Eldridge St., nr. Stanton St., six-sty bk. tenement & stores, 49' 6" x 87' x 87' 8"; \$45,000; o., Leon Spielberger, 76 St. Marks Pl.; a., Sass & Smallhaer, 23 Park Row.

One Hundred and Sixth St., nr. Columbus Ave., six-sty bk. tenement, 73' 9" x 87' 11"; \$109,000; o., John McGovern, 81 W. 103d St.; a., Moore & Landeidel, 148th St. & 3d Ave.

Fourth St., nr. Avenue B, 2 six-sty bk. tenements & stores, 48' x 83'; \$89,000; o., Perelman & Fish, 741 E. 5th St.; a., Horenburger & Straub, 122 Bowery.

E. Fifty-third St., Nos. 226-228, six-sty bk. tenement, 40' x 87' 5"; \$42,000; o., Abraham Silverman, Germania Bank Building; a., G. F. Pelham, 503 Fifth Ave.



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(Tenement-Houses Continued.)

One Hundred and Nineteenth St., nr. Lenox Ave., six-sty bk. tenement, 50' x 87' 11", plastic slate roof; \$60,000; o., Isaac and Hy. Mayer, 109 W. 119th St.; a., John Hauser, 1961 Seventh Ave.

One Hundred and Forty-first St., nr. Willis Ave., 6 five-sty & base, bk. tenements, 37' 6" x 88'; \$150,000; o., Gaines Roberts Co., 699 E. 140th St.; a., G. Fred Pelham, 503 Fifth Ave.

Prospect Ave., nr. Westchester Ave., 2 five-sty bk. tenements, 40' x 84', tin or plastic slate roof; \$70,000; o., John McGrath, 1793 Anthony Ave.; a., James F. Meehan, 1796 Anthony Ave.

Seventh St., Nos. 208-214, 2 six-sty bk. tenements & stores, 50' x 77'; \$90,000; o. & b., Horowitz Realty Co., 67 Seventh St.; a., G. F. Pelham, 503 Fifth Ave.

WAREHOUSES.

New York, N. Y.—Broadway, No. 658, twelve-sty bk. & st. loft & store building, 29' 6" x 130', tar & gravel roof; \$175,000; o., Pannly Estate, Oceanic, N. J.; a., Rossiter & Wright, 95 Liberty St.

St. Paul, Minn.—Fourth St., bet. Rosabel St. & Broadway, six-sty bk. & st. warehouse, 145' x 145', pitch & gravel roof, steam; \$175,000; o., Gordon & Ferguson; a., J. W. Stevens.

MISCELLANEOUS.

Fargo, N. D.—Three-sty bk. chemical laboratory, 100' x 100', steam; \$30,000; o., State; a., M. E. Beebe.

Minneapolis, Minn.—Garfield Ave., one-sty bk. & st. boiler-house, 137' x 269'; \$100,000; o., Northwestern Steam Boiler Mfg. Co., Duluth; a., C. A. P. Turner, 816 Phoenix Block.

New York, N. Y.—One Hundred and Fourteenth St., nr. Madison Ave., three-sty bk. & st. engine-house, 50' x 76' 2", slag roof; \$65,000; o., City of N. Y.; a., Percy Griffin, 244 Fifth Ave.

St. Paul, Minn.—Two-sty bk. & st. building, 125' x 150', gravel roof; \$20,000; o., Anheuser-Busch Brewing Co., St. Louis, Mo.

PROPOSALS.

SCHOOL.

Hans Nelson, president, will receive bids until April 14 for the erection of a school-house. 1423

(At Carder, N. D.)

PROPOSALS.

WATER-PIPES, ETC.

[At Falmouth, Mass.] The town of Falmouth, Mass., will receive proposals for laying cast-iron water-pipes, setting hydrants, gates and gate-boxes, etc., for extension of the water-mains of about 5½ miles, until April 10, 1903. Specifications and blank forms of proposal can be obtained by intending bidders upon application to the engineer at 101 Tremont St., Boston, Mass. JOHN H. CROCKER, JAMES T. WALKER, M. D., GEORGE E. DEAN, Water Commissioners. Louis E. Hawes, engineer, Falmouth, Mass. 1423

BRIDGE.

[At Salem, Mass.] Proposals will be received by the committee on Jefferson Avenue bridge, Salem, Mass., for building a steel bridge over the tracks of the Boston & Maine R. R. at Jefferson Ave., to conform to a general plan which will be furnished by said committee. Bids are to include all the necessary steel work placed in proper position, complete for receiving the wooden floor stringers, and will be received by said committee until April 10, 1903. C. H. DANFORTH, Clerk of Committee. 1423

Treasury Department, Office of the Supervising Architect, Washington, D. C., March 26, 1903. Notice is hereby given that the time for opening the bids for the completion of the U. S. Post-office building at Richmond, Kentucky, has been extended from April 8, 1903, to 3 o'clock P. M. April 27, 1903. JAMES KNOX TAYLOR, Supervising Architect. 1423

Treasury Department, Office of the Supervising Architect, March 26, 1903. Notice is hereby given that the time for opening the bids for the construction of the extension to the U. S. Post-office at Kalamazoo, Mich., has been extended from April 9, 1903, to 3 o'clock P. M. April 30, 1903. JAMES KNOX TAYLOR, Supervising Architect. 1423

Treasury Department, Office of the Supervising Architect, Washington, D. C., March 26th, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 4th day of May, 1903, and then opened, for the construction (including plumbing, electric wiring and conduits) of the extension of the U. S. Custom-house, Court-house and Post-office at Memphis, Tenn., in accordance with drawings and specification, copies of which may be had at this office or at the office of the Custodian at Memphis, Tenn., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1423

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PROPOSALS.

ADDITION TO DORMITORY.

[At Springfield, S. D.]

The Indian department, Washington, D. C., will receive bids until April 21 for addition to dormitory, construction of laundry, water and sewer systems, moving and refitting buildings at the Indian School at Springfield, S. D. 1424

CHURCH.

[At Lesterville, S. D.]

J. J. Wagner, chairman, has plans and will receive bids until April 25 for the erection of a church for the Catholic Society. Bids are asked for the material and labor, finishing and painting; also for all labor, constructing, finishing and painting. 1424

WHARF.

[At Fort Dade, Fla.]

Sealed proposals will be received until April 21, 1903, for constructing wharf here. Information furnished on application. ROBT S. WELSH, Q. M. 1424

SCHOOL.

[At Chokio, Minn.]

The undersigned hereby gives notice that sealed proposals for the erection of a school-building, including the heating and ventilation, will be received by J. C. Blaisdell, clerk School Board, Chokio, Minn., until the 28th day of April, 1903. All bids must be in strict accordance with the plans and specifications, prepared by Fremont D. Orff, architect, of Minneapolis, Minn., which may be seen at the office of the clerk of the School Board on and after April 14, 1903, and may also be seen on application to the architect, 615 Lumber Exchange, Minneapolis, the Builders' Exchange, Minneapolis, and the Builders' Exchange, St. Paul. J. C. BLAISDELL, Clerk. 1424

JAIL AND SHERIFF'S RESIDENCE.

[At Greatbend, Kan.]

The commissioners of Barton County will receive bids until April 21 for the construction of a jail building and sheriff's residence after plans by J. G. Holland & Squires, Topeka, Kan. F. M. LUTSCHG, county clerk. 1424

PORTLAND CEMENT, ETC.

[At Boston, Mass.]

U. S. Engineer Office, Winthrop Building, Boston, Mass. Sealed proposals for furnishing Portland cement, sand and broken stone will be received here until April 25, 1903. Information furnished on application. HARRY TAYLOR, Capt., Engrs. 1424

GATES, ETC.

[At Nashville, Tenn.]

U. S. Engineer Office, Nashville, Tenn. Sealed proposals for construction, delivery, etc., of 4 pairs steel lock gates, filling valves, etc., for locks A and No. 1 Cumberland River, will be received here until April 24, 1903. Information furnished on application. M. B. ADAMS, Lieut. Col., Engrs. 1423

WHARF.

[At Great Diamond Island, Me.]

Office of the Constructing Quartermaster, 185 Middle St., Portland, Me. Sealed proposals for furnishing all labor and material in the construction of a steel or stone wharf at Fort McKinley, Great Diamond Island, Me., will be received at this office until April 13, 1903. Information, specifications, plans and blanks on application. CAPT. A. W. YATES, Quartermaster, U. S. A. 1423

HOSPITAL.

[At Fort Greble, R. I.]

Office Constructing Quartermaster, 209 Thames St., Newport, R. I. Sealed proposals will be received here until April 15, 1903, for constructing, plumbing, heating and wiring 12-bed hospital, Fort Greble, R. I. Proposals invited for both brick and frame structures. Information furnished on application. CAPT. THOMAS H. SLAVENS, Qr. Mr. 1423

PAPER PULP PLANT.

[At Seven Islands, Que.]

Proposals will be received at the office of George F. Hardy, architect and engineer, 309 Broadway, New York City, for furnishing material and labor required for the construction of a plant for the manufacture of paper pulp at Seven Islands, Que., for the North Shore Power Railway & Navigation Co. Full information may be obtained upon application at the above office or at the Company's office, No. 7 W. 22d St., New York. 1423



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PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., March 28, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 5th day of May, 1903, and then opened, for the construction (except heating apparatus) of the extension to the U. S. Court-house, Post-office, etc., at Greensboro, North Carolina, in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Custodian at Greensboro, North Carolina, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1424

PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., March 31, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 6th day of May, 1903, and then opened, for the construction (except heating apparatus and electric wiring and conduits) of the U. S. Post-office at Norwich, Connecticut, in accordance with the drawings and specification, copies of which may be had at this office, or the office of the Postmaster at Norwich, Conn., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1424



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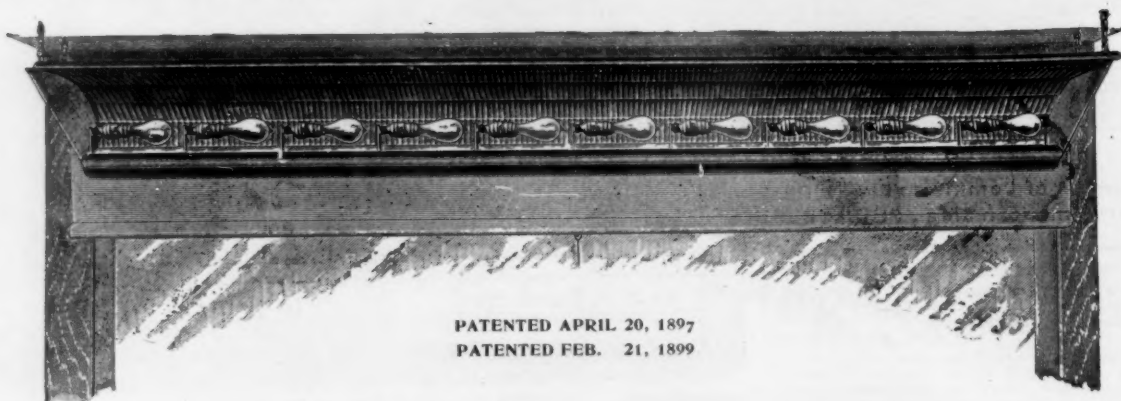
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PROPOSALS.

BUILDING MATERIAL.

[At Pineridge, S. D.]
Bids are wanted April 15 for furnishing and delivering a quantity of building material at the Pineridge Agency. Address JOHN R. BRENNAN, U. S. Indian Agent. 1423

SCHOOL.

[At Reedsburg, Wis.]
The Board of Education of the City of Reedsburg, Wis., will receive sealed proposals for the erection of a brick school-house according to plans and specifications prepared by Omeyer & Thori, architects, St. Paul, until April 30, 1903. On and after April 1, 1903, a copy of said plans and specifications may be seen at the office of said clerk in Reedsburg, the Builders' Exchange, Chicago, the Builders' Exchange, Milwaukee, the German American Bank, La Crosse, and the office of Omeyer & Thori, St. Paul. At the same time and place mentioned above proposals will be received for the necessary plumbing of said building, subject to all the foregoing conditions. JOHN D. DEVOR, Clerk. J. H. HOSLER, President. 1423

COURT-HOUSE.

[At Corsicana, Tex.]
Bids are wanted April 15 for erecting a three-story brick and granite court-house in this city, to cost about \$130,000. J. E. Flanders, archt., Dallas. 1423

RIPRAP.

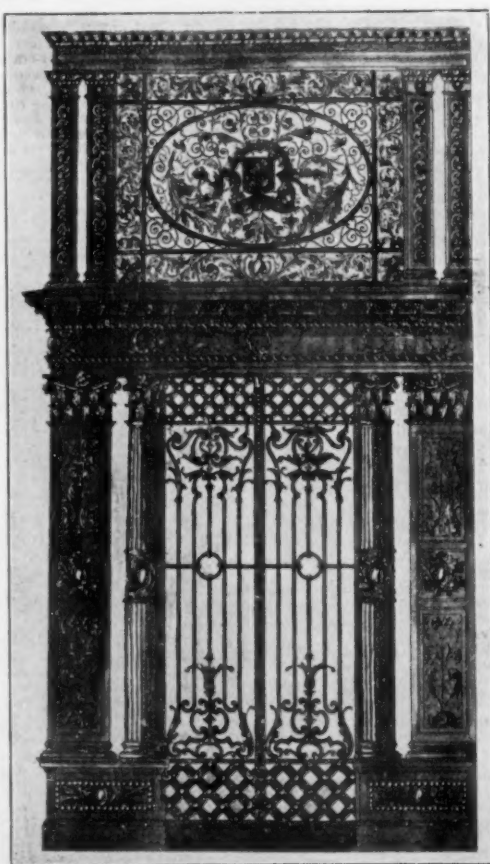
[At Occoquan Creek, Va.]
U. S. Engineer Office, 2001 I St., N. W., Washington, D. C. Sealed proposals for furnishing and placing riprap stone in dikes in Occoquan Creek, Va., will be received here until April 14, 1903. Information furnished on application. CHAS. J. ALLEN, Lt. Col., Engrs. 1423

PAVING BRICK.

[At Traverse City, Mich.]
Sealed proposals will be received at the City Clerk's office until April 15, 1903, for furnishing to the City of Traverse City, Mich., 8,800 square yards of paving brick and about 1,200 cubic yards of crushed stone. Specifications on file in the office of the City Clerk, Traverse City, Mich., and at the engineer's office at Bay City, Mich. Bloomfield & McCloy, engineers. CHAS. M. BEERS, City Clerk. 1423

CEMENT.

[At Marquette, Mich.]
U. S. Engineer Office, Duluth, Minn. Sealed proposals for furnishing 6,000 barrels Portland cement for concrete superstructure to breakwater at Marquette, Mich., will be received here until April 11, 1903. Information on application. D. D. GAILLARD, Capt., Engrs. 1423



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ADOPTED BY THE SOCIETY, FEBRUARY 1
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SECTION 1. No Member should enter into partnership, in any form or degree, with any builder, contractor, or manufacturer.

SECTION 2. A Member having any ownership in any building material, device or invention, proposed to be used on work for which he is architect, should inform his employer of the fact of such ownership.

SECTION 3. No Member should be a party to a building contract except as "owner."

SECTION 4. No Member should guarantee an estimate or contract by personal bond.

SECTION 5. It is unprofessional to offer drawings or other services "on approval" and without adequate pecuniary compensation.

SECTION 6. It is unprofessional to advertise in any other way than by a notice giving name, address, profession, and office hours, and special branch (if such) of practice.

SECTION 7. It is unprofessional to make alterations of a building designed by another architect, within ten years of its completion, without ascertaining that the owner refuses to employ the original designer, or, in event of the property having changed hands, without due notice to the said designer.

SECTION 8. It is unprofessional to attempt to supplant an architect after definite steps have been taken toward his employment.

SECTION 9. It is unprofessional for a Member to criticise in the public prints the professional conduct or work of another architect except over his own name or under the authority of a professional journal.

SECTION 10. It is unprofessional to furnish designs in competition for private work or for public work, unless for proper compensation, and unless a competent professional adviser is employed to draw up the "conditions" and assist in the award.

SECTION 11. No Member should submit drawings except as an original contributor in any duly instituted competition, or attempt to secure any work for which such a competition remains undecided.

SECTION 12. The American Institute of Architects' "schedule of charges" represents minimum rates for full, faithful and competent service. It is the duty of every architect to charge higher rates whenever the demand for his services will justify the increase, rather than to accept work to which he cannot give proper personal attention.

SECTION 13. No Member shall compete in amount of commission, or offer to work for less than another, in order to secure the work.

SECTION 14. It is unprofessional to enter into competition with or to consult with an architect who has been dishonorably expelled from the "Institute" or "Society."

SECTION 15. The assumption of the title of "Architect" should be held to mean that the bearer has the professional knowledge and natural ability needed for the proper invention, illustration and supervision of all building operations which he may undertake.

SECTION 16. A Member should so conduct his practice as to forward the cause of professional education and render all possible help to juniors, draughtsmen and students.

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ASPHALT ROOFING. Warren Chemical & Mfg. Co., N. Y.	COMPOSITION ORNAMENT. Lombard & Co., A. P., Boston.....	DRAUGHTSMAN. E. Eldon Deane, New York.....	FIREPROOFING. Associated Expanded Metal Co., New York
BLUE PRINTS. Makepeace, B. L., Boston.....	CONSERVATORIES. Lord & Burnham Co., Irvington-on-Hudson, N. Y.....	ELECTRICAL CONTRACTORS. Erickson Electric Equipment Co., Boston	National Fireproofing Co., Pittsburg, Pa.....
BRASS FINISHERS. Marble Co., W. P., Boston.....	CONTRACTING. Flynt Building & Construction Co., Palmer, Mass.....	ELECTRIC SIGNALS. Elevator Supply & Repair Co., New York	FIREPROOF LATHING. Haves, Geo., New York.....
BRICKS (Red Oxide). Wisconsin Graphite Co., Pittsb'g, Pa.	CONTRACTORS AND BUILDERS. McKay & Woolner, Boston.....	ELEVATORS (Foundry). Northern Engineering Works, Detroit, Mich.....	FIREPROOF SHUTTERS. Kinnear Mfg. Co., The, Columbus, O.
BRONZEWORX (Ornamental). Richey, Browns & Donald, Long Island City, N. Y.....	CORDAGE. Samson Cordage Works, Boston. (sow)	ELEVATOR SIGNALS. Hersing Telescope Co., New York.....	FLOOR POLISH. Butcher Polish Co., Boston.....
BUILDINGS TORN DOWN. Elston & Co., A. A., Boston.....	CRANES. Northern Engineering Works, Detroit, Mich.....	ENGINEERS. Jager Co., Charles J., Boston.....	FOUNDRY EQUIPMENT. Northern Engineering Works, Detroit, Mich.....
CAPITALS. Lombard & Co., A. P., Boston.....		ENGINES (Hot-Air). Rider-Errierson Engine Co., New York.	GATES. Wm R. Pitt, New York..... (mon)
			GRATES, ETC. Wm. H. Jackson & Co., New York...
			GREASE (Graphite). Wisconsin Graphite Co., Pittsb'g, Pa.