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SUMMARY:—

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A VERY interesting discussion has been going on in the New York *Evening Post* about American indifference to art. The *Evening Post* says, not without reason, that Americans look upon art with an intellectual, rather than an æsthetic eye, and it pleads for a greater appeal to the sense of beauty than is usual in our sculptured monuments, lamenting that our sculptors are obliged to spend their time in modelling the trousers and hats of their subjects, to meet the taste of their patrons, instead of endeavoring to charm spectators by some beautiful accessory. To artists and architects, familiar with the lovely and affecting French monuments, such as that to Regnault, in the School of Fine Arts, at Paris, or the Mau-passant monument, in the Parc Monceau, or scores of others, it certainly seems as if something might be done to relieve the dryness of such portrait sculpture as we see everywhere in New York, and Boston, and Washington; but we are not sure that it is the public taste alone which is responsible for the devotion of our portrait statues to pantaloons. On the contrary, the attempts of Mr. St. Gaudens to add ideal accessories to his portraits have been warmly applauded by the American public, which is, we venture to say, quite ready to receive with favor further efforts in the same direction. Moreover, it should not be forgotten that it is possible to idealize a very simple portrait, if the sculptor has within himself the material for such idealization. No living sculptor, for example, is more successful in what we may call ideal accessories than Mercié, yet Mercié, in his Lee monument at Richmond, has been able to make a simple portrait, without accessories, unless the horse on which the great general sits can be called an accessory, as noble and inspiring as if he had surrounded it with representations of all the gods of Olympus. The *Evening Post* says, with truth, that "it would do no harm if our sculptors were occasionally asked for something more specifically sculptural than a portrait statue," but it does not follow that a great artist cannot show his greatness in portrait statues. He may not be able to reach perfection in portraiture, without that personal acquaintance with his subject which sculptors rarely possess; but he can make a perfect portrait of his ideal of his subject, and in the nobility of his ideal, and the power with which he expresses it in his figure, he may reach the highest flights of art.

IT may be worth inquiring whether the transformation which is going on in our periodical literature does not indicate an approaching artistic movement. Undoubtedly, the transformation is due to the invention of cheap processes of photographic reproduction, but the question of its origin does not affect the fact that where our predecessors were content with printed descriptions of interesting objects, we are supplied with accurate photographic representations of them. Every murderer, every great banker, every distinguished beauty, every interesting scene, is displayed before our eyes in endless half-tone prints, which, while they have little pretension to be artistic, are, at least, truthful; and it is not impossible that

our habit of seeing accurate representations of all sorts of objects may be preparing us for a sense of that truthfulness which is the essence of art. Even now, the long necks and rosebud mouths of the idealized portraits of a hundred years ago look to us ridiculous in comparison with the actual human countenance as we see it drawn by the action of light on the pages of the daily newspapers; and the increase of our knowledge of the actual appearance of objects must make us more critical of artistic incapacity. Meanwhile, as if the publishers had observed a change in the public demand, the covers of magazines, and even the inside pages of Sunday newspapers, have begun to blaze with color. Undoubtedly, this is used, to a certain extent, to attract the eye of customers, unable to choose among the multitude of magazines offered for sale; but, even twenty years ago, a loud design in black and white would have been thought sufficient for a purpose for which the richest colors, combined with great skill, are now requisite. We are far from thinking that all the bright-colored magazine covers are artistically successful, but they are rapidly improving, and in them the coming generation is receiving a lesson which must have its effect sooner or later.

EVERY architect will regret the sudden death of Walter Cope, of Philadelphia, one of the most distinguished and popular members of the profession. It is something like twenty years since the firm of Cope & Stewardson came into note among architects all over the country for their beautiful and original work, as shown in the professional periodicals, and every year may be said to have added to their reputation. Some years ago, John Stewardson, the original Stewardson of the firm, was drowned while skating, to the deep regret of the community, as well as of the profession, but the firm name was continued, his brother taking his place, and has gained still more in note throughout the country. Mr. Cope was deeply interested in professional matters, and always ready to sacrifice himself in defence of the honor and rights of architects; and his loss will be felt among his brethren as that of a brave and wise defender of their interests, as well as of a beloved comrade.

MANY architects, particularly in Boston and New York, will hear with great regret of the death of Frederic Tudor, well known in the profession as an engineer for works of heating, ventilation and sanitation. Mr. Tudor belonged to an old and wealthy Boston family, and spent a considerable part of his boyhood abroad, returning from Paris to enter Harvard College. He was an earnest student of physics, and of science generally, and, on his graduation from college, entered immediately the service of the Boston and Maine Railroad, as a civil engineer. His health, even then, was delicate, and he found it necessary to give up a position in which he had already distinguished himself, and go back to Europe, where he interested himself in the movement for sanitation which was then at its height in England. On his return to this country, he undertook to put in practice the new ideas which he had received abroad, with improvements of his own, and, establishing himself as a consulting engineer in matters of heating, ventilation and drainage, he soon gained an extensive practice. Unfortunately for him, his enthusiasm for science led him to undertake contracts for work of the kind, in which, while he could better secure the execution of the work in the way in which he wanted it done, he was exposed to business hazards which he was hardly fitted by nature or experience to guard against, and, after some years of honorable effort, during which he introduced immense improvements, both in system and in detail, in the practice of heating and ventilation, he was forced into insolvency, with the loss of all his modest inherited fortune. He was, however, too valuable a man in his profession to be lost sight of, and his services as consulting engineer were soon in great demand. Under his advice, or from his designs, were installed the heating and ventilating system, to our mind unrivalled in the world, of the Metropolitan Opera House, in New York; the Pittsburgh Court House; the Boston Public Library; the Roxbury High School, and a great number of other buildings, public and private. He was, at the

same time, often called in consultation in regard to matters of drainage, upon which he was also an accomplished expert; and, in connection with his brother-in-law, he established a system of inspection and guaranty of plumbing and drainage which the profession has found of great service. Although he had suffered for many years from unmistakable pulmonary disease, his enthusiasm for his work kept him actively employed until within a few months, and it is said that even on his death-bed his mind was still busy with new inventions, which he was never to see carried out.

PROFESSOR GOODYEAR, of the Brooklyn Academy of Arts and Sciences, has been making an extremely interesting study of a Renaissance leaning façade, that of the church of S. Ambrogio, at Genoa, which was built in the latter part of the sixteenth century, probably about 1590, and shows, in the lower story of the front, an inclination forward of about eight inches, the story above being vertical. That the forward inclination was intentional is shown beyond question by the fact that the return pilasters show base-mouldings perfectly horizontal, which form an obtuse angle with the front edge of the pilaster, and an acute angle with the other edge. This observation of Professor Goodyear and his party, made in 1901, was subsequently confirmed by the official architect of the church, Signor De Andreis, who, it appeared, had noticed and measured the inclination ten years before, on the occasion of certain repairs and alterations.

THIS discovery is of peculiar value, as confirming the results of Professor Goodyear's study of the Cathedrals of Pisa and Ferrara, and the churches of S. Ambrogio, at Milan, S. Michele at Pavia, and Notre Dame at Paris, the fronts of all of which have the lower portion inclined forward, although, in most of them, the walls above are vertical. It is interesting, also, to learn that the lower tier of columns adorning the front of St. Mark's Church at Venice lean forward about three inches, in a height of something over nine feet, although the wall behind them is vertical, as are also the columns of the tier above; while the Porta della Carta, in the courtyard of the Palace of St. Mark, leans forward as a whole, the inclination being about eight inches. The Porta della Carta is a work of the early Renaissance, or, at least, of the Transition, so that this, with the much later front of S. Ambrogio at Genoa, indicates that the practice of curving or varying lines and surfaces to correct the effect of perspective, or to give certain artistic qualities, was not confined to the architects of the Middle Ages, but persisted, in a certain degree, far into the Renaissance period.

THE exact purpose of these variations from geometrical accuracy can only be conjectured. Undoubtedly, the practice of inclining forward the lower portion of the front of a building contributes to the peculiar advancing effect characteristic of many mediæval churches, but whether this effect was aimed at, or whether the walls were inclined for some other purpose, we cannot say. In the case of S. Ambrogio at Genoa, and of the Porta della Carta at Venice, it is probable that the inclination was given to allow the sculptured detail to be seen more fully, and with less change from foreshortening, just as the pinnacles and statues on the top of St. Mark's lean forward, the pinnacles overhanging more than six inches, and as friezes have been inclined forward, even down to our own time; but there is nothing in the lower portion of the front of Notre Dame, at Paris, which could be better seen in an inclined wall than in a vertical one, nor are the nine-foot columns of St. Mark's more favorably placed, in this respect, than they would be in a vertical position; so that we must, perhaps, conclude that the bulging effect was sought for its own sake, possibly as a correction of the flatness and dryness which the architects of the Middle Ages seem to have disliked so much.

THE State of Minnesota has a law under which any person or corporation owning bare, waste, sandy, rough or rocky lands, or denuded forest tracts, may convey such lands by deed to the State, for forestry purposes; and all lands so deeded are to be forever dedicated to forestry. The statute further provides that one-third of the revenue from such lands shall be divided between the State, county and town in which the forest is situated, in lieu of taxes, and the remaining two-thirds shall be paid to such public educational institution in the

State as the grantor may designate. Under this law the late Governor John S. Pillsbury very generously conveyed to the State a tract of a thousand acres of land, once covered with forest, which would have been available for grazing, and even for farming, but which was also particularly well adapted for the experimental forestry which the donor desired to aid in carrying out. This tract is now in charge of the State Forestry Board, and will, it is hoped, form the nucleus of an extensive and profitable public forest. There are many other States in which a law similar to that of Minnesota might prove very useful. Millions of acres in the Eastern States, particularly, are nothing but a burden to their owners, who cannot profitably cultivate them, and whose attempts to plant them with trees, if they are enterprising enough to make any such attempts, are hampered by the smallness of the area with which they have to deal, and the indifference of their neighbors. The owners of these lands are too proud to abandon them, and, in consequence, continue to pay taxes on them, year after year, without the smallest prospect of ever receiving any return. Under the Minnesota law, such owners could relieve themselves of this burden, at the same time that they gained credit for themselves, by conveying the useless land to the State, and, incidentally, might confer great benefits on their posterity, or, rather, on the community of which their posterity would form a part; and it is conceivable that, by reserving some of the more available land out of a large tract, the remainder of which was conveyed to the State, the value of the portion reserved might ultimately be so much enhanced by the vicinity of a productive and well-kept forest that the operation would be a profitable one to all concerned.

THE French professional journals inform us that the Count de Castellane has bought from its former proprietor, an enthusiastic antiquarian, the celebrated Château de Grignan, long associated with the name of Madame de Sévigné, who spent there the last years of her life, with her daughter, Madame de Grignan. The husband of the latter, after his appointment as Governor of Provence, was obliged to maintain a style of living too magnificent for his comparatively modest fortune, and many of the letters of Madame de Sévigné, who was much attached to the husband of her beautiful daughter, relate to the construction of the château, a part of which dated from the time of Francis I, while the more modern portion was built under Louis XIV, from the designs of Mansard. As M. de Grignan found himself unable to carry out the plans of Mansard from his own resources, his two brothers, the Bishop of Carcassonne and the Bishop Coadjutor of Arles, came to the rescue, and supplied the funds required for the completion of the work. Unfortunately for the comfort of the people who lived in the house, the construction of the new portion, the "Bishops' Wing," as it is still called, went on very slowly, partly from the irregularity of payments, but still more on account of the caprices of the two Bishops, who made continual changes in the plans, "like little girls," as Madame de Sévigné says, who embroider on canvas, and "immediately pull out what they have done"; and the amiable Marquise did not hesitate to call vigorously upon the reverend gentlemen to finish the building, or, at least, to get it enclosed, so as to keep out the winds which rushed furiously through it. Her appeals seem to have been heard, for the "Bishops' Wing" was at last finished, and Madame de Sévigné lived for many years in the room which is still shown as hers, and, after her death, which took place in the château, was buried in the little church on the estate. All this took place nearly two hundred years ago, and the "Bishops' Wing" is now falling to decay, while the Francis I portion of the castle, nearly two hundred years older still, has almost disappeared; but the castle is so highly valued in France that it is officially classed as an "historic monument," and, although the Government was unable to purchase the property, it is hoped, undoubtedly with reason, that the new owners will respect, as far as possible, the associations of the place.

THE late Henry G. Marquand has been succeeded, as President of the Metropolitan Museum of Art, by Frederick W. Rhineland, who has been for more than thirty years connected with the Museum as Trustee or Vice-President. Mr. Rhineland is a connoisseur of great experience, and the active interest which he has taken in the affairs of the Museum, ever since its incorporation, makes it probable that the conservative but enlightened policy which has done so much for the Museum will be continued during his administration.

NOTES ON IRON AND STEEL CONSTRUCTION.¹—XI.

THE steel-beam grillage-footings described in the previous article are exceedingly expensive on account of the great weight of steel required in their design. In the effort to obtain a spread footing that would possess the advantages of a steel-beam grillage-footing and at the same time be reasonable in cost, the reinforced concrete footing was studied and adopted to a considerable extent. This type of footing is shown in Figure 79 and consists of a monolithic concrete footing rein-

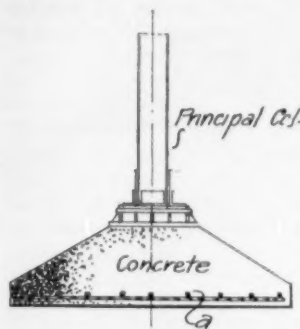


Fig. 79.

forced by tension-bars of metal as shown at *a* in the figure. The reason for thus reinforcing the concrete is due to the fact that while concrete has a great compressive strength, it offers comparatively little resistance to tension, so that in order to more nearly realize the compressive strength of concrete when a slab is subjected to transverse stress, the tensile resistance is supplied by the insertion of wire-netting, expanded-metal, twisted or corrugated rods of steel.

The principal reason for using these forms of steel consists in the fact that the adhesion between the metallic reinforcement and the concrete must be sufficient to realize the tensile strength of the metal, that is, if the reinforcing-rods should slip and the joints between the concrete and the metal be thus destroyed, its efficiency as a reinforcing element would be materially lessened. The greatest use of reinforced concrete has previously existed in the construction of fireproof floors, arched bridges, concrete retaining-walls and similar structures. The slab of concrete reinforced with metal as shown in Figure 80 will deflect to a great extent before any signs of fracture or cracks can be detected on the under side of the slab, and it has been stated by some authorities that concrete slabs reinforced with metal do not crack until the point of rupture is nearly reached and also that the tensile-stress in the under surface of the slab and metallic rods does not decrease with excessive deflection and remains nearly constant until rupture occurs.

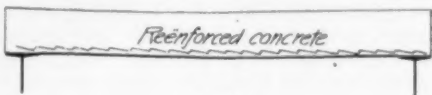


Fig. 80.

In reinforcing concrete that it may resist transverse stress, there have been employed several metallic forms. The common forms of metallic reinforcing bars are shown in Figures 81, 82, 83 and 84. In Figure 81 is designated a system of reinforcement which consists of heavy metallic wires crossed and recrossed until they practically form a woven-wire netting. This system of reinforcement is distinctly French. In Figure 82 is shown a twisted bar of iron and the introduction of this bar in concrete slabs is known as the Ransome system of concrete-construction. This bar is provided with a twist, the idea being that it will be held more tenaciously within the body of the concrete and no danger of slipping will exist. Another

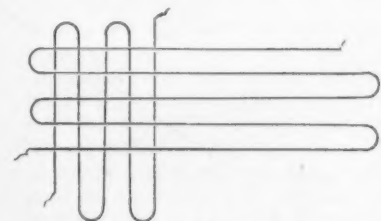


Fig. 81.

form of concrete reinforcement consists in the embedding of expanded-metal lathing in the under portion of the slab. The expanded-metal and the method of using it for this purpose is shown in Figure 83. The manufacturers of expanded-metal make a particularly extra heavy type of metal for this purpose. The metal may be obtained either of black or galvanized soft steel.

In Figure 84 is shown a type of rolled bar which has recently been introduced for the reinforcement of concrete under transverse-stress and which is admirably adapted for the purpose of building foundations. This bar is corrugated or ribbed in rolling and the angle made by the sides of the ribs with a plane at right angles to the axis of the bar is less than the angle of friction between the metal and the concrete. By this

means the liability of the loss of strength in the reinforced slab, due to the breaking of the adhesion between the concrete and the metal, is necessarily eliminated. It is questionable, however, whether these corrugations or ribs need be provided in order that the adhesion between the concrete and metal bars be sufficient to realize their tensile strength. By experiment and tests plain bars of iron embedded in concrete have developed surprising adhesive resistance and many important works have been built abroad in which simple plain iron, round or square bars without twist or corrugations, have been used. Undoubtedly, the corrugations and the twists of the bar in the Ransome system are safeguards against any possible slipping and it may



Fig. 82.

be that the efficiency of the plain bars used in the construction abroad depended entirely upon the fact that there was a great difference between the working-loads and the ultimate strength of the structure.

In order that one can intelligently design concrete foundations reinforced with steel rods, it is important that they should understand the present theory of the transverse strength of steel and concrete in combination. It is necessary in the design of spread footings that the transverse strength be known, for on account of the small area of the column base and the great area of the footing there is a tendency for a spread footing of shallow depth to fail by rupture adjacent to the perimeter of the column base. In the study of the transverse strength of steel and concrete in combination, it is requisite that one should have a clear understanding of the term *modulus of elasticity*.

It has been found by experiment and test that in all elastic materials subjected to stress and deformation the elongation under tension or the shortening by compression is directly proportional to the stress, within the elastic limit of the material. The *elastic limit* of the material is the load at which the deformation is not directly proportional to the stress. The *modulus of elasticity* in all formulas of the strength of materials is usually represented by *E* and $E = \frac{s}{d}$. In this formula *s* = the

stress, that is the pull or compression in pounds per square inch; *d* = the proportional change or deformation per unit of length. The value of *s* is always equal to the amount of the force acting upon the material, divided by the area of the cross-section of the material, while *d* equals the total length of the member, bar or material in the direction of elongation or in the direction of deformation, divided by the amount of distortion or deformation, so that the value of *E* may be expressed by the formula

$$E = \frac{S}{A} = \frac{SL}{\Delta L}$$

In the application of this formula, assume that a force of 120,000 pounds applied to a structural-steel tension member, whose length is 120 inches and whose cross-section is 2 square inches, produces an elongation equal to .24 inches, the problem being to determine the modulus of elasticity of the steel. According to the formula

$$E = \frac{SL}{\Delta L}$$

and by substitution it becomes $\frac{120,000 \times 120}{2 \times .24} = 30,000,000$.

In composite beams of steel and concrete the nature of their section is not homogeneous and the steel does not possess the same elasticity as the concrete. While the modulus of elasticity of steel has been determined as between 28,000,000 or 30,000,000 pounds, this value of concrete has not been definitely ascertained. The value varies with the particular quality of the concrete employed and with its age. It is considered by good practice, however, that 1,000,000 is the safe value for the modulus of elasticity of Portland-cement concrete having aggregates of slag or broken stone, while cinder-concrete possesses far less

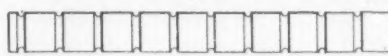


Fig. 84.

¹Continued from No. 1395, page 95.

strength and probably its modulus of elasticity does not exceed 150,000. This latter concrete is mostly used for fireproof floor-construction and would never be used in the construction of foundation footings, so that it may be dropped from the discussion. In a composite beam it must be assumed that each material making up the section offers a resistance proportional to its rigidity, and it may likewise be stated that the rigidity of steel and concrete having like areas is proportional as the ratio existing between their moduli of elasticity, or, since the rigidity of the concrete is expressed by 1,000,000 and the steel by 28,000,000, that equal strain or deformation will be created in the concrete and steel when there is 28 square inches of concrete similarly placed with respect to the neutral axis as one square inch of steel. Therefore, in order to determine the resistance to transverse stress of a beam combining steel and concrete, it is reasonable to *redraw* the section of the beam and substitute, on a line coincident with the steel bars, an area of concrete which will be equal to them in resistance. This will be made clear by reference to Figure 85, which shows a concrete footing reinforced with four steel

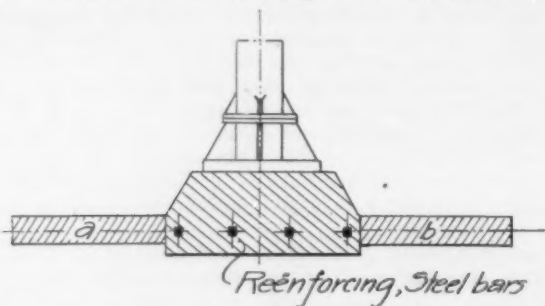


Fig. 85.

bars. Considering that the steel bars are omitted and substituting in their stead the areas a and b , which are equal in extent to 28 times the sectional area of the bars, the neutral axis may be determined by calculation, and found where shown in the figure. The moment-of-inertia may then be calculated and the strength of the footing or beam determined when the beam fails by cracking on the tension side, by the formula $M_1 = \frac{sI}{c}$. In this formula M_1 = the moment-of-resistance of

the section, s = the safe unit fibre-stress, that is, the safe unit tensile-stress of the concrete, I = the moment-of-inertia of the new section and c = the least distance from the neutral axis of the extreme fibres on the tension side.

When the bending-moment is known it is usually necessary to determine the compressive stress at the top of the concrete and the tensile stress at the bottom of the concrete and these values, which may be represented by Sc and St respectively, are obtained from the following formulas:—

$$Sc = \frac{Mc_1}{I} = S \left[\frac{1 + m - 2\frac{d_1}{d}}{1 + m + 12\frac{d_1^2}{d^2}} \right]$$

$$St = \frac{Mc_2}{I} = S \left[\frac{1 + m + 2\frac{d_1}{d}}{1 + m + 12\frac{d_1^2}{d^2}} \right]$$

In the above formulas the value of the algebraic symbols are as given in the following notation:—

I = moment-of-inertia of the altered cross-section.

S = stress in the extreme fibres of the unenforced concrete section which may be found by the formula $\frac{6M}{bd^2}$

E_s = modulus of elasticity of the steel reinforcing rods or bars.

E_c = modulus of elasticity of the concrete in the beam section.

b = width of the concrete beam.

d = height.

a = sectional area of the steel reinforcing bar or rod.

A = sectional area of the concrete substituted instead of the steel reinforcing members, which is equal to

$$\frac{E_s}{E_c}$$

d_1 = distance from central axis of the original beam-section to the centre of the reinforcing bar.

d_2 = distance from central axis of the original beam-section to the new neutral axis of the altered cross-section.

c_1 = distance from the neutral axis to the tension side of the beam.

c_2 = distance from the neutral axis to the compression side of the beam.

m = ratio of the longitudinal rigidity existing between the concrete beam and the steel reinforcing member imbedded within its lower portion; this value of m

$$\text{is equal to } \frac{bd}{a} \times \frac{E_c}{E_s}$$

The values of d_2 , c_1 , c_2 and I may readily be worked out by the following formulas:—

$$d_2 = \frac{l}{m+1}$$

$$c_1 = \frac{d}{2} - d_2$$

$$c_2 = \frac{d}{2} + d_2$$

$$I = bd \left(\frac{d^2}{12} + \frac{l^2}{1+m} \right)$$

In connection with this subject of combination concrete and steel beams, and concrete spread-footings reinforced with steel tension members, the Expanded Metal Fireproofing Company gives valuable data in their several publications. Especially interesting is an article entitled "Discussion of the Strength of Steel-Concrete Beams," which is an abstract from a paper presented to the American Society of Civil Engineers, by A. L. Johnson. This discussion, since it seems one of the most reasonable and practical, is given in connection with this article, and reads as follows:—

"It is a peculiar fact that, though plain concrete beams will deflect but very little before rupture on the tension side, the same concrete when it has a metal reinforcement on this side will deflect enormously before any cracks are noticed, even if the under side is plastered to a perfectly smooth surface. Some authors go so far as to say that the concrete does not crack when armed with metal until near rupture, and that it retains a nearly constant tensile strength after exceeding the distortion at which it should have failed.

It is possible that this is true, but it is a position not as yet generally accepted amongst engineers. As a matter of fact, however, it makes very little difference, as it unquestionably is a fact that the cracks, if present, are so small as to be invisible, and no injury to the construction could result from their presence. If present, we should have to omit from our formula for the moment-of-resistance of the cross-section the moment due to the tension in the concrete below the neutral axis. But as the tensile strength of the concrete is very small anyway, the omission of this element would not materially alter our design.

For this reason, and to avoid a quibble over an unimportant matter, we have assumed that the concrete below the neutral axis is inoperative.

We also assume that very little more than the elastic limit strength of the metal will be developed at the maximum load-carrying capacity of the construction. In testing it is possible to break the metal entirely in two, but this does not occur until after the maximum load-carrying capacity has been passed.

In bar construction therefore, we should use as high a steel as consistent with sufficient ductility, in which case we can readily obtain an elastic limit of from 40,000 to 45,000 pounds per square inch, which would allow us to use about 50,000 in our formula. In the expanded-metal the elastic limit has been much increased by the stretching of the metal in expanding so that the foregoing figure is not far wrong for this material also.

With these values the assumption is made that the modulus of elasticity of the steel is practically constant up to the maximum load-carrying capacity of the construction.

This condition, however, does not hold for the concrete. The maximum load-carrying capacity will occur when the extreme fibre-stress on the concrete is equal to its ultimate compressive strength, assuming that there is enough steel used to develop it. When this occurs the stress diagram will be as shown above the neutral axis in Figure 86. On this diagram the total stress Pc , equal to the area of the shaded portion, is

about 25 per cent greater than the area between the lines on and os . This is true either for rock or cinder concrete. Also the modulus of elasticity as represented by the tangent of the angle nos is only $\frac{2}{3}$ in rock concrete, and $\frac{1}{2}$ in cinder concrete,

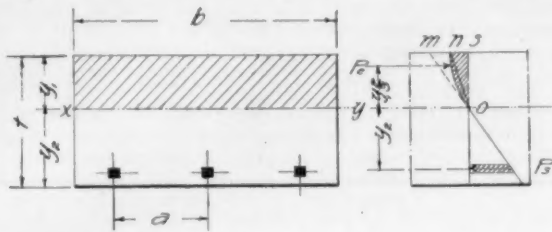


Fig. 86.

as much as the original modulus shown by the tangent of the angle nos .

With these preliminary conditions disposed of, we are ready to derive the formulas for the moment-of-resistance of steel-concrete slabs.

Let,

E_s = modulus of elasticity of steel in pounds per square inch.

E_c = modulus of elasticity of concrete in compression in pounds per square inch.

F = elastic limit of steel in pounds per square inch.

f_c = compressive strength of concrete in pounds per square inch.

b = width of section considered in inches.

t = thickness of section considered in inches.

d = spacing of bars in inches.

a^2 = area of bars in square inches.

$\frac{a^2}{d}$ = amount of metal per inch of width in square inches.

For No. 16 Ga. 2½-inch mesh expanded-metal this = .012 square inches.

For No. 10 Ga. 3-inch mesh expanded-metal this = .016 square inches.

M_o = moment of ultimate resistance of cross-section in inch-pounds for failure in tension.

$M^1 o$ = moment of ultimate resistance of cross-section in inch-pounds for failure in compression.

M = bending-moment of external forces in inch-pounds.

W = total load on beam in pounds.

w = load per square foot uniformly distributed in pounds.

P_s = total stress on metal in width b .

P_c = total stress on concrete in width b .

e_1 = unit elongation of extreme fibre in compression.

e_2 = unit elongation of steel.

We will use the following values for the constants, based upon the best information obtainable. The values for concrete are taken from a very thorough discussion of this subject in the September number of the *Journal of Engineering Societies* for 1900, page 145. They are for an age of one month, this being the age at which tests are usually called for.

E_s = 30,000,000.

E_c = for rock-concrete 1 : 3 : 6, 4,800,000.
for cinder-concrete 1 : 3 : 6, 1,000,000.

F = 50,000.

f_c = for rock-concrete 1 : 3 : 6, 1,500.

= for cinder-concrete 1 : 3 : 6, 600.

b = 12 inches.

d^2 = for ½-inch-square corrugated bars = 0.21 square inches.

The general discussion for single-span beams on knife-edge supports is as follows:—

Total area of metal in width $b = \frac{a^2 b}{d}$.

Total stress on metal, $P_s = \frac{F a^2 b}{d}$.

Then the strain, or stretch, of the metal is $e_2 = \frac{F}{E_s}$,

and $P_s = E_s e_2 \frac{a^2 b}{d}$.

On the compression side we have

$e_1 = e_2 \frac{y_1}{y_2}$, and the resulting stress is

$f_c = e_1 \frac{2 E_c}{3}$ for rock-concrete, and

$= e_1 \frac{E_c}{2}$ for cinder-concrete

$= e_2 \frac{y_1}{y_2} \frac{2 E_c}{3}$ for rock-concrete, and

$= e_2 \frac{y_1}{y_2} \frac{E_c}{2}$ for cinder-concrete.

Also,

$P_c = \frac{5}{4} f_c \frac{b}{2} y_1$ for both rock and cinder concretes.

Then

$P_c = \frac{5 b y_1^2 e_1 E_c}{12 y_2}$ for rock-concrete

$= \frac{5 b y_1^2 e_2 E_c}{16 y_2^2}$ for cinder-concrete.

But

$P_c = P_s$.

Hence,

$E_s e_2 \frac{a^2 b}{d} = \frac{5 b y_1^2 e_2 E_c}{12 y_2}$ for rock-concrete;

from which

$y_1^2 = \frac{12 a^2 y_2 E_s}{5 d E_c}$ for rock-concrete. (1)

Also,

$E_s e_2 \frac{a^2 b}{d} = \frac{5 b y_1^2 e_2 E_c}{16 y_2}$ for cinder-concrete;

from which

$y_1^2 = \frac{16 a^2 y_2 E_s}{5 d E_c}$ for cinder-concrete. (2)

For the moments-of-resistance of the cross-section we have

$M_o = P_s y_2 + \frac{2 P_c y_1}{3} = \frac{P_s}{3} (3 y_2 + 2 y_1) =$
 $\frac{F a^2 b}{3 d} (3 y_2 + 2 y_1)$ (3)

$M^1 o = P_s y_2 + \frac{2 P_c y_1}{3} = \frac{P_c}{3} (3 y_2 + 2 y_1) =$
 $\frac{5 b f_c y_1}{24} (3 y_2 + 2 y_1)$ (4)

We also have another equation between y_1 and y_2 , viz:—
 $t = y_1 + y_2 + \frac{1}{4}''$ for expanded-metal construction, (5)

and

$= y_1 + y_2 + \frac{3}{4}''$ for ½-inch corrugated bar construction. (6)

For beams of equal strength in tension and compression, the following is derived:—

Here M_o becomes equal to $M^1 o$, or

$\frac{F a^2 b}{3 d} = \frac{5 b f_c y_1}{24}$, or $y_1 = \frac{24 F a^2}{15 f_c d} = \frac{1.6 F a^2}{f_c d}$ (7)

Combining (1) and (7) and (2) and (7) we have for rock-concrete,

$y_2 = \frac{y_1^2 5 d E_c}{12 a^2 E_s}$ where $d = \frac{1.6 F a^2}{f_c y_1}$
 $= \frac{2 F E_c}{3 f_c E_s} y_1$ for rock-concrete. (8)

In the same way we get

$y_2 = \frac{F E_c}{2 f_c E_s} y_1$ for cinder-concrete. (9)

Introducing these values in (4) we have

$M_o = M^1 o = \left[\frac{5 b F E_c}{12 E_s} + \frac{5 b f_c}{12} \right] y_1^2$ for rock-concrete, (10)
and
 $= \left[\frac{5 b F E_c}{16 E_s} + \frac{5 b f_c}{12} \right] y_1^2$ for cinder-concrete. (11)

In designing slabs for a given bending-moment, M , the following appertains:—

For this case we have $M_o = M^1 o = M$, and using value of $M^1 o$ given in (10) and (11) we have

$y_1 = \pm \sqrt{\frac{M}{\frac{5 b F E_c}{12 E_s} + \frac{5 b f_c}{12}}}$ for rock-concrete, (12)

and

$= \pm \sqrt{\frac{M}{\frac{5 b F E_c}{16 E_s} + \frac{5 b f_c}{12}}}$ for cinder-concrete. (13)

In the following Table the values of these functions for rock

and cinder concrete and for three different kinds of metal reinforcement are given. The values for the constants are as previously given.

mindedness. We can all bear ready testimony to the cheerful willingness with which engineers in general are wont to place the results of their experience at the free disposal of their colleagues, both on private and public occasions. By some this policy is carried

VALUES OF FUNCTIONS IN FORMULAS FOR CROSS-BENDING OF STEEL-CONCRETE SLABS WHICH ARE SIMPLY SUPPORTED AT THE ENDS, USING VALUES FOR CONSTANTS AS GIVEN.

Kind of Metal employed.	Kind of Concrete.	General Values for Rock and Cinder Concrete.			Special Values when $M_o = M^1_o$.		
		y_1^2	M_o	M^1_o	y_1	y_2	$M_o = M^1_o$
$\frac{1}{2}$ " square Corrugated Bar.	Cinder-concrete 1:3:6 machine-mixed.	$\frac{20.16 y_2}{d}$	$\frac{42,000}{d} (3 y_2 + 2 y_1)$	$1,500 y_1 (3 y_2 + 2 y_1)$	$\frac{28}{d}$	$1.385 y_1$	$9,250 y_1^2$
No. 16 Ga. $2\frac{1}{2}$ " mesh Expanded-metal.		$1.15 y_2$	$2,400 (3 y_2 + 2 y_1)$	$1,500 y_1 (3 y_2 + 2 y_1)$	$1.60''$ $t =$	$2.23''$ $4.08''$	23,736 inch-pounds.
No. 10 Ga. 3" mesh Expanded-metal.		$1.53 y_2$	$3,200 (3 y_2 + 2 y_1)$	$1,500 y_1 (3 y_2 + 2 y_1)$	$2.13''$ $t =$	$2.96''$ $5.34''$	41,982 inch-pounds.
$\frac{1}{2}$ " square Corrugated Bars.	Rock-concrete 1:3:6 machine-mixed.	$\frac{3.15 y_2}{d}$	$\frac{42,000}{d} (3 y_2 + 2 y_1)$	$3,750 y_1 (3 y_2 + 2 y_1)$	$\frac{11.2}{d}$	$3.56 y_1$	$47,500 y_1^2$
No. 16 Ga. $2\frac{1}{2}$ " mesh Expanded-metal.		$.18 y_2$	$2,400 (3 y_2 + 2 y_1)$	$3,750 y_1 (3 y_2 + 2 y_1)$	$.64''$ $t =$	$2.28''$ $3.17''$	19,488 inch-pounds.
No. 10 Ga. 3" mesh Expanded-metal.		$.24 y_2$	$3,200 (3 y_2 + 2 y_1)$	$3,750 y_1 (3 y_2 + 2 y_1)$	$.85''$ $t =$	$3.01''$ $4.11''$	34,200 inch-pounds.

M. M. SLOAN.

[To be continued.]

THE DUTY OF THE ENGINEER.¹—I.

WE have been for some time waiting for a chance to publish this discussion since, *ceteris paribus*, the ethical and educational considerations which control the engineering and architectural professions should be nearly identical, and it is very satisfactory to find here the proof that in the main they are so identical.

THE discussion this evening is intended, I understand, to develop a somewhat informal expression of opinion on the duties of the engineer in his several professional relations. I have been asked to say a few words on his duty to himself and to his profession. A moment's consideration will show that the two are indeed inseparable. There is nothing an engineer can do in furthering the interests of his profession by which he, himself, does not become the chief gainer. The contrary is no less true. He who is remiss in discharging his duties to his profession to the measure of his ability fails to a like extent in promoting his own interests. This is, indeed, but another way of saying that every successful effort in doing something by which the profession profits adds to the professional capital of the doer, and hence redounds directly to his personal advantage. There was a time in the earlier days of engineering when its few followers had to rely upon their private note-books, containing the accumulated store of their professional knowledge, as their chief source of information. And it was natural that data gathered by the slow, laborious process of personal experience, when other means were almost wholly lacking, should have been more or less jealously guarded. In those days engineering-societies had no existence, or next to none, and engineering-literature was of the crudest kind. Just as every trade and every business had its "secrets," engineering had its mysteries. To-day such "secrets" are seldom kept, not because men have grown more altruistic, but chiefly because they recognize that it does not pay to keep them. The accumulation and diffusion of knowledge along all lines is now proceeding at such a tremendous rate that the greatest possible contribution on the part of any single individual sinks into comparative insignificance. The gain that may accrue to him by selfishly withholding the results of his personal experience and observation is apt to be as nothing compared with the professional prestige he may derive from their publication through the widest channels. It is true that there are not wanting men to-day in our profession, as in every other, who, like the sponge, absorb what comes within their narrow reach and yield it only upon pressure. Happily, such men constitute an insignificant minority. Nor can there be a doubt that they are themselves the chief sufferers of their narrow-

so far that they refrain from patenting devices that show good possibilities of profitable development. While no one can reasonably condemn him who seeks to reap the largest legitimate returns from ideas that are his own, we cannot refrain from applauding the high-mindedness that prompts a contrary course. And such examples are by no means so infrequent that they must be classed as rare exceptions.

Coming now to the direct question before us—the duties of the engineer to himself and his profession—which, as I have said, are really one and the same, the answer can be put, I think, in very few words. His duty is to hold high professional ideals and to make a conscious and conscientious effort to apply them to himself, as nearly as may be, in all his professional relations. To consider in any great detail just what these ideals should be and how they are to be observed under various contingencies would be equivalent to formulating a code of professional ethics. To attempt even an outline of such a code would be alike presumptuous and unprofitable. Since engineers are human, they may be broadly classified, ethically, under two headings. First, that overwhelming majority who would not stoop to unprofessional practices under any consideration; and, second, that small but ever-present minority who strive persistently for momentary advantage without a nice regard to the means by which it is to be attained, or for the rights of others. Men whose moral sense is so warped will never be redeemed by any artificial code that may be prescribed for their professional guidance. Their natural tendencies may perhaps be somewhat curved, or at least their influence for evil partly negated, by giving the widest publicity to their practices whenever they assume a form that plainly warrants public exposure. Our leading engineering-journals have not hesitated, in extreme instances, to assume this duty.

It has been recommended from time to time that the engineering-societies should exercise a sharp restraint upon unprofessional conduct through their power of expulsion. Experience has shown, however, that this power is rarely or never brought into play; not only because the chief offenders are apt to be beyond their pale of membership; but because it is human nature for men to condemn silently rather than accuse openly. . . .

Unlike the physician, the engineer cannot conceal downright incompetency behind an agreeable personality, nor can he count on burying his mistakes. Some years ago there appeared in one of our foremost magazines² two papers, in which the question "Can lawyers be honest?" was ably presented from opposite points of view. While I would yield to none in my tribute of respect to the legal profession in its best estate, it is a comforting thought that in our own profession the very suggestion of such a heading, much less a serious argument upon the question, were inconceivable. In claiming this, we need not withhold the admission that the engineer has probably less temptation to depart from normal, every-day

¹ Extracts from a paper by Edgar Marburg, read at the Engineers' Club, of Philadelphia, and published in the *Proceedings* of the same.

² The *North American Review*, Vol. clix, 1891, pp. 194 and 504.

standards of rectitude than has his brother of the law. Nor does he need to defend his practices by professional traditions not always easily reconcilable with such plain standards. . . .

When we come to consider the relatively small number of engineers in independent practice, there is more ground for reasonable differences of opinion. Whatever tests of competency may be applied, however, it would seem that they should rather take the form of a searching inquiry into the professional record of the candidate than an examination. While it is easy to set an examination that will exclude incompetent men, it is exceedingly difficult to prevent the exclusion of men who are really competent. The tendency of an examination is almost unavoidably to set a premium on memory rather than general intellectual fitness; on so-called book-learning rather than on practical experience and plain common-sense.

Let us turn aside a little further to consider for a moment an interesting matter, not strictly germane to the subject. The question is not infrequently asked, Why does the profession of engineering not receive the same measure of recognition by the general public that is so freely accorded to the so-called learned professions: theology, medicine and law?

While public sentiment is doubtless growing more enlightened, one is still often amazed at the vague notions betrayed by men of good average information concerning the functions of the engineer. Even at this day a civil-engineer is not uncommonly looked upon as a surveyor who occasionally turns his hand to other duties. A college graduate, speaking of civil-engineering, once said to me, with blunt frankness, that the prospect of spending one's life looking through the small end of a telescope seemed to him singularly unattractive. I replied that I thought all men who regarded engineering in that light would doubtless share his feelings.

The mechanical-engineer is scarcely better off. The average intelligent layman looks upon him as some kind of a cross between an inventor, a machinist and a stationary-engineer; but is sorely puzzled to identify him more closely. As for the electrical-engineer, he is popularly regarded as an inventor, pure and simple, whose talents may sometimes elevate him to the so-called "wizard" class.

Quite recently I was asked by a doctor of philosophy to explain the distinction between a civil and a mechanical engineer. I could not resist the temptation to reply at first that there was none, since every mechanical-engineer was really a civil-engineer, the one being the specific, the other the generic designation. I was honest enough to add that the mechanical-engineers were somewhat inclined to object to this classification.

A highly cultivated woman whose son proposed to study engineering recently observed in my presence that she could not account for what she called her son's peculiar mechanical bent; that the male members of the family had been professional men for generations; but that her son seemed determined to become a mechanical-engineer and she supposed she would have to let him have his way. She came to this conclusion in a tone of such helpless resignation as to remind me forcibly of the luckless hen who had hatched out an ugly duckling.

These instances are believed to be fairly characteristic in showing the imperfect understanding and the inadequate appreciation of the public at large of engineering as a profession. Admitting the fact, what are the reasons? If we turn to our engineering-schools—which, by the way, are seldom counted with the professional schools—we find their average standard of admission and the prescribed length and breadth of their courses distinctly in advance of those in medicine and law; nor are they, to say the least, less difficult. Speaking generally, there is no course in a university held in more wholesome respect by the student body, or more carefully shunned by those in quest of "soft snap" courses, than those in engineering. And it may be claimed with equal confidence that there is no profession which makes more exacting demands upon its followers, and in which high honors are more difficult of attainment or, on the whole, more deservedly bestowed. Clearly the answer, whatever it may be, must be sought in other quarters.

To say that engineering as a profession is yet in its swaddling-clothes is true if the reckoning be in years. If gauged, however, by the more rational standard of achievements, we find it has attained to giant's stature. We rest our claim to professional recognition upon the fact that engineering has its basis no longer in empiricism, but in science. The justice, and, in fact, the meaning, of that claim, however patent to ourselves, can appeal but dimly to the layman. His appreciation of our work is apt to be in proportion to its outward magnitude or striking novelty. To him the building of a railway means little more than an amount of digging and filling, the laying of ties and rails, and the dumping of ballast. The construction of water-supply and sewerage systems seems to consist essentially of the opening and closing of ditches for the reception of simple pipes, whose sizes, he vaguely conjectures, are fixed somehow by experience. As for the building of pavements and ordinary roadways, or canals, dykes and levees, evidently nothing could be much easier. In short, it is impossible for him to fully grasp the idea that there is scarcely a detail of processes apparently so simple that has not been made the subject of profound scientific study and that is not undergoing constant change in the light of new inventions and discoveries.

Another reason which militates strongly against us in shaping the popular estimate of our profession lies in the fact that the overwhelming majority of engineers are employed for fixed hours at fixed salaries. The fewest number stand in direct personal relations with their

clients. This circumstance is, indeed, an unfortunate one for us from more than one point-of-view.

It must be conceded, too, that the public appreciation of a profession and of its individual members stands in a not altogether remote relation to their earning capacity. To maintain a high social position on a slender income is becoming increasingly difficult and, in our larger communities, is well-nigh impossible. We cannot blind ourselves to the fact that the maximum earning-capacity of engineers is insignificant compared with that of the most successful men in other professions. When life or liberty, character or fortune is at stake, there is no haggling over fees. Retired statesmen find apparently little difficulty in speedily accumulating snug fortunes in legal practice. I need not add that engineering offers no such possibilities. In engineering a net professional income exceeding \$10,000 per annum is, indeed, a very rare exception. To be sure, I am leaving out of consideration that large number of men who owe their success in kindred vocations more or less directly to their engineering training; and those to whom this training has served as a stepping-stone to salaried positions of high responsibility and trust, in lines not strictly technical. . . .

The one-sidedness of our development is due in a measure to causes normal and unavoidable. But in a larger measure the fault is one for which we are at least passively responsible. The tendency toward narrowness is apparent even among students pursuing engineering-courses. Studies not strictly technical are too often looked upon as useless and slighted accordingly. This tendency is deplorable in a double sense. Not only because the purely cultural studies occupy at best a scant place in the curriculum, but because there is probably no profession which affords less opportunity for recovering such lost ground in after-life. It is a rule, rather than an exception, that engineering-students are not able to write creditable English upon graduation. We are painfully aware, too, that this fault is not confined to the fledglings of our profession. Let me quote the testimony of the Past-President of the American Society of Civil Engineers, in his own words, as spoken at the last annual convention of that Society, in London: "For two years, during my period of holding the office of Vice-President, I was a member of the Publication Committee, and I was surprised at the manner in which some papers were presented. What I am saying now is of course not for general publication, but simply for the members of our Society. . . . If some of the papers presented to that Publication Committee by men who stand high in our profession had been presented by pupils of a high school, they would never have been permitted to receive consideration." Those of us who have served in a similar capacity can appreciate the justice of these strictures, humiliating as they are. And it is better that they should be emphasized too strongly than that they should be glossed over.

We owe it to ourselves and to our profession to recognize the danger to which I have alluded,—the danger of unsymmetric development,—and to make well-directed and persistent efforts to escape its consequences. We should seek to keep in intelligent touch with the world of men and affairs. We should strive to take a generous interest in all higher lines of human endeavor. We should try to cultivate a taste for art, an appreciation of good literature, and of all else that makes for culture and refinement. We should have a proper regard, too, for social forms and usages, by estimating them at their true worth. To despise, or to affect to despise, the amenities of life is almost as censurable as to make them the chief aim and end of one's existence.

[To be continued.]

ILLUSTRATIONS

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

THE BLAIR BUILDING, BROAD ST. AND EXCHANGE PL., NEW YORK, N. Y. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

HOUSE ON WOODLAWN AVE., CHICAGO, ILL. MR. W. A. OTIS, ARCHITECT, CHICAGO, ILL.

THE HORACE MANN SCHOOL, WINNETKA, ILL. MR. W. A. OTIS, ARCHITECT, CHICAGO, ILL.

HOUSE OF BRADFORD NORMAN, ESQ., PORTSMOUTH, R. I. MESSRS. WINSLOW & BIGELOW, ARCHITECTS, BOSTON, MASS.

[Additional illustrations in the International Edition.]

COMPETITIVE DESIGNS FOR A SWEDISH CHURCH.

THESE sketches are copied from *Teknisk Tidskrift*.

CHAPEL OF THE SEMINARY, ISSY, SEINE, FRANCE. M. EDOUARD BERARD, ARCHITECT.

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SECTIONS OF THE SAME.

UNION TRUST BUILDING, PROVIDENCE, R. I. MESSRS. STONE, CARPENTER & WILLSON, ARCHITECTS, PROVIDENCE, R. I.

ENTRANCE TO THE SAME.



RESTORING THE HALL IN THE NUREMBERG RATHHAUS.—It has been decided to restore the great hall in the Rathaus, or City-hall, at Nuremberg. This hall, which belongs to an older part of the building, erected in 1522, is decorated with frescos by Dürer, representing the triumphal procession of the Emperor Maximilian, town musicians and minstrels, and the discomfiture of Midas; it also contains remarkable stained glass by Hirschvogel. On the central buttress is represented an execution by the guillotine, dated 1522, which shows that those terrible instruments date far back of the French Revolution. The cartoons now to be restored were already touched up and altered in the seventeenth century, and German artists are doubtful whether much will remain of Dürer's work. The German art-journals which discuss this question also note the recent discovery at Frankfort, in the Church of St. Leonard, of a curious fresco containing a large face of Christ; experts place the date some time in the thirteenth century. Also in the Church of the Holy Spirit at Nuremberg there has been brought to light, back of an old plaster partition, several curious paintings of the fifteenth century representing the death of the Virgin, a meeting of the twelve Apostles, and a colossal St. Christopher. The church dates from 1390.—*N. Y. Evening Post*.

A STRIKE THAT IS "STILL ON."—"Forty years ago, when I was a boy and living at Concord, N. H.," said a guest at a Detroit hotel the other evening, "a man built a factory for the manufacture of sleds and wheelbarrows. It was a water-power concern, and the cost was about \$20,000. When the forty employés had turned out about a hundred wheelbarrows a difference of opinion arose between them and the boss. I don't exactly remember what it was, but it was stated over and over again in after years that it would have made a difference of less than a dollar a week to either side. The owner wouldn't give in, and the men stood firm, small as the matter was, and a strike took place—perhaps the first in New Hampshire. When the men walked out the owner said to them: 'Very well; you can go. Remember, however, that I'll see this factory rot to the ground before I'll give in.' They answered that they would starve before they would yield, and so the factory was locked up, and time went on. A score of attempts were made to arbitrate, but without avail. The owner grew old and gray, and the hands died or disappeared, and 5 years ago, by personal investigation I found that only the owner and one of the strikers were left alive in Concord. Knowing them both, I had a talk with them about the strike, but both were still firm. I was in Concord again a month ago. The factory was still closed and ready to tumble down, and the last of the strikers was dead. The owner was hobbling about the streets of the town on crutches, with only a few months' life left, when I said to him: 'Well, Uncle Billy, I learn that Job Sabins is dead. As he was the last of the strikers you'll open the factory again, won't you?' 'No, I won't!' he bluntly replied. 'Being as I've been a blanked fool for forty years, I'm going to keep it up the rest of my days.'"—*Detroit Free Press*.

THE ETHICS OF ELECTRICAL ENGINEERING PRACTICE.—The Council of the Institution of Electrical Engineers (England) have circulated among the clerks of some of the principal counties and boroughs the following suggestions with regard to the standard of professional etiquette which ought to be observed by, and expected from, consulting electrical-engineers: "1. No consulting-engineer should solicit employment as consulting-engineer verbally, by letter, by agent paid by commission or otherwise, or by any other means. 2. No consulting-engineer should answer advertisements for consulting-engineers. 3. No consulting-engineer should advertise for employment. 4. No consulting-engineer should pay by commission or otherwise any one who introduces clients. 5. No consulting-engineer should receive trade or other discount, or surreptitious commissions or allowances in connection with any work which he superintends. 6. A consulting-engineer who is also directly or indirectly interested in any contracting or manufacturing business should inform his client in writing what his connection is with such contractor." These are excellent rules, and it will of course be the more easy for electrical-engineers to act up to them if public bodies are informed in regard to them.—*The Builder*.

THE MUSEE FALGUIERE.—Mme. Falguière, the widow of the distinguished artist, has added one more to the numerous museums in Paris—the Musée Falguière. This is at the deceased artist's studio, No. 68 Rue d'Assas, where Falguière worked during the last years of his life; and it is well furnished with all the remaining works of the artist, both in painting and in sculpture; in the latter section will be found a complete series of sketches for all Falguière's work, from the Gambetta monument to the "Triomphe de la Révolution."—*The Athenæum*.

A SIMPLE TEST FOR SLATE.—Professor Brunner, of Lausanne, stated recently that the following method of testing slate would be found to be both simple and effective: A piece of slate measuring 7 centimetres by 3 centimetres (2 7/8 x 1 1/8") is hung by a cotton thread inside a glass vessel so as to be just above, but not touching, 100 cubic centimetres (.176 or 1/16 pint) of water saturated with sulphurous acid. The vessel is closed up, and if bad the slate in a few days becomes exfoliated; if it remains compact, it will become very friable and spongy. Good slate will remain unaffected from 4 to 6 weeks, whilst superior slate has no sign of decomposition after several months. The rapid decomposition of bad slate is due to the presence of iron pyrites, carbonate of lime, and magnesia. The iron pyrites under the action of the sulphurous acid gives off sulphuric acid, which decomposes the other minerals, while the carbonate of lime under the influence of humid air and carbonic-acid gas is transformed into the soluble bicarbonate of lime.—*Stone Trades' Journal*.

A QUEER PIPE-ORGAN.—One of the queerest musical instruments that was ever built was put up in a house nearly as queer. Both were made at the instigation of Joris Karl Huysmans, a Frenchman who has been called the greatest living literary sensualist. The house was built to represent the bottom of the sea. Inside were all manner of strange seaweeds, mosses and grasses. The tinting of the walls was of pale green, with the most delicate shades of browns and pinks. Outside all the windows were great tanks of fish of nearly every known variety, for in this way he determined to keep up the illusion in which he took so much delight. But in the strange domicile that he had erected for himself there was nothing that was so in keeping with the sensualistic character of the man as his musical instrument. Charmed with a song as he was with color, it must yet mean something tangible to him. To this end he authorized the building of an immense pipe-organ, every pipe of which was connected with one central tube, which could be held in his mouth as he played. The organ was so constructed that each pipe was in communication with a butt of liqueurs, so that with each note he touched he was thrilled not alone by the sound but by a drop or two of the most choice wine. The beautiful strains of Mendelssohn's "Spring Song" or the Lohengrin "Wedding March" meant to him a double harmony; for as the beautiful chords filled his sea-house with melody he was receiving a dulcet minstrelsy of benedictine, chartreuse, crème de menthe and many other equally epicurean drinks with each wizardlike touch of the white keys. The man who conceived this weird idea has run the gamut of all human emotions to find something new and has just entered as a lay brother in a Benedictine order of monks. After living a life full of all that makes it worth living to such a man, he has given it up for a daily routine of religious observances that begin with mass at 6 o'clock, private prayers at 7, matins at 8.30, and so on through all the day, with nones, compline and vespers, and manual in all the lapses of time. This last freak seems even more eccentric than all that has gone before in his career of extravagances and eccentricities.—*Boston Transcript*.

THE MUMMIFYING PROPERTIES OF A CHURCH VAULT.—Bremen Cathedral is no less renowned than the Rathaus, and also because of its cellar, which contains, not wine, but mummies. This cellar, known as the Bleikeller, or lead cellar, because there the lead for the roof was melted, was accidentally found to have the property of preserving bodies from decay. The story of how this discovery was made speaks volumes as to the life and customs of the Bremers who lived four centuries ago. It seems that one of the workmen fell from the roof and was killed. His body being in the way of other workmen, was pushed into this cellar along with a lot of other rubbish and then forgotten, until long afterward some one found it quite mummified. And the fellow-citizens of this unfortunate workman—or was he not rather fortunate, considering the fame he had achieved, quite outrivalling that of any mere bridge-jumper?—thought the Black Death a scourge sent by God to punish them for their sins, never dreaming it was for their filth that they were being chastised. Since that time a number of bodies have been placed in the cellar. A Swedish general of the Thirty Years' War and his faithful aide-de-camp, an English duchess, and others who during their lifetime enjoyed the homage of the world, now lie there arrayed in simple loin-cloths, and any stranger who will pay the sacristan a few pfennigs may rap on their august chests or peer into the holes which vandals have knocked in the sides of two of their number. Only one sarcophagus still shields its inmate from these indignities, and that because members of his family have bestirred themselves to keep it inviolate.—*J. W. Ihlder in N. Y. Evening Post*.

THE GENEVA SCHOOL OF INDUSTRIAL ART.—The Paris *Bulletin de l'Art* gives some details of the success which has attended the work of the Geneva School of Industrial Art, an institution founded in 1875, to remedy the distress brought about by the falling off of exports in watches to the United States. Classes in enamelling and bronzework were taught by experts brought from Paris, and wood and stone carving and china-making were taught by Germans from Bavaria and Saxony, to such good purpose that the exports in all these specialties have become of large importance. Practical work goes hand-in-hand with the study of art principles, the needy student being enabled to sell the wares he makes in the school-shops. In a Government report just published the municipal authorities of Geneva testify to the value of the work done by the school, in furnishing the local factories not only with competent designers, but with a class of shop-leaders who inspire the rank and file of the workers with art enthusiasm. The course followed yearly by several hundred pupils includes drawing, modelling, iron-forging, lock-making, china-making, engraving, wood and stone carving, printing, etc. At the Paris Exhibition of 1900 the jury, in awarding a prize of honor, also offered its congratulations to the directors of the school.

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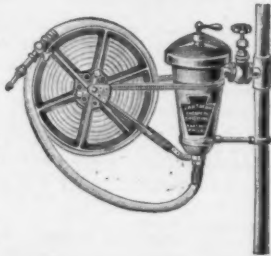
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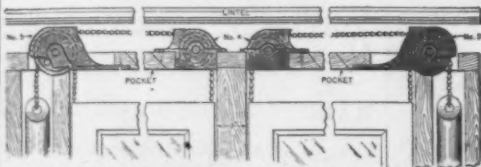
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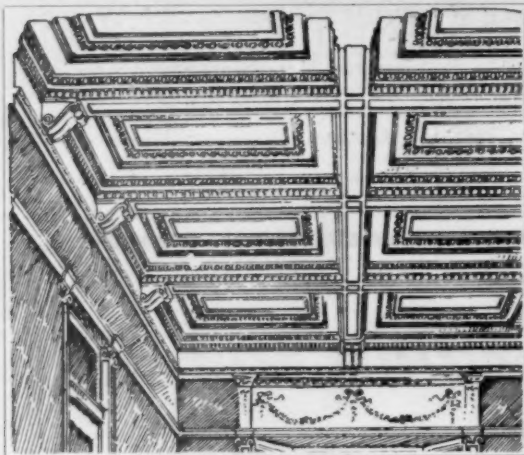


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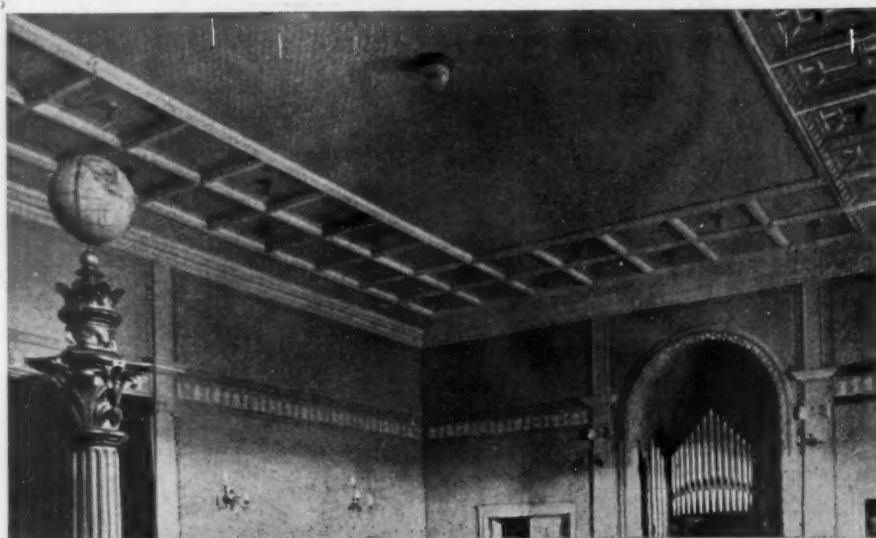
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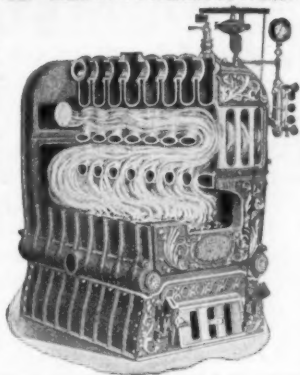
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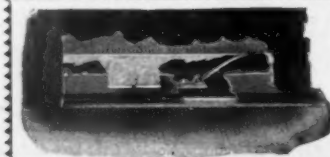
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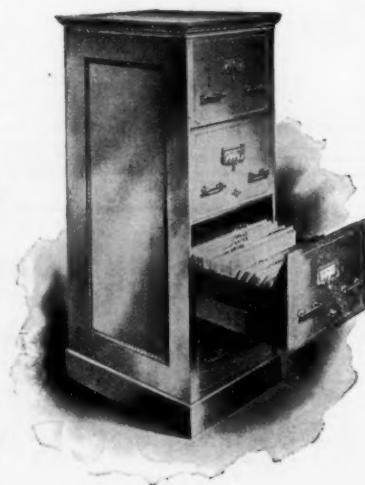
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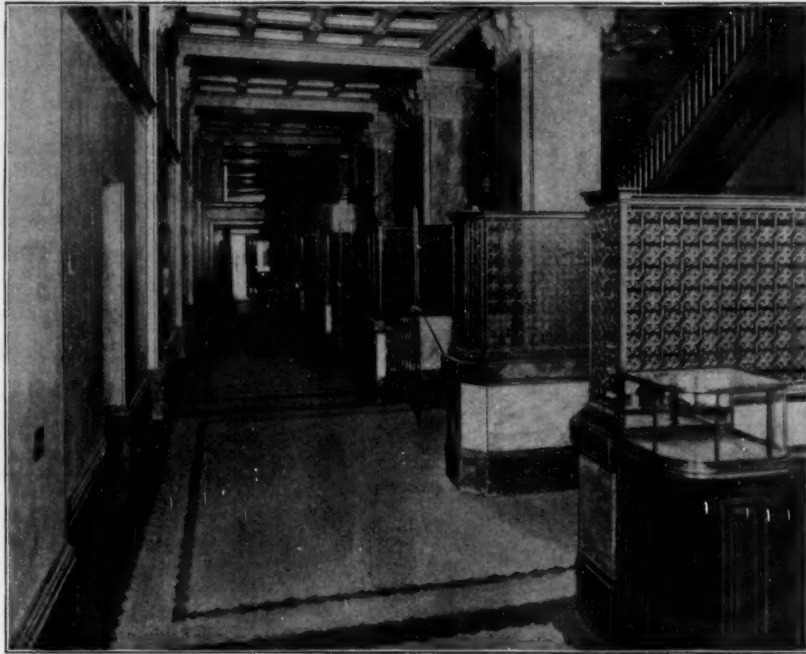
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Part XI

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

- Fredericksburg Brewery, recently destroyed by fire, is to be rebuilt at once at a cost of \$150,000.
- Hannibal, Mo.—Press reports state that the Anheuser-Busch Brewing Co., of St. Louis, is making arrangements to erect a new building here.
- Irrington, N. Y.—Work has been started on the new club-house which Miss Helen Miller Gould will build in Sheldon Ave. for the benefit of the poor people and neighbors of Irrington and Tarrytown. The club-house, which will be two stories high, will cost about \$9,500. The style of architecture will be Colonial, and the furnishings will be modern and costly. On the lower floor there will be a gymnasium for the young people. The second floor will be devoted to a cooking school.
- Lake Charles, La.—The Southwestern Brick Co., New Orleans, has purchased a site here for the erection of a \$25,000 brick-making plant.
- Lexington, Ky.—The proposition of issuing \$75,000 bonds for the erection of school-buildings will be considered at the November election.
- Liberty City, Ga.—The Ludowici Roofing Tile Co., Chicago, will erect a \$75,000 roof tile plant in the city.
- Little Falls, N. Y.—Action will be begun at once to acquire the property at the southwest corner of Main and Williams Sts. on which the federal building is to be erected.
- Meyersdale, Pa.—The contract will soon be let for the new church and parish-house to be built here for the First Methodist Episcopal Society. Plans by Charles W. Bolton & Co., architects, Witherspoon Building, Philadelphia. The building will be of brick and stone, costing about \$30,000.
- Milwaukee, Wis.—Dr. S. S. Staek, 134 Thirteenth St., has had plans prepared by Ferry & Clas, 419 Broadway, for a Colonial residence which he intends to build at a cost of \$17,000.
- The Bucyrus Co., South Milwaukee, will erect a steel and brick addition, 30' x 80', costing \$30,000.
- Minneapolis, Minn.—The State Board of Health has applied for an appropriation of \$125,000 to construct a new building for the State University, to cost \$125,000.
- A \$500,000 group of buildings will be erected near Lorling Park by Edmund G. Walton.
- New York, N. Y.—Plans have been filed for a six-story brick office-building, to be erected at No. 51 Broadway, and No. 27 Trinity Pl., having a frontage of 26.4 feet in Broadway and a depth of 192 feet. The building is estimated to cost \$100,000. C. H. & W. L. Campbell are the owners, and B. W. Morris, Jr., is the architect.
- A press report states that two dwelling-houses, one for Mr. and Mrs. Howard Gould and the other for James Stillman, president of the National City Bank, are to build on 5th Ave., between 72d St. and 73d St. to cost at least \$1,000,000 each. Plans for the Stillman house have been drawn by McKim,

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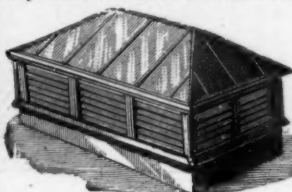
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

- Mead & White. This house will stand on a plot on the northeast corner of 72d St., having a frontage of 87 feet in the avenue and of 172 feet in the street. Its facade and all the exterior work will be plain and massive. The house will be four stories high, with basement. The Gould house is to be of white marble, and its style will be somewhat of the modern French school. It will be six stories high.
- Press reports state that the Mutual Life Insurance Co. has arranged to tear down the Gilman Building at 62 and 64 Cedar St. and erect in its place a banking house for Harvey Fisk & Sons.
- Mr. Wm. Durland has purchased the five-story building at Nos. 30 and 32 W. 67th St., adjoining his riding academy, and will make extensive alterations to the building.
- The property on the north side of 151st St., between St. Nicholas Ave. and St. Nicholas Pl., recently purchased by Mr. George Maurer, will be improved by the erection of a seven-story brick, stone and iron apartment-house of fireproof construction with all modern conveniences.
- Mr. Ernest G. Steadman has bought the property at 27 W. 17th St., and intends to tear down the old buildings and erect at once a modern brick, stone and iron business building.
- Plans have been drawn by Flemer & Koehler, 11 Broadway, for a new store and theatre building to be erected at the corner of 7th Ave. and 49th St. by Mr. M. L. Sire, 15 Cortlandt St.
- The John W. Stevens Building Co., 156 Fifth Ave., will erect a \$250,000 ten-story brick and stone warehouse. John W. Stevens, 156 Fifth Ave., architect.
- Reports state that Mrs. Norman L. Munro will erect a \$150,000 summer residence at Norwood Park on the site of the one which was destroyed by fire about a year ago.
- Notre Dame, Ind.—An addition, 100' x 230', of Bedford stone and brick, will be made to St. Mary's Academy; cost, \$250,000.
- Ottawa, Kan.—Plans have been completed by Geo. P. Washburn & Son, 413 S. Main St., for a \$50,000 three-story stone building, 102' x 112', to replace the one recently destroyed by fire, for the Baptist Society of the State of Kansas. Slate roof, steam heat. The building will be erected by day work.
- Pittsburgh, Pa.—McCargo & Miller, 6017 Penn Ave., propose the erection of a \$250,000 theatre, 114' x 145'.
- S. T. McClarren, Park Building, has made plans for a \$20,000 Colonial residence to be erected on Shady Ave., Squirrel Hill, for A. J. Miller.
- The Colonial Printing & Lithographing Co. will erect a \$40,000 building, 65' x 110', after plans by F. C. Sauer, Hamilton Building.
- It is stated that 100 brick veneered dwellings, to cost \$4,000 each, will be erected by W. A. Minter, Ash St., Wilkesburg, next spring.
- Plans for three brick Colonial residences, costing \$15,000 each, to be erected on Bryson St., Squirrel Hill, for Frank J. Lanahan, will be prepared by the Century Architectural & Engineering Co., 309 Fourth Ave.
- Providence, R. I.—The contract for the new John Carter Brown Library building on the Brown University campus calls for its completion January 1, 1904.
- Specifications of the new engineering building at Brown University are in the hands of contractors for bids. Construction is to begin at once, and the building will be ready in a comparatively short time. Its location is Lincoln Field. The plans were drawn by Clarke & Howe, 72 Weybosset St., and call for a building three stories in height, of red brick with limestone porch and trimmings, and classic in style.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

- Richmond, N. Y.—A press report states that the new Cathedral of the Sacred Heart, to be built here as a gift from Thomas F. Ryan, will be erected on the triangular lot opposite Monroe Park and bounded by Park Ave., Laurel St., Floyd Ave. and Cherry St. The main entrance will face Monroe Park. The Cathedral will be of brick, with limestone trimmings. The height to the top of the cross on the dome at the intersection of nave and transept is to be 172 feet; the width at the transept, 135 feet, and the length over all, 135 feet. The estimated seating capacity is 1,200. The most notable feature of the plans is the continuation of the columns from the main body of the church to form an ambulatory around the apse. This will be screened off by wrought-iron grille-work. While common in cathedrals of this type in France, this ambulatory is seldom used in this country. The contract will be awarded in a few days and work will begin at once. J. J. H. McGuire, 75 E. 42d St., is the architect.
- Rock Island, Ill.—L. Drach, architect, has plans for a brick machine shop and foundry building, fireproof, steam heat, steel beams, iron columns, etc.; cost, \$30,000.
- Saginaw, Mich.—W. R. Burt has offered the School Board \$150,000 for the establishment of a manual training school.
- San Francisco, Cal.—A clinical hospital, to cost \$400,000, has been proposed for the College of Medicine at the University of California.
- Saratoga, N. Y.—Acting Secretary Taylor has decided not to purchase a site for the federal building at present but will report to Congress that the present appropriation of \$15,000, for the purpose, is insufficient to secure a proper location.
- Sault Ste. Marie, Mich.—Articles of incorporation for the American Sault Ste. Marie Paper Co., with a capital stock of \$4,000,000, have been filed. The company is organized for the purpose of building and operating a pulp and paper mill on the Chandler and Dunbar water power at this place.
- Seattle, Wash.—The Seattle Athletic Club has decided to erect a seven-story club-house at a cost of \$75,000. James S. Goldsmith, C. A. McKenzie and George Billings, building committee.
- St. Cloud, Minn.—J. E. Jenks has had plans and specifications prepared by Charles R. Aldrich, of Minneapolis, for a frame residence which he will erect here in the spring. The foundations will be put in this fall. Cost, \$5,000.
- St. Louis, Mo.—Plans have been completed and details arranged for the building of a permanent hotel at the corner of West Pine Boulevard and King's Highway at a cost of \$1,250,000. The new hostelry, which will be built to accommodate 1,000 guests, is to be known as the Hotel Buckingham and will be managed by Henry Weaver, at present manager of the Planters'. The building is to be constructed of red brick and steel, with white terracotta trimmings and copper cornices. It will be absolutely fireproof.
- The exterior of the Illinois Building at the World's Fair is to be in the French Renaissance style and very elaborate. The building is 193 feet long, with a centre pavilion running back 144 feet. Owing to the uneven grade of the site allotted Illinois, these differences of level are made up by means of a stone terrace, which continues around the entire building. The building will stand at the head of one of the principal drives, and will have a most beautiful and commanding view of the entire Fair grounds. The main entrance is in a large public rotunda, off of which are the custodian's office, men's check-room, post-office, bureau of information, telegraph and telephone conveniences. Back of the main

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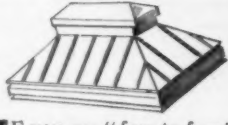
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

rotunda will be the room of state, a very large and dignified room, the dimensions of which will be 50' x 80'. This room will be elaborately decorated in plastic relief and finished in gold, and the entire area of the rotunda and halls is to be of tile. The main stairs leading to the second story are to be of marble. The architects of the building are Watson & Hazelton, Plymouth Building, Chicago.

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

A \$45,000 three-story brick and stone Colonial residence will be erected on Hortense Pl. and Euclid Ave. for Albert B. Lambert, after plans by G. W. Hellmuth, 122 N. 7th St.

Thirty-five houses, costing \$7,000 each, will be erected on Minerva and Ridge Aves. by a syndicate of capitalists, represented by Philip Green, 8th and Chestnut Sts.

St. Paul, Minn.—Griffith Jones has plans for a flat building to be erected on Selby Ave., near St. Albans. There will be two buildings, of pressed brick and cut stone, 34' x 56', three stories and basement. Will contain 12 apartments of seven rooms, fitted up in the most approved manner throughout, with steam-heating plant. Cost, \$40,000.

Texarkana, Tex.—J. D. Fitzgibbons has the contract to erect a hospital here for the Cotton Belt R. R. for \$100,000. W. E. Green, Gen. Supt. of R. R., Tyler.

Tray, O.—The Christian Society is reported to have decided to erect a \$20,000 church. Geo. W. Humphreys, treasurer.

Vancouver, B. C.—It is said that Jonathan Rogers will erect a four-story and basement block, to cost \$50,000.

Walla Walla, Wash.—The Co. Comrs. are reported to be considering the erection of a \$25,000 infirmary.

Washington, D. C.—Congress, in the "Omnibus Bill" of last session, authorized 118 public building sites. The Department of Justice has already approved the title to 35, for which drafts on the Treasury are now on their way through the mails, and fresh sites are going through the mail daily. Most of those in small cities will cost probably \$10,000 each. It is expected by the Treasury authorities that all the sites will be purchased within the next sixty or ninety days, involving an outlay of something more than \$1,250,000.

Waverley, Mass.—Work has been commenced on the erection of the proposed new brick and stone addition to the administration building at the Mass. School for Feeble Minded here. Wm. G. Preston, 186 Devonshire St., Boston, architect.

Yonkers, N. Y.—The First Methodist Episcopal Church observed Superannuates' Day recently with a special service. John E. Andrus, a member of the church, offered \$50,000 if the churches of the New York conference would raise an additional \$100,000 before April, 1904, toward the establishment of a fund to provide a home for disabled ministers of the conference. Large individual

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

offerings were made at the service, and a total of \$1,520 was contributed.

York, Pa.—The Bd. of School Control has decided to erect two schools, one in the 9th Ward, the other in the 10th Ward, at a total cost of \$80,000.

APARTMENT-HOUSES.

Minneapolis, Minn.—Fifteenth St., Nos. 311-317, four-st'y bk. apart., 82' x 87', steam; \$25,000; b., I. H. Edmonds, 2119 Girard Ave. S.

CHURCHES.

New York, N. Y.—Broadway and Fifty-sixth St., nine-st'y bk. church, 107 x 178'; \$350,000; o., trustees Broadway Tabernacle Society, 119 W. 40th St.; a., Barney & Chapman, 10 W. 34th St.

FACTORIES.

Worcester, Mass.—Duncan Ave., four-st'y bk. factory, 54' x 252'; ell, 54' x 90', ell, 46' x 54'; \$60,000; o. & a., Reed & Prince Mfg. Co.; e., E. J. Cross.

HOUSES.

Boston, Mass.—Bay State Road, Nos. 159-169, 6 four-st'y bk. & st. dwells., 22' x 60', comp. roofs, furnaces; \$108,000; o., G. T. Wheatland, 24 Congress St.; a., S. D. Kelley, 209 Washington St.; b., Vaughan & Warren, 23 Court St.

Duluth, Minn.—Superior St., nr. 20th Ave., three-st'y & base. st. dwell., 40' x 55'; \$20,000; o., Geo. H. Crosby.

Janesville, Minn.—Two-st'y fr. dwell., 34' x 41', furnace; \$5,000; o., J. Monroe Gordon; a., E. P. Overmire, 816 The Phoenix, Minneapolis.

Minneapolis, Minn.—Clifton Ave., No. 239, two-st'y bk. & st. dwell., 50' x 75', slate & tile roof, hot water; \$20,000; o., John D. McMillan; a., W. C. Whitney.

Pleasant Ave., No. 2538, two-st'y bk. dwell., 30' x 35'; \$4,000; o., B. S. Benton; a., Bertrand & Chamberlin.

Twenty-fifth St., nr. Nicolett Ave., two-st'y fr. dwell., 30' x 38', hot water; \$5,000; o., J. B. Mosher; a., Fremont D. Orr.

Hennepin Ave., cor. 25th St., two-st'y fr. attic & base. dwell., 33' x 58'; \$5,500; o., Mr. Otis; a., S. J. Bowles.

Worcester, Mass.—Knowlton Ave., three-st'y fr. dwell., 27' x 54'; \$5,000; o., Frank W. Kelleun; e., James I. Elliott.

Genett St., 14-st'y fr. dwell., 29' x 35'; \$3,000; o. & c., G. G. Thompson.

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(Houses Continued.)

Trowbridge Road, 2½-st'y fr. dwell., 32' x 48'; \$4,000; o. C. W. Gilbert; a. Barker & Nourse.
Merrick St., three-st'y fr. dwell., 27' x 62'; \$5,000; o. & c. Aaron & Juspar.
Stanton St., three-st'y fr. dwell., 27' x 47'; \$3,660; o. C. J. Carlson; a. M. Petterson; c. L. M. Petterson.
Holland Road, two-st'y fr. dwell., 28' x 40'; \$5,000; o. J. B. Scrimgeour; a. J. P. Kingston; c. C. E. Anderson.
Uzbridge St., two 1½-st'y fr. dwells., 27' x 38'; \$6,000; o. & c. W. E. Putnam.
W. Boylston St., three-st'y fr. dwell., 27' x 59'; \$4,700; o. John Lindblad; c. J. H. Skoglund.
Lincoln Ave., two-st'y fr. dwell., 25' x 57'; \$4,500; o. & c. H. B. Pender.

COMPETITIONS.

SANATORIUM.

[State of Rhode Island.]

TO ARCHITECTS.

The Commission on State Sanatorium for Consumptives invites architects to submit plans, in competition, for buildings for proposed sanatorium. Programmes for the competition may be obtained at the office of Arthur W. Joyce, Clerk of the Commission, Room 815, Industrial Trust Company Building, Providence, R. I. Plans will be received at office of Clerk of Commission up to 12 o'clock, noon, on Monday, December 8, 1902. For the Commission, C. ALVIN POTTER, chairman. 1402

LIBRARY.

[At Albert Lea, Minn.]

Competitive designs will be received by the Library Bld. until December 1 for the proposed \$12,000 Carnegie Library. 1403

PROPOSALS.

BUILDING.

[At Norfolk, Va.]

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until November 29, 1902, for constructing a brick and steel storehouse for equipment at the navy yard, Norfolk. Estimated cost, \$68,000. Plans and specifications may be seen at the bureau. MORDECAI T. ENDICOTT, chief of bureau of yards and docks. 1402

ELECTRICITY.

[At Superior, Wis.]

The Common Council will receive proposals until November 18 for a franchise for supplying the city with electricity for power, heating and lighting purposes. JOHN A. HOBE, city clerk. 1402

OIL HOUSE.

[At Fort Greble, R. I.]

Office Constructing Quartermaster, 209 Thames St., Newport, R. I. Sealed proposals will be received here until November 15, 1902, for constructing frame oil house, Fort Greble, R. I. Information furnished on application. CAPT. THOMAS H. SLAVENS, Q. M. 1402

BUILDING.

[At Philadelphia, Pa.]

Sub-bids for a \$250,000 four-story brick and steel fireproof department building to be erected at Juniper and Chestnut Sts. for the Murt Realty Co., will be received by William Steele & Son, Witherpoon Building. Slag roof, tile and mosaic work, steam heat and combination light fixtures. 1402

PROPOSALS.

STABLE.

[At Fort Crook, Neb.]

Chief Quartermaster's Office, Omaha, Neb. Sealed proposals will be received at this office until November 20, 1902, for furnishing material and labor in construction of a frame quartermaster's stable at Fort Crook, Neb. Full information furnished; on application to this office, where plans and specifications may be seen, or to the Quartermaster, Fort Crook. JNO. W. PULLMAN, Chief Q. M. 1402

ELECTRICAL PLANT.

[At Puget Sound, Wash.]

The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until November 18 for the construction of an electric generating and distributing plant at the navy yard, Puget Sound. A. S. KENNY, United States Navy, Washington, paymaster general. 1402

HOUSES.

[At Philadelphia, Pa.]

Bids for 177 two-story brick houses, to be erected at 52d St. and Chester Ave., at a cost of about \$300,000, are wanted by Thomas Bennett, 1022 Walnut St., architect. Slate and tin roofing, gas fixtures, furnace heat and tile work. 1402

BARN.

[At Columbus, O.]

The board of county commissioners will receive bids at the office of the county auditor of Franklin County until November 20 for the erection of a barn for the county infirmary. R. Z. Dawson, Jr., 609 Outlook Building, architect. L. E. JONES, county auditor. 1402

N. C. O. QUARTERS.

[At Fort McKee, Fla.]

Bids will be received until November 19 for constructing, plumbing and electric wiring two single sets of N. C. O. quarters, Fort McKee, Fla. W. E. COLE, Fort Barrancas, quartermaster. 1402

HOSPITAL.

[At Shreveport, La.]

Bids will be received November 20 by the Bd. of Administration of the Shreveport Charity Hospital for erecting the new hospital. Thos. Sully, architect, New Orleans. P. M. WELSH, sec'y. 1402

SEWER SYSTEM.

[At Fort Columbia, Wash.]

Bids are wanted November 15 for constructing a water and sewer system, etc., at Fort Columbia. Address CAPT. GEO. L. GOODALE, Q. M., U. S. Army. 1402

SEA WALL.

[At Fort Morgan, Ala.]

Engineer Office, U. S. Army, Mobile, Ala. Sealed proposals for raising and strengthening sea wall at Fort Morgan, Ala., will be received here until November 22, 1902. Information furnished on application. SPENCER COSBY, capt., engr. 1403

ELECTRIC PLANT.

[At Fort Monroe, Va.]

Engineer Office, U. S. A., Room 2, Custom-house Norfolk, Va. Sealed proposals for furnishing generator, engine, switchboard, boiler and chloride accumulator element for an electric plant at Fort Monroe, Va., will be received here until December 4, 1902. Information furnished on application. 1403

SANITARY WORK.

[In Montevideo Harbor, Uruguay.]

Proposals are wanted by the Uruguayan government at Montevideo until December 15 for sanitary work in Montevideo Harbor. The work includes a rock tunnel, a main collector, a secondary collector,

PROPOSALS.

auxiliary collector, affluents, etc., plans and estimates for which can be had by applying to the Ministerio de Foment, Montevideo. 1403

HEATING APPARATUS.

[At Columbia, S. C.]

Sealed proposals will be received by the undersigned at Columbia, S. C., until December 15 for a new boiler and heating apparatus for heating and ventilating the State Capitol at Columbia, S. C. Plans and specifications must accompany bid. Information as to requirements can be obtained from the undersigned. M. R. COOPER, secretary of State 1403

BUILDING.

[At Portsmouth, N. H.]

Sealed proposals for brick and steel building will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until November 22, 1902, for reconstructing building No. 60, navy yard, Portsmouth, N. H. Estimated cost, \$65,000. Plans and specifications can be seen at the bureau or will be furnished by the commandant at the navy yard named above upon deposit of \$15 to secure their return. MORDECAI T. ENDICOTT, chief of bureau. 1403

LAVATORIES.

[At Fort Huachuca, Ariz.]

Denver, Col. Sealed proposals will be received here until November 29, 1902, for constructing two lavatories at Fort Huachuca, Ariz. Information furnished on application to Q. M., Fort Huachuca, Ariz., or the undersigned. LIEUT. COL. J. W. POPE, C. Q. M. 1403

PUMP AND BOILER HOUSES.

[At Dover, N. J.]

U. S. Powder Depot, Dover, N. J. Sealed proposals will be received here until November 22, 1902, for constructing one one-story frame building for loading house and one one-story brick building for pump and boiler house. Bids will be received for all or part of foregoing. Information can be had on application to CAPT. O. B. MITCHAM, Ord. Dept., Comdg. 1403

BUILDINGS.

[At Dover, N. J.]

U. S. Powder Depot, Dover, N. J. Sealed proposals will be received here until November 22, 1902, for constructing the four one-story brick and steel buildings, as follows: Magazine for high explosives, 50' x 150'; storehouse for fuzed projectiles, 50' x 200'; house for fuzing high explosive shell, 30' x 75'; detonating fuze house, 30' x 42'. Bids will be received for all or part of foregoing. Information can be had on application to CAPT. O. B. MITCHAM, Ord. Dept., Comdg. 1403

QUARTERS.

[At Fort Riley, Kan.]

Bids will be received until November 25 for the construction of two double sets of non-commissioned staff quarters. CAPTAIN G. O. CRESS, quartermaster. 1403

DORMITORY.

[At Berkeley, Cal.]

Bids are wanted November 23 for erecting a recitation and dormitory building, including plumbing, gasfitting, heating, etc. W. H. Weeks, architect, Watsonville. E. J. WICKSON, sec'y bd. of trus. of the California Polytechnic School. 1403

BUILDING.

[At Boston, Mass.]

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until December 6, for constructing a brick and

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PROPOSALS.

steel smithery building, navy yard, Boston, Mass. Estimated cost, \$130,000. Plans and specifications can be seen at the bureau or will be furnished by the commandant of the navy yard named upon deposit of \$25 to secure their return. MORDECAI T. ENDICOTT, chief of bureau. 1404

PUMPING ENGINES.

[At Louisville, Ky.] Sealed proposals for pumping engines will be received at the office of the Louisville water company, No. 549 Third St., Louisville, Ky., until December 20. All bids, whether for pumping engines, boilers or furnaces, must be for both 31,000,000 and 21,000,000 gallons, and also separate bids for boilers and furnaces to meet the requirements of the engines of both the respective capacities. Louisville Water Company. By CHARLES R. LONG, president. 1404

WATER SYSTEM.

[At Newport, R. I.] Bids are wanted November 26 for a water supply and storage system at the U. S. Naval Coal Depot, Narragansett Bay. R. B. BRADFORD, Ch. of Bureau of Equipment, Navy Dept., Washington, D. C. 1402

Treasury Department, Office of the Supervising Ar-

PROPOSALS.

chitect, Washington, D. C., October 27, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 3d day of December, 1902, and then opened, for the construction, including plumbing, heating and ventilating apparatus, electric wiring and conduits of the U. S. Post-office at Emporia, Kansas, in accordance with drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Emporia, Kansas, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1402

TRUNK SEWER.

[At Washington, D. C.] Office of the Commissioner, D. C., Washington, D. C. Sealed proposals will be received at this office until November 15, 1902, for constructing a portion of the low area trunk sewer in the District of Columbia. Specifications and blank forms of proposals may be obtained at this office. HENRY B. F. MACFARLAND, HENRY L. WEST, JOHN BIDDLE, commissioners, D. C. 1402

DOOR FRAMES.

[At Washington, D. C.] U. S. Engineer Office, 735 N. Capitol St., Washington, D. C. Sealed proposals will be received here until November 15, 1902, for freight elevator door frames for new building for government printing

PROPOSALS.

office. Information furnished on application. JOHN STEPHEN SEWELL, capt., engrs. 1402

HIGH SCHOOL.

[At New Prague, Minn.] Sealed bids will be received by the undersigned for the erection and completion of a high school at New Prague, Minn., according to plans and specifications therefor prepared by H. C. Gerlach, Mankato, Minn. Said plans and specifications will be on file at the office of the undersigned, and at the architect's office. Bids will be received up to November 26, 1902, at the City-hall, New Prague, Minn. JOS. T. TOPKA, Sec'y B. O. E. 1403

POST-OFFICE BUILDING.

[At Rome, N. Y.] Bids are wanted November 20 for erecting the U. S. Post-office Building at Rome. Jas. Knox Taylor, Suprv. Archt., Treas. Dept., Washington, D. C. 1402

JAIL AND RESIDENCE.

[At Marion, Ind.] The board of commissioners will receive bids until November 25, for the construction of the \$125,000 jail building and a jailer's residence to be built by Grant County. Richards, McCarty & Bulford, "The Ruggery," Columbus, O., architects. 1402

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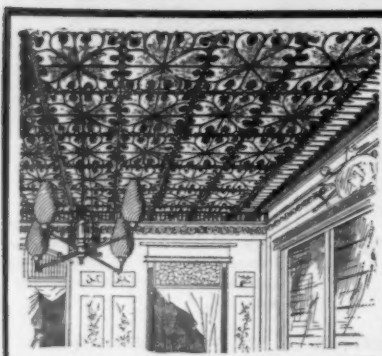
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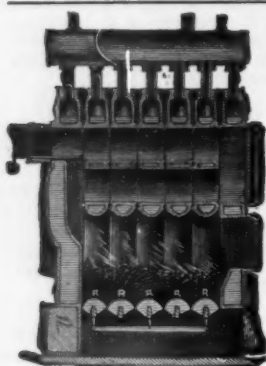
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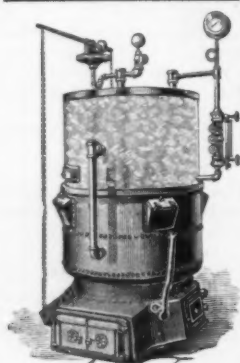
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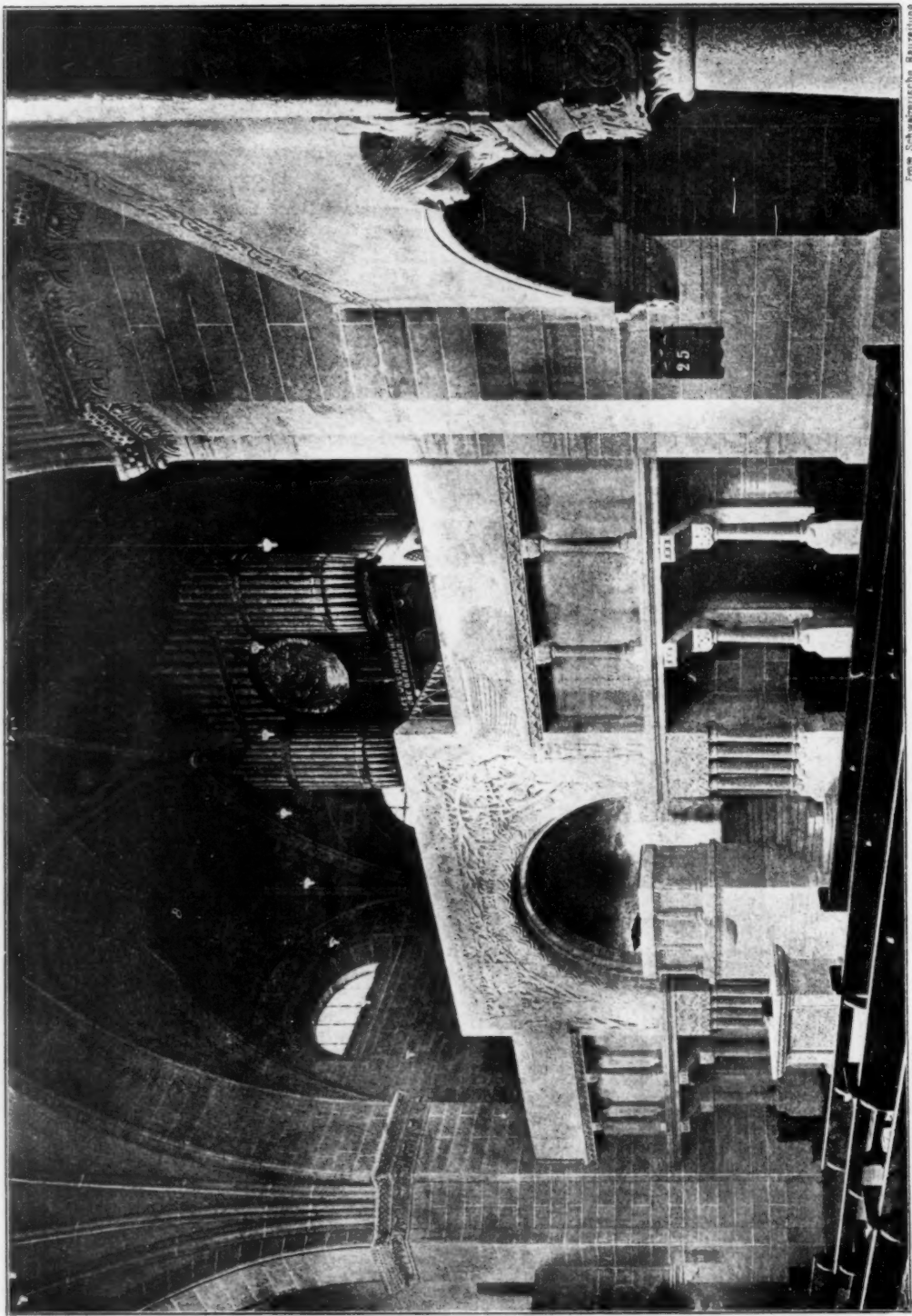


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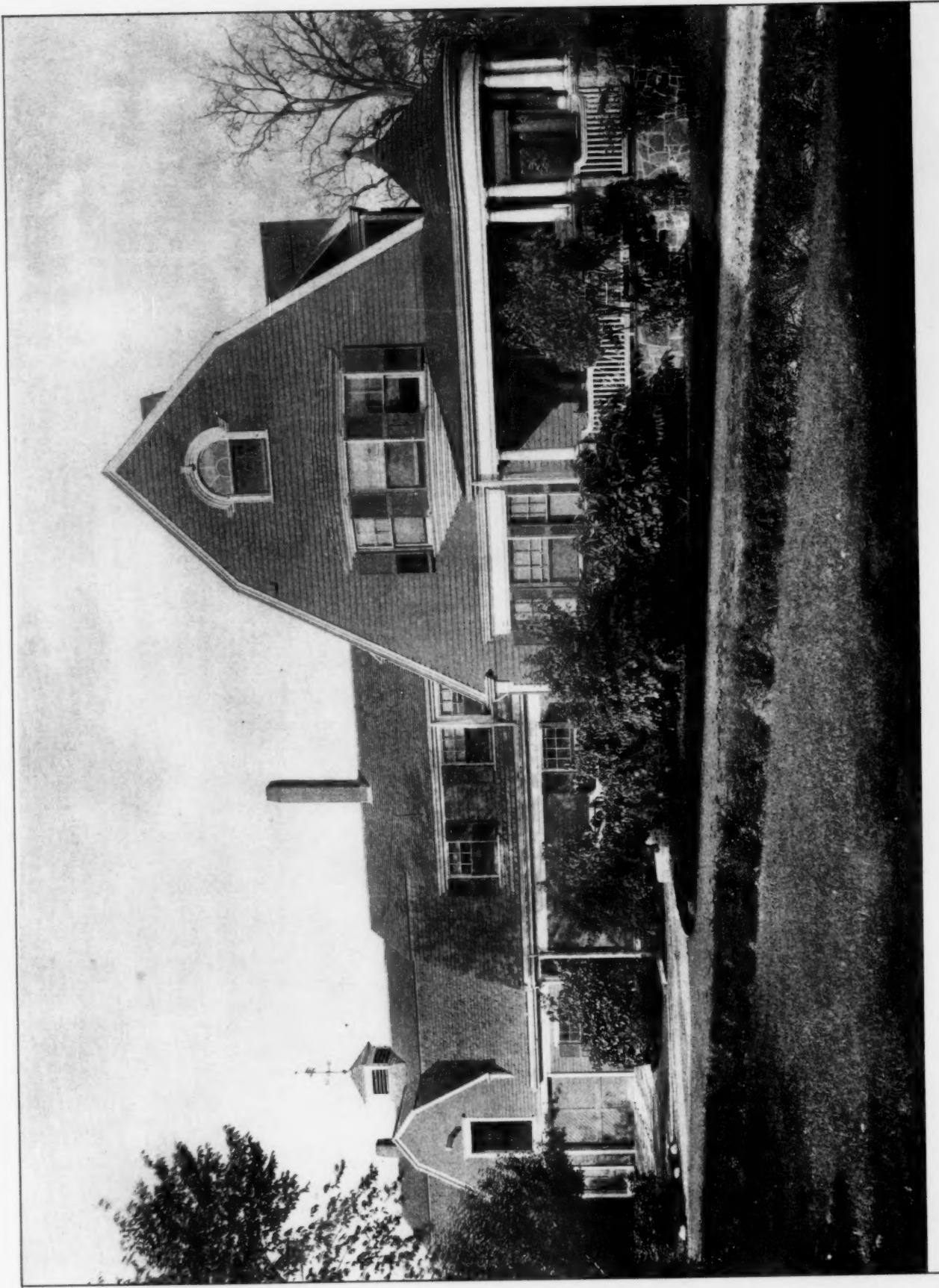
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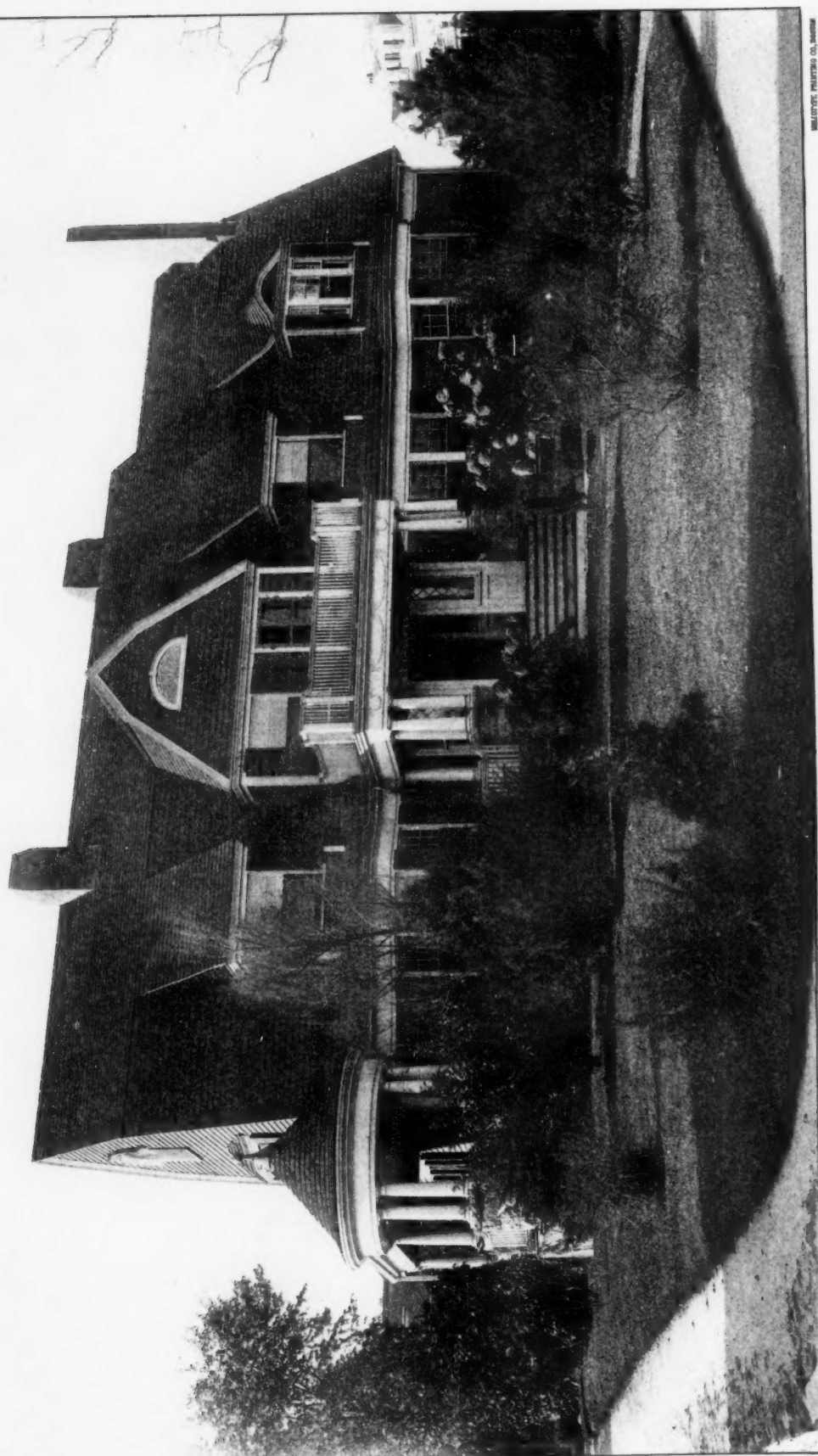
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