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THE American Association of Portland Cement Manufacturers recently held a meeting in New York, and appointed a committee to go to Washington and protest against the proposed increase in the duty on cement. Under the present law, the duty is thirty-two cents a barrel, and at that rate the Government collects nearly a million dollars a year from importations, while the American manufacturers, who can sell cement at a satisfactory profit at from twenty-five to fifty cents a barrel less than the cost of the imported cement, and who are gradually bringing their product to a very high standard, are quite contented with the existing conditions. Both Mr. Dingley's and Senator Aldrich's committees left the duty unchanged, but an amendment introduced by Senator Quay and passed by the Senate, raises it to forty-four cents a barrel. No one seems to understand why the change was made, for a representative of the American manufacturers appeared before the Dingley committee, to say that they were satisfied with the present rate, and their recent action in protest indicates that they were sincere in their first position. Although a difference of five or six per cent in the cost of Portland cement does not count for very much in building work, it seems altogether probable that the American manufacturers are prudent in opposing any material increase in the duty, which would lead to bringing fresh capital into the business. The history of the iron manufacture in this country shows how the profits due to high protection, intensified by combination, attract capital, until the monopoly breaks down by its own weight, and a scramble for a market ensues, which carries prices almost as far below a reasonable standard as they had been forced above it. To the consumer, there is a certain advantage in this temporary demoralization of prices, but, in the end, the distress of one branch of business reacts on all others, and people who would have liked to buy and use iron beams at a cent a pound have been unable to do so, because their own affairs did not encourage them to spend any money, even for bargains.

ANOTHER Senate amendment which has been adopted is one increasing the duties on plate-glass from twenty-five per cent to about eighty per cent *ad valorem*. Whether this change, which was also proposed by Senator Quay, will be accepted by the House of Representatives, remains to be seen, but the plate-glass manufacturers would probably be wise in opposing it, as the cement manufacturers have the change in the item which concerns them. The materials for making plate-glass are not costly, and are very widely diffused, so that although the manufacture in this country is practically in the hands of one corporation, an unreasonable profit would be likely to lead to the establishment of new factories; and the more irresponsible and unfortunate these concerns were, the more disastrous would be the break in prices which their operations might bring about. Probably no one who uses plate-glass would object seriously to the continuance of the present duty, and a general demoralization of what is now a very important business is to be dreaded by consumers, almost as much as by the persons more immediately engaged.

GENERAL COLLIS, the New York Commissioner of Public Works, has been seized with an inspiration, which has led him to propose to the Mayor to convert the lower end of the Central Park into a "grand plaza." As most people do not know what a "plaza" is, it is interesting to learn that General Collis explains it as "an open and unobstructed level, appropriately ornamented, and suitably paved and lighted." Pavements appear, perhaps naturally, to occupy a considerable tract in the Commissioner's mind, for he adds further, in enumerating the attractions of the plaza, that he proposes to provide "five avenues of approach" from the south to this "open area," all of which, in the near future, "will be laid with the most approved modern pavements." Whether the other people of New York would look upon this vast area of paving-stones with as keen enjoyment as the Commissioner is doubtful, but, to reconcile persons unable to appreciate paving-stones to the project, he explains that New York is the only city of considerable size which does not possess an area suitable for military or civic displays, and thinks that it would be a decided advantage to the city to have some place of assemblage, like the Place de la Concorde, in Paris, or Trafalgar Square in London, which, as he says "contribute largely to the attractiveness of those great cities," and "draw to them annually millions of strangers, whose lavish expenditures are distributed among business men and the working-classes." The Commissioner's estimate of the "millions" of strangers who incur "lavish expenditures" for the sake of seeing Trafalgar Square and the Place de la Concorde needs attention from the Comptroller, for, although many people pass through those spaces to get somewhere else, very few are seen to linger there, and those few would not stay long, if it were not for the Nelson Monument and the fountains, which would look quite as well in a smaller area.

THE Commissioner's plea that New York needs a plaza because Paris has a Place de la Concorde is hardly a happy one, for no one can forget that the most notable "civic display" that the Place de la Concorde has ever accommodated was that presented by the operations of the guillotine, monotonously chopping off the heads of the noblest men and women in France, while their fellow-citizens crowded about, yelling their applause. Moreover, it should not be forgotten that great open spaces in a crowded city afford peculiar dangers. Independent of the facilities which they offer for the gathering of excited and vicious mobs, such as have often collected in Trafalgar Square, a vast assemblage of people, however innocent, is never safe from the consequences of sudden movements. In the Place de la Concorde itself, on the occasion of the marriage of the Dauphin and Marie Antoinette, in 1770, a great crowd was collected to see the fireworks which closed the day's entertainment, when a panic broke out. So far as is known, there was no reason for alarm, but the pressure of the people nearest the fireworks, who, when the last piece had been set off, turned to go home, seems to have been taken as a sign of danger by those on the outside, and a wild terror spread through the multitude. The night was very dark, and the principal approach to the place, through the Rue Royale, was encumbered by some building operations, so that there was difficulty in escaping. This obstruction made the multitude frantic. Men hewed their way through the crowd with swords and knives, and the weaker ones, who were forced to the ground, were immediately trampled to death. More than twelve hundred persons were killed on the spot, and many others survived their injuries only a short time. Although the better lighting, and more accessible position, of the New York plaza would help in preventing such mishaps, there are other dangers to be feared. Many people in New York can remember when all police control in the city was suspended; when the mob reigned supreme, pillaging and burning until the streets were swept by bullets from the rifles of the troops hastily summoned from outside. The vicious element has greatly increased since 1863, and the provision of a space so easily barricaded, and so suitable for collecting and haranguing a mob of foreign ruffians, is not one which experience shows to be desirable.

THE new French review of applied art, *Art et Décoration*, fulfils, so far, the expectations raised by its prospectus. Covering, as it does, much the same ground as the *Studio*, its subjects are, of course, mainly illustrated by Continental examples, and it is curious to see how widely the lesser arts have diverged, in their recent development, in different countries of the world. Stained-glass working, for example, which seemed at one time likely to take from this country a renewed impulse as a means of artistic expression, has, of late years, decidedly fallen back in England, and to a certain extent here, into habits of antiquarian "correctness," that is, of mere copying, while the Continental glass, starting from the extreme naturalism of Oudinot and his school of twenty-five years ago, seems to be turning in an interesting manner to the conventionalism which, as all architects will agree, is, if not carried to excess, a very important quality in stained-glass for buildings. In the February number of *Art et Décoration* is a photographic reproduction of a little window, by Luc-Olivier Merson, which curiously illustrates this. The subject is the Bridge of Avignon, where, according to the legend, everybody "danced around." Nothing could be freer and prettier than the little group of dancing peasants; but, instead of being merely painted in enamel colors on the glass, as on a canvas, after the French manner of two or three decades ago, the movement of the figures is simplified, just as would be those of a doll with a small number of joints, and just as are those of the figures in the mediæval glass, and, obviously, with the same purpose, — that of expressing the movement with the smallest possible number of pieces of glass. Evidently, one who has only seven pieces of glass with which to represent a person dancing, as in the principal figure in the group, must make every piece tell, and to do so, must give the utmost possible expression to outline, simplifying the rest, so as not to rob the outline of any of its value. All this M. Merson has accomplished with charming skill; and, although the group is unsymmetrically arranged, it is really a fine study of that artistic conventionalization which consists in keeping the essentials of the expression sought, while sacrificing details which would interfere with the general effect.

OF decorative painting, in the modern sense, a form of art with which, as we may say at once, we have not much sympathy, *Art et Décoration* furnishes French examples, which are, at least, as queer as those which the art of any other people can display, and they have the advantage of being much better drawn than the "decorative panels" which lend horror to most American and English exhibitions; and the "art furniture" which it illustrates can hold its own against anything that an English "arts and crafts" display ever had to show. It must not be supposed, however, that eccentricities form the most important part of the matter which *Art et Décoration* offers its readers. On the contrary, although sideboards framed, apparently, of mutton-bones are to be found by those who like such things, the illustrations with which it is generously filled present, for the most part, the beautiful objects which the French love with such undying passion, described with the sympathetic intelligence which has made French artistic criticism the best in the world.

OUR readers will remember something of the history of the great glass-workers' strike at Carmaux, in France, which originated in the discharge of a man for having absented himself without leave to attend a Socialist Congress, and was taken up by the Socialist party in general, to serve as a demonstration against the "existing order." While the Socialist deputies and others, with political notoriety to gain or keep, were expending floods of oratory over the oppressions of capital, and the sufferings of the down-trodden toiler, the proprietors of the glass-works quietly began filling up their shops with new men, and when the strike was declared off by the workmen themselves, and their rush to get back their old positions was over, a considerable number remained, for whom no employment could be found. A new inundation of oratory followed. The proprietors of the works were invited to discharge their new men, so that the strikers could be reinstated; and, when they declined to do this, they were requested to cut down the hours of labor, reducing wages to correspond, so that more men might be employed, without increasing the total labor cost. The owners and manager of the works, who seem to have shown much good feeling toward their men, of course declined this proposition to tax their faithful men for the benefit of the unfaithful ones, and a new flourish of oratorical trumpets followed, after which it was announced that the workmen themselves, under the auspices of the Socialist politicians, would found a coöperative glass-factory, which should be "a refuge for oppressed labor against the tyranny of capital." The money for building the new factory was raised by private contributions, a lot of land was purchased, in pursuance of some negotiations which do not seem to be clearly understood, at Albi, nearly ten miles from Carmaux, where the workmen lived; and, when all was ready, a twenty-thousand-dollar order for bottles was secured from a dealer of Socialistic inclinations, with which to start the business. The managers of the affair evidently thought that, getting their capital for nothing, they were sure to make money, for, after a heated discussion as to the disposal of the profits of the enterprise, it was settled that whatever was left over, after paying the bills and the men's wages, should be put "in the treasury of the Socialist propaganda." Unfortunately, things did not turn out just as the orators expected. There was soon grumbling among the workmen, which was repressed with savage severity by the management. The contracts, instead of furnishing a goodly surplus for the Socialist propaganda, resulted in a loss; the bills were not paid, and the workmen's wages fell far into arrears; and now, after only a few months' operation, the works are closed, the debts are unpaid, and the unhappy workmen, with their wives and children, are begging in the streets of Carmaux. Meanwhile, the Socialist orators, whose temper does not seem to have been sweetened by the outcome of this cruel farce, are making themselves more conspicuous than ever by their violence in the Chamber of Deputies, where their language recalls that which used to season the deliberations of the Knights of Labor in this country.

WE do not know how many of our readers will recognize the "rainbow trout" as an American fish, but it appears that there is a variety, so-called in France, on account of the brilliancy of its colors, which is just now the object of much interest on the Continent. The Fish Commission of Geneva recently imported some eggs of this species, which we imagine to be our ordinary brook trout, and found that, when properly fed after hatching, they increased in size so fast as to overtake the lake trout, hatched six weeks before, from eggs of much greater size. What is proper feeding for trout is interesting to know. The Commission placed two hundred newly hatched ones in a basin in the Brunswick garden, and fed them regularly with minnows, chopped horseflesh, and small fish. At the end of twelve months, one hundred and six trout remained in the pool, weighing, in all, twenty-two pounds. The largest fish weighed nearly seven-tenths of a pound, but the smallest weighed less than an ounce, this inequality of development being common among trout under artificial raising. This rapid growth is attributed by the Commission, says *Le Génie Civil*, to the great activity of the American trout, which is almost always in motion, and snaps up food which floats away from the more sluggish lake trout. Naturally, therefore, the brook trout eats more, and requires liberal feeding. The most salable size for "rainbow trout" in Geneva is about ten ounces. To reach that weight, in eighteen months from hatching, it must eat about five times that amount of food, or something over three pounds. Now, while three pounds of horse-meat in a year and a half is not very much, where a person only keeps one fish, a pond containing a thousand little trout, which is a very small number, our State fish-hatcheries often raising a million at a time, will need to be supplied with three thousand pounds of food in eighteen months, or nearly six pounds a day, on an average, the quantity being, of course, much greater toward the end of the time.

STATICS OF STRUCTURES. — THEORETICAL AND APPLIED.[1]—VI.

THEORY OF THE TRUSS.

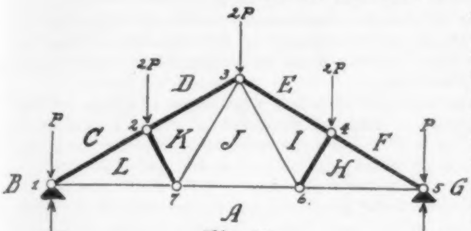


Fig. 48.

115. A truss is a frame-work of struts and ties, the middle lines of which all lie in the same plane. These struts and ties, or *members*, are combined at their ends by joints, or *panel-points*, which in theory are assumed as frictionless, but in practice are generally riveted in order to give the greatest possible rigidity.

The *external* forces acting upon a truss are the loads and reactions,[2] as for instance, $B\,C$, $C\,D$, $D\,E$, etc., and $G\,A$ and $A\,B$ (Fig. 48). To facilitate calculating, all the loads are assumed as acting at the panel-points; while the effect of any concentrated loads acting upon a member between panel-points is treated separately, according to the theory of beams.

The external forces are counteracted by the *internal* forces, or stresses, either compressive or tensile, called forth in the members.

116. If a truss is to be in equilibrium, that is, if all its members and panel-points are to remain in their original positions after the external forces are applied, the following conditions must be fulfilled: —

1. The external forces (*i. e.*, loads or reactions) acting upon any panel-point must be in equilibrium with the internal forces, or stresses, existing in the members which meet at that point. If the external and internal forces are thus in equilibrium for each separate point, it follows that they will be in equilibrium for the whole truss.

2. The internal force or stress called forth in a member must act in the direction of that member, and be coincident with its axis. For, let us cut the truss in Figure 48 along the line m — n, and, removing the right-hand part, replace the latter by forces, equal to it in effect and applied to the severed members $D\,K$, $K\,J$ and $J\,A$ (Fig. 49), in order to keep the remaining left-hand part in position. It is apparent that these forces must act in the direction of their respective members, which would otherwise be free to rotate about their joints and thus destroy the equilibrium of the truss. But these forces take the place of the stresses, which must, therefore, act in the same manner.

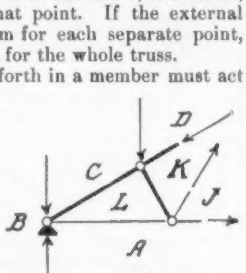


Fig. 49.

117. A truss can be analyzed either graphically or analytically. We shall take the former method up first. It is based on the possibility of combining the loads and members about each panel-point into closing force-polygons (§ 52) by virtue of their being in equilibrium. This can always be done, provided not more than two of the forces are unknown as to magnitude and sense.

Thus, for instance, take panel-point No. 1, Figure 50. Acting at it are the reaction $A\,B$ and the load $B\,C$, the magnitude and sense of both of which are given; and the stresses in the members $C\,L$ and $L\,A$, which are to be found. We combine these into a closing-force polygon (Fig. 50*a*), by adopting a convenient load-scale and drawing, first, $a\,b$ parallel to $A\,B$, and with an upward sense; then, $b\,c$, downward; then, $c\,l$ parallel to $C\,L$; and finally, $l\,a$ parallel to $L\,A$ and outward from a until it intersects $c\,l$ at l. By measuring $c\,l$ and $l\,a$ with the load-scale, the amount of the stresses in the members $C\,L$ and $L\,A$ can be ascertained.

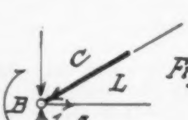


Fig. 50.

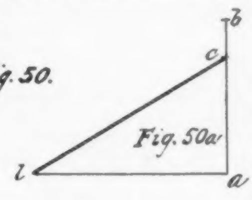


Fig. 50a.

118. In determining the sense of $c\,l$ and $l\,a$, and thereby the nature of the stresses in their corresponding members, the following is to be observed:

In reading the forces in Figure 50, the same direction must be followed entirely around. Thus, if we adopt the direction towards the right, that taken by the hands of a clock, the reaction will read $A\,B$; the load, $B\,C$, and not $C\,B$; the upper member, $C\,L$, not $L\,C$; and so on.


Fig. 51a.

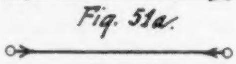


Fig. 51b.

Further, in reading the sides of the polygon in Figure 50*a*, the letters must be taken in the same order in which they occur around the joint in Figure 50. Thus, the polygon side corresponding to member $C\,L$, for instance, is read $c\,l$, and not $l\,c$. The sense of $c\,l$ is downward, toward the left; that of $l\,c$ would be directly opposite.

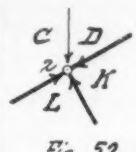


Fig. 52.

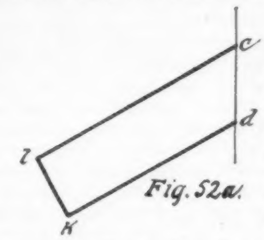


Fig. 52a.

The polygon in Figure 50*a* being a closing one, its sense must be constant all around (§ 52); that is, beginning at a, the letters must succeed each other in the same order in which they were taken about the joint in Figure 50; or, a — b — c — l — a, corresponding to A — B — C — L — A.

Having begun by giving $a\,b$ an upward sense, corresponding to the upward direction of $A\,B$, similarly $b\,c$ a downward sense, corresponding to $B\,C$, we find, proceeding in the direction thus established, that the sense of $c\,l$ is downward, and that of $l\,a$ to the right. Returning to Figure 50, we place corresponding arrows on the members. They must be drawn very close to the panel-point, for a reason which will become apparent as we proceed.

119. It must be borne in mind that these arrows represent the *stresses* exerted by the members, and by no means the *strains* to which they are subjected; for it is the former which, together with the external forces, hold the equilibrium about the point (§ 116).

Thus the stress in member $C\,L$ exerts a pressure toward the joint; it resists a strain which is directed toward the cross-section of the member, tending to crush or bend it; $C\,L$, therefore, is said to be in *compression*. And the stress in member $L\,A$ pulls away from the joint; it resists a strain which tends to stretch or pull the member apart; $L\,A$, therefore, is said to be in *tension*.

In other words, a member in compression is represented with arrows directed outward, as in Figure 51*a*; and one in tension, with arrows turned inward, as in Figure 51*b*. The former is called a *strut*, the latter a *tie*.

120. Let us now pass on to the next panel-point, No. 2 (Fig. 52). We begin with $l\,c$ (Fig. 52*a*), one of the stresses just found; then comes $c\,d$, downward; then $d\,k$, parallel to $D\,K$; and finally $k\,l$, parallel to $K\,L$, starting out from l and intersecting $d\,k$ at k.

Proceeding again around the joint in a right-hand direction, in the order of L — C — D — K — L, we find $l\,c$ to have an upward sense; therefore, we place an arrow on $L\,C$ directed toward the panel-point; next, $c\,d$, of course, has a downward sense, corresponding to $C\,D$; then $d\,k$ has a downward sense; accordingly, we place an arrow directed downward, toward the panel-point, on $D\,K$; and finally, we find that $k\,l$ has an upward sense; after placing a corresponding arrow on $K\,L$, all the forces about the joint have been determined. We find that all the members are in compression.

121. In this manner the entire truss could be analyzed, but instead of drawing all the polygons separately, it is more convenient to construct a *stress-diagram* by adding each succeeding polygon to the one preceding it, so that sides common to several will occur but once.

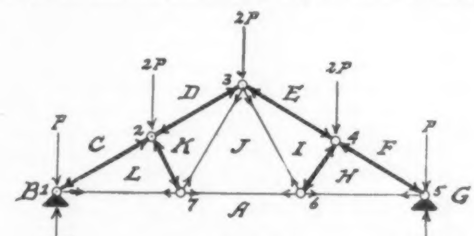


Fig. 53.

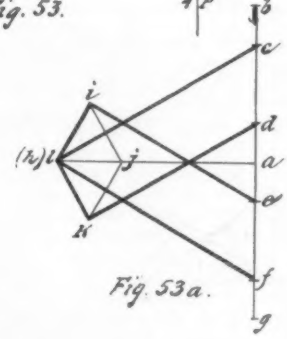


Fig. 53 a.

Suppose the truss in Figure 53 to be uniformly loaded by $8\,P$. The upper chord (consisting of the members $C\,L$, $D\,K$, $E\,I$, $F\,H$) being divided into four equal sections, each section will carry $2\,P$, half at each end or panel-point. Those panel-points common to two sections will therefore get $2\,P$, while the end joints will get $1\,P$ each.

[1] Continued from No. 1115, page 45.

[2] A load or truss-member is denoted by the two capital letters placed on either side of it. Farther on, in the stress-diagrams, the stress of a member is denoted by corresponding small letters placed at each end of the stress-line. This method, based on the reciprocity existing between the truss and stress diagrams, is known as "*Bow's Notation*," in honor of its originator.

122. We first draw a load-line (Fig. 53a), beginning with BC (bc), at the left-hand end, and adding CD (cd), DE (de), EF (ef) and FG (fg). These all act downward; their sum is equal to the two reactions, ga and ab, which, of course, act upward. Since the truss is symmetrical, the latter are equal, which locates a at the middle of the load-line.

We can now draw the polygon for joint No. 1 again, exactly as we did before, getting: ab, upward; bc, downward; cl, downward;

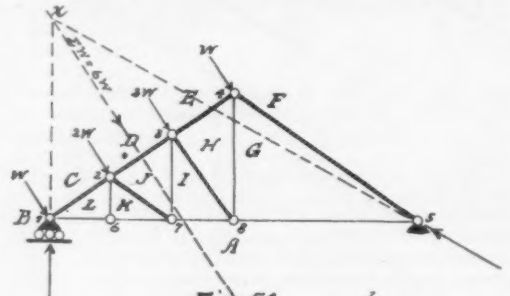


Fig. 54.

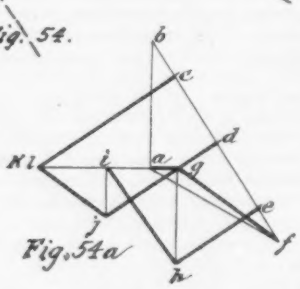


Fig. 54a

and la, to the right. After placing corresponding arrows on the members, closely around the joint, we proceed with joint No. 2: lc, upward; cd, downward; dk, downward; kl, upward; arrows correspondingly.

Joint No. 7: al, to the left; lk, downward; kj, upward; ja, to the right. Arrows correspondingly.

Joint No. 3: jk, downward; kd, upward; de, downward; ei, upward; ij, downward. Arrows correspondingly.

Joint No. 6: Symmetrical with joint No. 7; aj, to the right; ji, upward; ih, downward; ha, to the left. Arrows correspondingly.

Joint No. 4: Symmetrical with No. 2; hi, upward; ie, downward; ef, downward; fh, upward. Arrows correspondingly.

Finally, joint No. 5: ah, to the left; hf, downward; fg, downward; ga, upward. Arrows correspondingly.

123. If we now measure the stresses in Figure 53a with our load-scale, and make use of the arrows in Figure 53 to determine their nature, the result can be embodied in the following table:

Member.	Compression.	Tension.
CL	$6P$	——
DK	$5P$	——
EI	$5P$	——
FH	$6P$	——
LK	$1.75P$	——
KJ	——	$1.75P$
JI	——	$1.75P$
IH	$1.75P$	——
LA	——	$5.25P$
JA	——	$3.5P$
HA	——	$5.25P$

Frequently, when the truss is not very complicated, the amounts of the stresses are written on the members, and their natures indicated by the signs + and —; the former signifying tension, the latter compression.

We find that the members composing the *upper chord* (CL, DK, EI, FH) are all in compression, while those of the lower chord (AL, AJ, AH) are all in tension. This is always the case in roof-trusses.

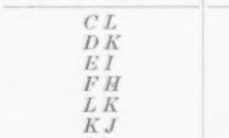


Fig. 55.

124. In Figure 53 all the loads are directed vertically downward, that being the direction in which the *static* and *snow loads*, and the *vertical component* of the *wind* act. For the wind-pressure, the direction of which usually makes an angle of 10° with the horizontal, can be resolved into a vertical and a horizontal component. In the case of ordinary roofs, that is, such having a moderate pitch, the vertical component is alone taken into consideration, while the horizontal component is dropped; it being highly improbable that the maximum snow and wind loads will both occur at the same time. When working upon this assumption, however, the vertical wind-load is applied to both sides of the roof at once although the wind itself can act only from one side at a time. This adds to the factor-of-safety, and also simplifies the stress diagram.

125. When the roof is steeper, or apt to be exposed to strong winds, separate stress diagrams have to be made for the wind-pressure, which is then reduced to a direction normal to the upper chords of the truss, by means of trigonometrical formulas which shall be given later on. Two diagrams have to be made, one for *left*, and the other for *right* wind-load.

Figure 54a is an example of a left wind-stress diagram for the truss shown in Figure 54. Suppose the latter to sustain a total wind-pressure, or ΣW, of 6 W. Then the individual pressures, or loads, will be 1 W for each of panel-points Nos. 1 and 4, and 2 W for Nos. 2 and 3.

126. In order to find the reactions, one of the ends of the truss must be assumed as resting on *rollers*. Bearings of this kind are required for trusses of larger span, to permit of their expanding and contracting with changes in temperature.

Since the reaction passing through a roller-bearing is always normal to the plane along which the rollers are free to move, we get, by assuming such a bearing under the left-hand foot of our truss, the left-hand vertical reaction AB. By prolonging this until it intersects ΣW at x, the right-hand reaction FA is found as the line drawn through x and the right-hand point of support. For, if three non-parallel forces are to be in equilibrium, they must all pass through one point. To find the magnitude of the reactions, we draw the force-triangle abf, Figure 54a; bf (equal to ΣW, or $bc + cd + de + ef$) being the load-line of the stress diagram to follow.

127. Now, beginning with panel-point No. 1, we get:—ab, upward; bc, downward; cl, to the left; la, to the right; we place arrows indicating these directions around the panel-point.

Panel-point No. 6: al, to the left; lk, upward, but infinitely small, *i. e.*, k coincident with l; ka, to the right. Arrows correspondingly. There is no stress in LK.

Panel-point No. 2: lc, upward; cd, downward; dj, downward; jk, upward; kl, infinitely small, as before. Arrows correspondingly.

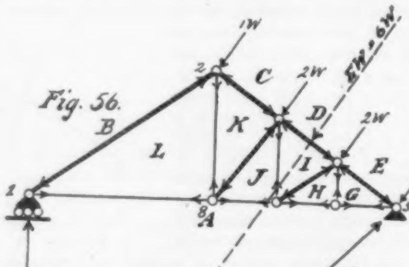


Fig. 56.

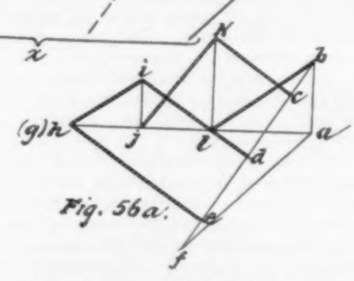


Fig. 56a.

Panel-point No. 7: ak, to the left; kj, downward; ji, upward; ia, to the right. Arrows correspondingly.

Panel-point No. 3: jd, upward; de, downward; eh, downward; hi, upward; ij, downward. Arrows correspondingly.

Panel-point No. 8: ai, to the left; ih, downward; hg, upward; ga, to the left. Arrows correspondingly.

Panel-point No. 4: he, upward; ef, downward; fg, upward; gh, downward. Arrows correspondingly.

Panel-point No. 5: gf, downward; fa, upward; ag, to the right.

128. There is no strain in the *web-members* (the struts and ties between the upper and lower chord) of the right-hand side of the truss. This can be readily seen by passing a section $m — n$ through one of the panels of this side (Fig. 55), and regarding that part to the right of it.

Now, panel-point No. 5 can only be in equilibrium if the sum of the moments of all the forces acting about it are equal to zero. But the moments of MF, FA, and AN are all equal to zero, because these forces pass through the point; therefore, Mx must be equal to zero, and that, of course, is only possible if M is equal to zero.

129. We find by regarding the arrows in Figure 54, that the left-wind load calls forth compression in both upper chords, the right-hand half of the lower chord, and the diagonals; and tension in the left half of the lower chord and the verticals.

130. Figure 56a shows the stress diagram for the wind coming from the right-hand side; the truss bearings remaining as before—rollers under the left-hand foot. The reaction AB for that side, therefore, is again vertical; and the right-hand reaction is found by prolonging ΣW downward until it intersects AB at x. The right reaction is then passed through x and panel-point No. 5. The magnitude of the two is again found by drawing the triangle b (c, d,

e) *f a*. Then, beginning with panel-point No. 1, we get for the stress-diagram: *a b*, upward; *b l*, downward; *l a*, to the right. Arrows correspondingly.

There being now no stress in the web-members of the left-hand part of the truss, the next panel-point we come to is No. 4, for which we get: *l b*, upward; *b c*, downward; *c k*, upward; *k l*, downward. Then going on to panel-point No. 8, the reader will have no difficulty in tracing the remainder of the diagram, which is very much like the last. There is no stress in member *H G*, that is, *g* and *h* coincide.

131. After this diagram has been completed, it must be compared with Figure 54*a*, with respect to every member, to ascertain whether the left or the right hand wind load causes the greater stress. This greater stress must then be added to that called forth by the vertical loading — the dead-weight and the snow, as previously found, and the cross-sectional area of each member proportioned to the sum. O. F. SEMSCH.

[To be continued.]

THE NARROWING INFLUENCES OF TECHNICAL EDUCATION.

IN the following extracts from a paper read before the Boston Society of Civil Engineers recently, Prof. George F. Swain broaches a subject which has often occupied our own minds — looking at the matter from the standpoint of the would-be architect, of course — and in talking with young men we have often tried to inculcate the view which has appealed so strongly to Professor Swain.

If the following extracts are read heedfully and if the reader will substitute "architect" wherever "engineer" occurs, perhaps something may be done toward correcting the narrowing tendency of technical training which produces quite as deplorable results on the architect as it does on the engineer.

I desire to call your attention this evening to a few general matters connected with the profession of the engineer that have frequently occupied my thoughts. . . .

To my mind, the principal defect among engineers to-day is a lack of breadth and culture. Engineering, in its highest sense, is no doubt a learned profession, but it is too apt to be a narrow one. In many of its branches it should, if properly practised, require as great learning and as firm a mastery of scientific principles as any other profession. But there is, to my mind, no doubt that the engineer does not occupy as high a position in modern life as do members of the professions of law, medicine, or theology, and I believe it is mainly on account of this defect. The engineer is too often looked upon as a skilled artisan, as one who works with actual materials, but without the aid of art, and sometimes without the aid of science. There are, of course, many exceptions, but I believe that engineers to-day have, as a rule, less breadth of education and sympathy, are narrower and less cultured than members of these other professions. How many engineers are well acquainted with literature or history, art or music? I repeat, there are exceptions, but they only prove the rule. Engineers associate too exclusively with men of their own profession and not enough with leading men of other callings. . . .

I believe it to be a fact that, in engineering, scientific knowledge thus far has counted for relatively less in proportion to experience and judgment than in other professions. Engineering is, or at least has been, largely practical. It has depended, perhaps, more on good sense than on the calculus; more on judgment than on mechanics; more on experience than on books. This is true, I think, of all branches, though perhaps less so of electrical engineering than of others; and yet, even in this branch, which is by some supposed to be extremely mathematical, and in which the science has preceded the practice, a prominent young electrical engineer, a graduate of one of our foremost colleges, being recently asked by a friend of mine how much mathematics he used in his work, said that he had no occasion to go beyond the slide rule. . . .

We must realize that the engineer should strive not only to make himself, first of all, a good engineer, but, secondly, a man of broad and liberal sympathies, and that in his professional work he should encourage in every possible way the science of engineering, discouraging rule-of-thumb methods, and striving to do everything in his power to make his profession rank with the other learned and scientific professions. During the last few decades our engineering schools have sprung into existence, and they have been doing a great work in improving the status of the engineering profession. But there is yet room for even greater exertion. Even the young man who graduates from one of them with a creditable record, equipped with much book knowledge, and with a command of the principles of modern science sufficient to launch him on his career, may be and generally is woefully lacking in breadth. There are many such men, and they have done, and will do, excellent work. But many of them somewhat resemble a Western town which has sprung up in a few years from the prairie, completely equipped with water-works, electric-lights, a sewerage system, street-railroads, and all the appliances of modern civilization. And yet something is lacking — the mellowness which comes from association with the traditions and learning of the past. . . .

Those who have charge of the schools in which no general studies are taught claim that the engineering school should be a post-graduate institution; that the young man coming there should be a college graduate, and that the engineering course should be such as to offer the fullest technical training. This, I admit, would be an ideal condition, but I believe it can never be attained in this country, where a large majority of the young men who attend engineering schools will have neither the time nor the money to take a college course first. They now come to the technical schools with essentially the same amount of preparation which students possess who enter college, and this will continue to be the case. In engineering schools, therefore, which offer only technical studies, a large majority of the graduates have been and will continue to be equipped only with the general knowledge that they have acquired in the preparatory schools. Their technical training is narrow, and tends to stifle what little interest they may originally have taken in general studies. . . .

Let me also express my conviction that any young man who has in him the elements of success will be a better and broader engineer, as well as a better citizen, ten or twenty years after graduating, for having devoted some considerable time during his school days to general literary or economic studies. . . .

If my view is correct, it becomes the duty of every engineer, whether he has had the advantage of a technical training or whether he has by experience, native good sense, and good judgment attained a responsible position — every engineer, I say, should lend his aid to counteract the narrowing tendencies of the profession. He should, other things being equal, in employing assistants give the preference to men who have had a technical training, and, more, he should give the preference, other things being equal, to men who have had a general training as well as a technical training. He should encourage young men to enter the engineering schools, and discourage the attempt to become engineers upon leaving the preparatory school. He should do everything in his power to broaden himself by general reading and studies, and by associating with men in other callings. Only those in a profession can raise its standard.

I do not wish to be understood as definitely advising a young man who wishes to become an engineer to take a college course before going to a technical school. I simply wish to insist that he should in some way gain a breadth of training outside of his technical studies. One way is to take a college course first; another is to go to a technical school where the course is broad, and where, if he has the time, he may spend five or more years, instead of the usual four. To discuss the relative advantages of these two plans would lead me too far, and is not necessary in the present connection.

Let us take a step farther. The student graduates from the technical school and enters upon the practice of his profession. He has been received by the profession, and its status has been altered correspondingly. According as he is good or bad, its standard has been raised or lowered. Thenceforth he must labor with the rest to improve the standard. This leads us to the proposition, which has already been stated in another way, that we should all labor to attract only the best men into the profession. One of the first questions presenting itself to the young man concerns his entrance into some engineering society, and we are thus brought to consider the relations which engineering societies should have to new members of the profession. I will consider but one question in this connection, for I have already occupied too much of your time: What should be the requirements for admission to engineering societies? Granting that the object of an engineering society is to raise the standard of the profession, and that this can be done best by encouraging the scientific element, the educational element, the broadening element, it seems to me that in the larger engineering societies there should, in the first place, be several grades of membership; in the second place, that these grades should differ very considerably in their requirements; and in the third place, that education should be considered as the equivalent of a very considerable period of experience in judging of a young man's eligibility.

No society can make its membership a criterion of ability. There always will be poor men inside and good men outside. I think the requirements for the lowest grade of membership should be very low; for the highest grade, very high. Men can but be improved by entering a professional society, and by thus improving them the standard of the profession as a whole will be raised. In the American Society of Civil Engineers a four years' technical course is considered equivalent to two years of actual practice. I believe it would be more nearly correct to reverse the figures, and consider that a technical course of two years should be equivalent to four years of actual practice. Certainly, a young man who begins the practice of his profession at sixteen years of age, and by the time he is twenty has spent four years holding a rod, keeping notes, and perhaps using a transit, should not be considered the equivalent, in the influence which he is able to exert on the profession, of a young man who has spent the same four years in the college or technical school, and the difference between the two men will be brought out still more fully in the succeeding four years. To my mind, it would, perhaps, be nearer right to make one year of school work equivalent to one year of practice. A man of brains does not need to hold the rod for a year. If he is equipped with the principles of his profession, and has the practical sense without which no man can succeed, a very short apprenticeship in many directions should be sufficient to qualify him for advancement. I believe, therefore, that too much weight is given to experience and too little to education, judgment and practical good sense in the requirements of some of our engineering societies. I personally know of instances where young men have been rejected who have applied for admission, whom I knew to be broader, abler, and better men in every way than many others who had for years been members. . . .

The practising engineer, whether he be a graduate or not, should encourage a young man to get the best education he can, and to encourage the most cordial relations between the school and the society. Members of a society should be encouraged to go to the schools for data, for experimental results, and for such other help as they can gain there, and those in charge of professional schools should realize that their success depends upon the support that they receive from the profession.

SOCIETIES

SKETCH-CLUB OF NEW YORK.

THE regular monthly meeting and dinner of the Sketch-Club of New York was held on Saturday evening, June 5th, at Treiers Roof Garden, 143 Liberty Street, New York City. Mr. Evans, the President, occupied the chair. Twenty-five members were present.

The Chairman of the Entertainment Committee, Mr. Cramer, read a letter from Mr. Stevenson Constable, Superintendent of Buildings, New York City, regretting his inability to be present, unforeseen business having arisen which prevented his addressing the Club. Mr. Kiess, the Chairman of the House Committee, having resigned, an election was held to fill the office. Mr. Julius C. Kastner was nominated. On motion, the nominations were closed. It was moved and seconded that the Secretary cast one ballot for the nominee. Motion being carried, the ballot was cast and Mr. Kastner was declared duly elected. The attention of the members was called to the competition for the cover of the "*Home Magazine.*" Prizes of $15 and $10 are to be given for designs placed first and second, respectively.

On motion, the meeting adjourned at 10 o'clock.

ARTHUR M. DUNCAN, *Recording Secretary.*

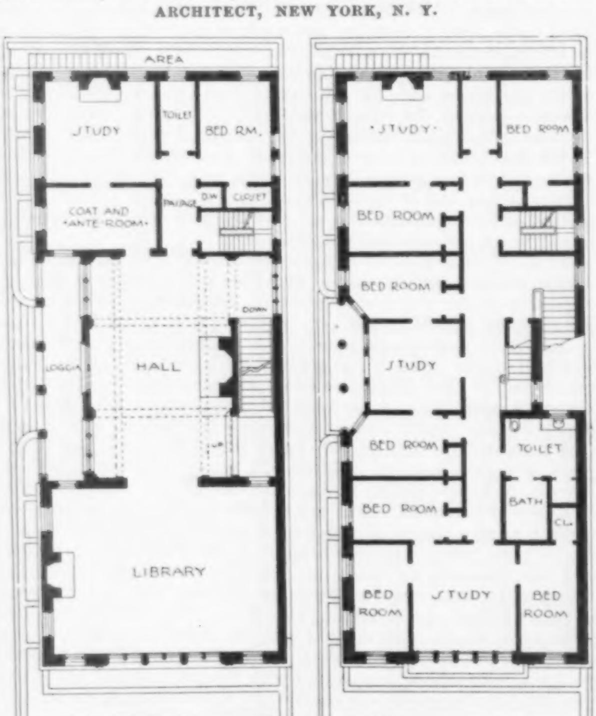
THE ILLUSTRATIONS

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

SKETCH FOR A COUNTRY HOUSE. MR. FRANK A. HAYS, ARCHITECT, PHILADELPHIA, PA.

[Issued with the International and Imperial Editions only.]

YORK HALL, NEW HAVEN, CONN. MR. GROSVENOR ATTERBURY, ARCHITECT, NEW YORK, N. Y.



·FIRST·FLOOR PLAN· ·SECOND·FLOOR·PLAN·

DETAILS OF THE SAME: TWO PLATES.

PROPOSED SCHOOL-HOUSE, RADNOR, WAYNE CO., PA. MR. DAVID KNICKERBACKER BOYD, ARCHITECT, PHILADELPHIA, PA.

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

DOORS AND DOORWAYS, NO. 5: WEST DOOR OF THE CHURCH OF ST. MICHEL, LESCURE, TARN-ET-GARONNE, FRANCE.

EQUESTRIAN STATUE OF GENERAL FAIDHERBE, LILLE, FRANCE. M. PUJOL, ARCHITECT; M. J. A. MERCIÉ, SCULPTOR.

[Additional Illustrations in the International Edition.]

STAIRWAY LEADING TO THE ROTUNDA GALLERY: LIBRARY OF CONGRESS, WASHINGTON, D. C. ARCHITECTS, MESSRS. SMITHMEYER & PELZ; P. J. PELZ; E. P. CASEY.

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COMMUNICATIONS

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

FIREPROOFING AT THE PITTSBURGH FIRE.

CINCINNATI, O., June 2, 1897.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Your statement in issue May 29 is wrong. Columns and girders in warehouse at Hamburg was not enveloped in concrete. It was wood floor (mill-construction type), lattice columns and single I-beams (cantilever form). No protection to columns and girders whatever.

A fine account was published in *Bauzeitung.* I have nothing on hand at present of it, but write this from remembrance.

On the contrary, experiments that the City of Hamburg carried on in the last couple of years, show up well for concrete iron protection. See the last two issues of *Bauzeitung.* L. EID.

BOSTON, MASS., May 29, 1897.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — As many reports are being circulated, relative to the results of the fire at Pittsburgh, and as some are thoroughly misleading, it appears pertinent that these should be rectified.

The *Engineering News* of May 20th contains a fairly complete description of this conflagration: and from such description, together with its diagrams and photographs, numerous opinions are offered.

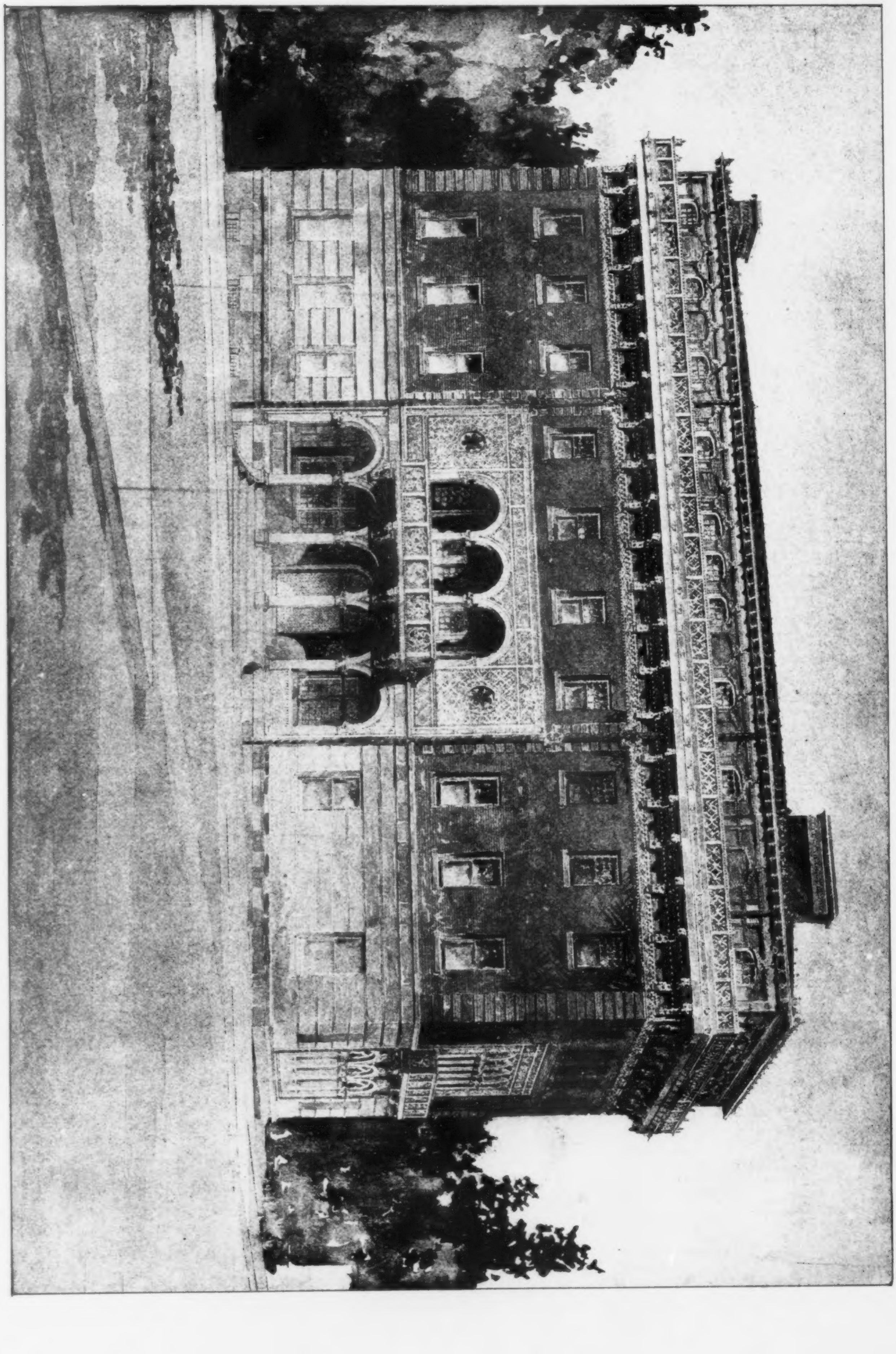
To answer the common query "of the feasibility of fireproofing," the results show: that cellars are all that are left to mark the spot where non-fireproof buildings stood; while the fireproof structures still stand, invulnerable against the progress of this fiery demon. They show but slight damages to the structural portion of the buildings, except those occasioned by the fall of an immense steel tank that fell from its support on the roof and tore its way to the bottom.

The fire, considered in detail, was discovered in the Jenkins building. This building was of the style known as the "slow-burning construction," six stories high and filled with highly inflammable merchandise. From the time of discovery of the fire to the time of sending in the alarm was probably about twenty minutes. During this time not much headway had been made by the fire, it still being confined to a barrel of waste-paper and offal. The flames, though, at this time reached high up in the elevator shaft, in which the barrel was located. The watchman now became aware that he could not successfully combat the fire alone and sent in the alarm.

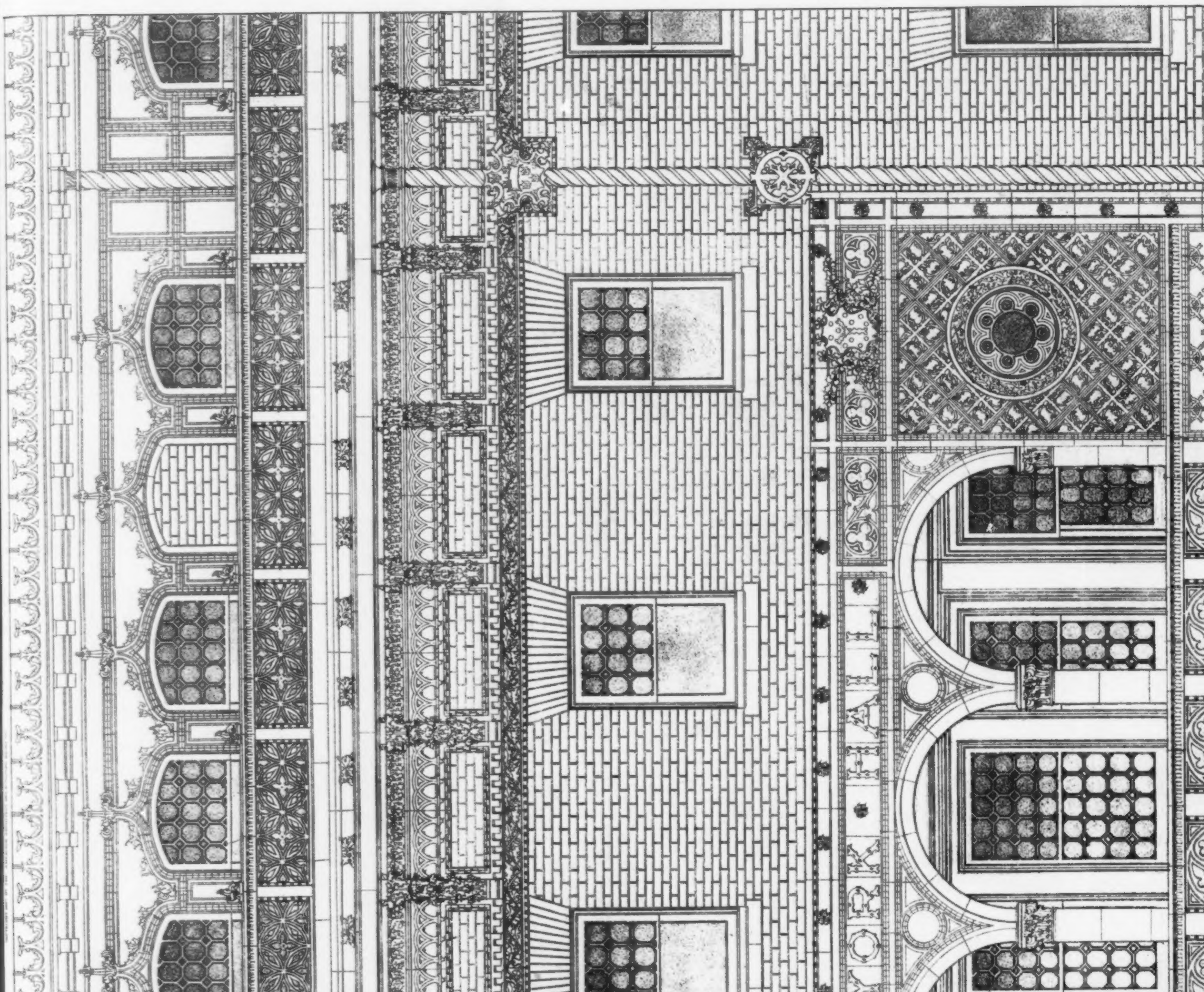
The fire spread with alarming rapidity and shortly before forty minutes had expired from time of sounding the alarm, the firemen had ceased trying to save the building, having decided it was hopelessly beyond the control of the department.

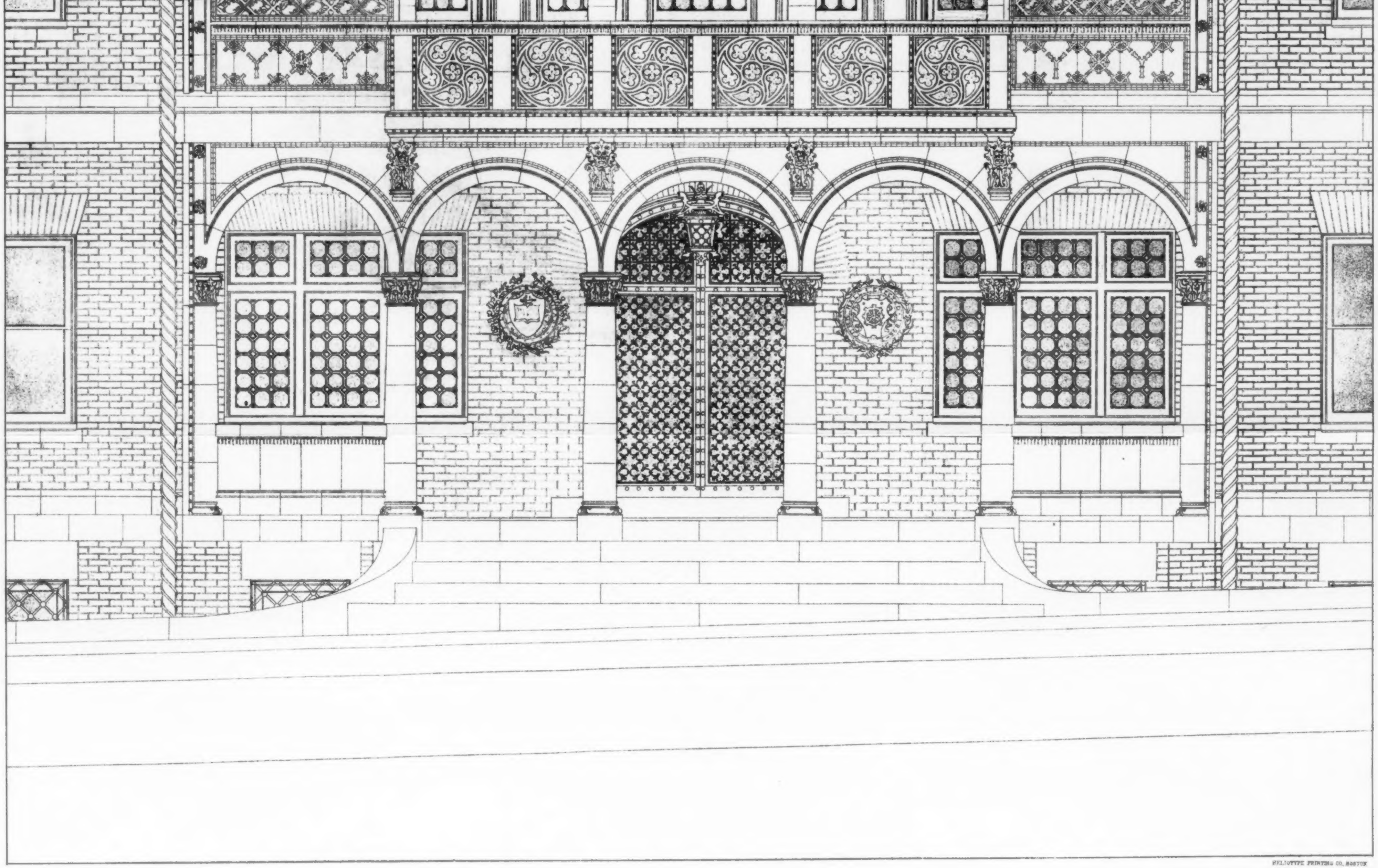
This should stay the arguments of the advocates of the so-called "slow-burning construction." It also offers us an opportunity to choose from example rather than from argument.

The wind bore the flames to the two Horne buildings, directly opposite. The Horne store-building was a six-story structure, steel



YORK HALL, NEW HAVEN, CONN.
GROSVENOR ATTERBURY, Architect.





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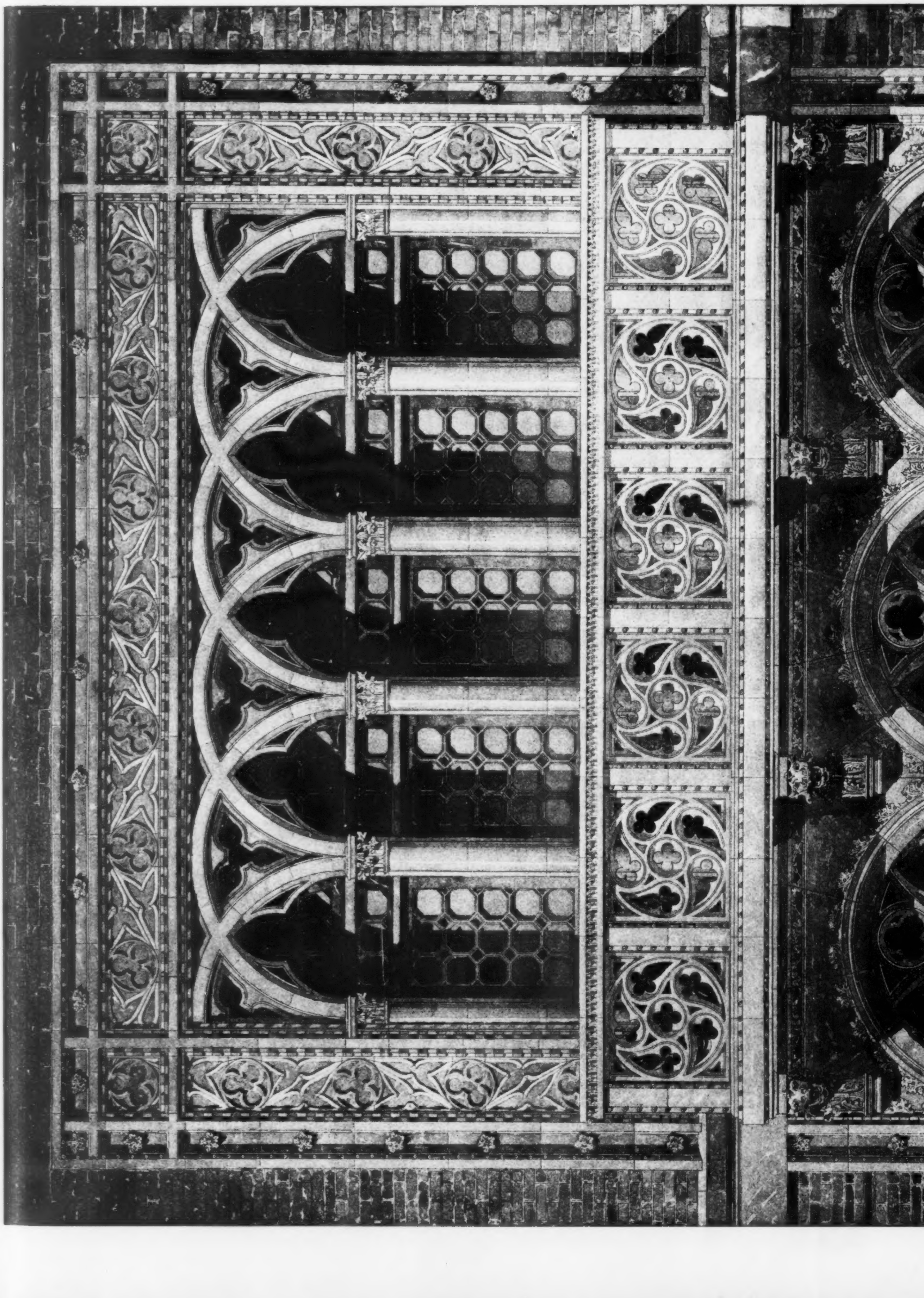

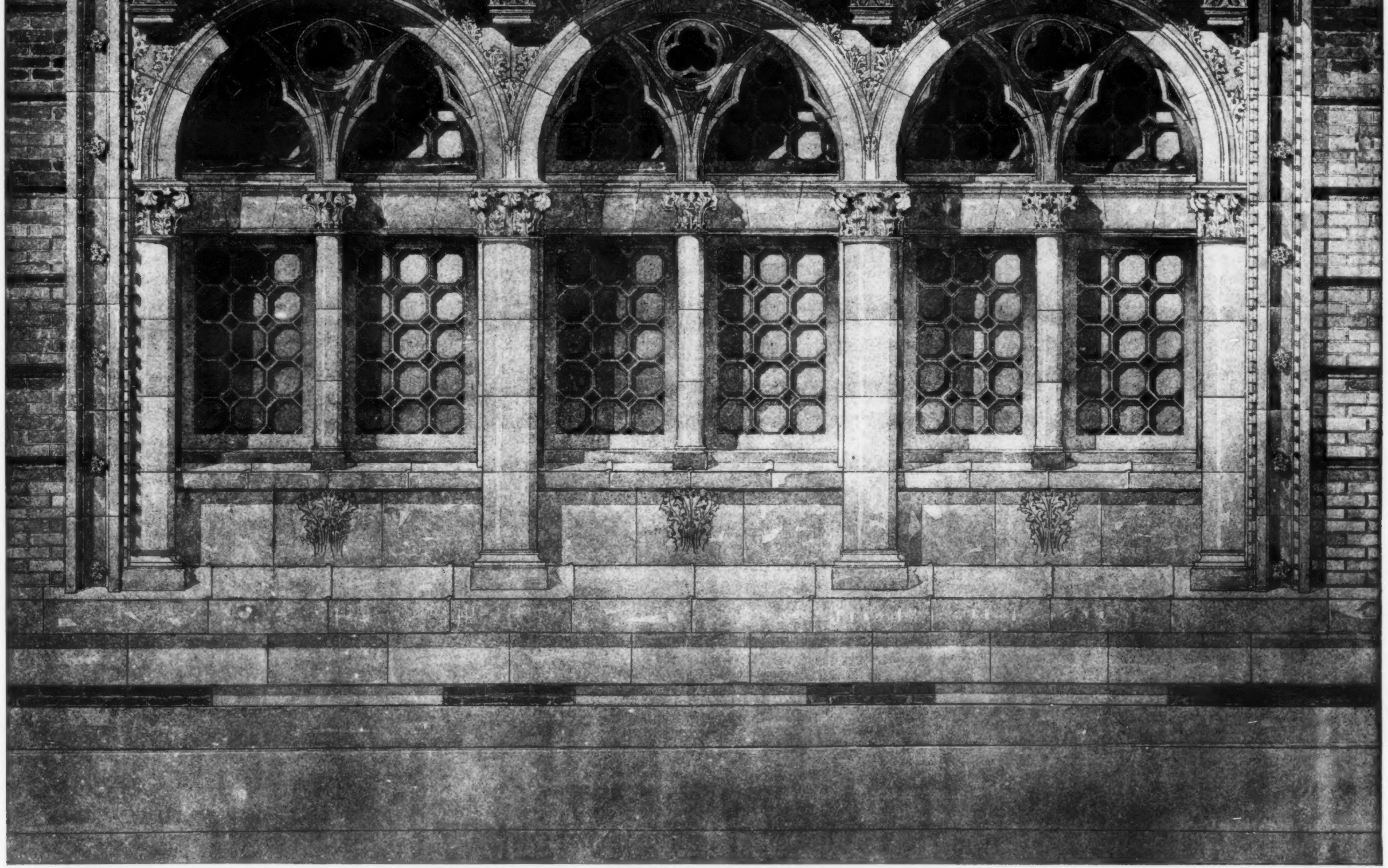

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ELEVATION OF LIBRARY WINDOWS: YORK HALL, NEW HAVEN, CONN.

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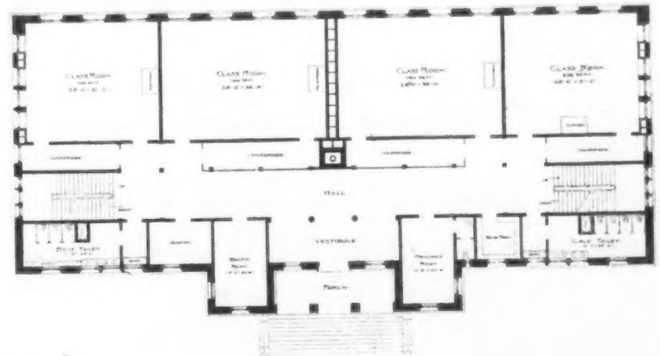
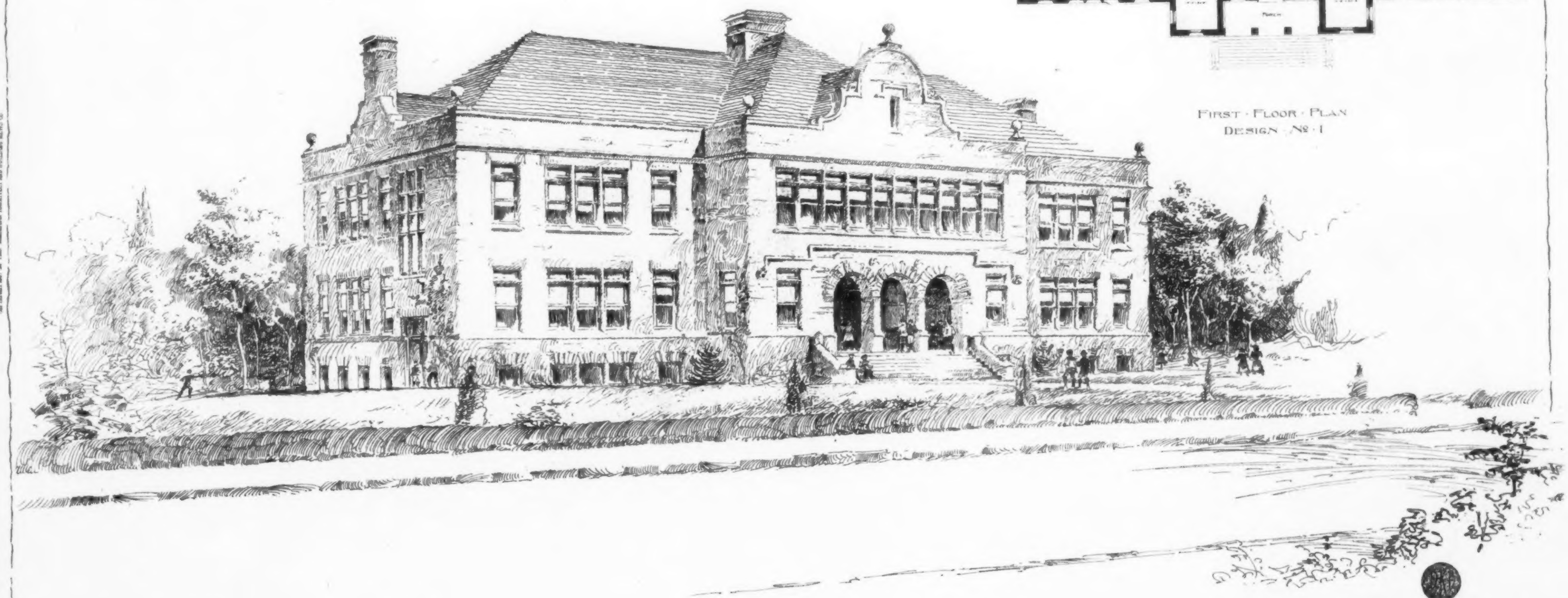


FIRST · FLOOR · PLAN
DESIGN · No. 1



APRIL · 5 · 1897

DAVID KNICKERBACKER BOYD
ARCHITECT

HELIOTYPE PRINTING CO. BOSTON

frame and fireproofed with terra-cotta. The Horne office-building was four stories and similarly built. Between these buildings a dwelling stood, of the ordinary construction, adding its mite to the crucial test of these two buildings.

As the *Engineering News* remarks, these buildings, attacked by flames from a building on the opposite side of the street, of about the same height and burning from basement to roof, had no protection but glass to resist these solid sheets of flame. The glass soon cracked and fell, and opened the whole front for the flames to enter and devour the immense quantities of combustible materials.

The Horne store-building could not have been better planned, to provide the most favorable opportunities for the thorough spread of fire: its whole area was open from front to rear, and rising through its centre was an immense light-shaft, open on all sides, about 25 feet by 48 feet in size, and extending from first floor to roof.

That the heat in this building was most intense is evidenced by the complete consumption of all inflammable material. Globes on the chandeliers were melted like wax, in many cases, and not a vestige of wood remained, not even the screeds in the floor that were buried in the cement.

The fireproofing was not an ideal piece of work. The style was constructionally weak and offered the least resistance to fire of any style that could have been adopted. The beams were 15″ I-beams and, supported on "raised skews," was built an 8″ or 9″ flat arch, the voissoirs running parallel to beam and not transversely. The "skew" was left exposed for six or seven inches below the arch. This block, having all the shearing and compressive load to stand, as well as the further duty of protecting the beam, had a much greater heat to bear than any other portion of the floor, while from its shape and position it was far less fitted to do so. That any of these skew-backs stood under such intense heat is miraculous and testifies more for terra-cotta than volumes of reports of tests.

Considerable comment is made about the column-covering falling from the columns. This occurred most seriously on the first front tier and around the light-shaft (before spoken of), and in the section destroyed by the falling tank. There are three factors that appear to have much to do with these results. First: the terra-cotta in this building is what is known as "hard stock," very brittle and easily "checked" when suddenly cooled. The front columns were the first to get the great heat, as it was blown back by the wind from the front; they also received floods of water from the many streams played into the building and were suddenly chilled and, having no elasticity, cracked and fell.

Second: the columns skirting the gallery were located in the midst of the flames as they ascended through this well; the torrents of water as it covered the floor fell in sheets on one side of the column, keeping this side cool, while the other side was expanded and caused the tile to "work" and lose its suction, and when the immense tank fell, it caused the building to vibrate and these loosened pieces to fall.

Third: the falling of the tank, filled with water and weighing many tons, tore the beams from their fastenings and ploughed its way, till its force was spent. The columns in this wrecked section were, on the lower floors, stripped for many feet of their covering. That this should happen is not strange, when the iron itself could not stand such mighty onslaughts.

Two columns are reported bent, one on the tier around light-shaft, where one side was probably much more exposed than the other and where the covering had fallen. The other had a compound curve, and was at the point where the shock and wreckage from the falling tank was more severe than elsewhere. This was probably caused by a heavy blow when the column was hot.

The Horne office-building started to burn at about the same time as the store-building. The damage in this building to the structure and fireproofing was but slight, a contract for its restoration having been made for a trifle. In this building, as in the store-building, all wood or other combustible material was totally destroyed. The floor-arches and many of the partitions are intact.

The *Engineering News* says, "It may be reasonably assumed that the better action of the fireproofing in the office-building was due, to some extent, to the use of porous tile and the end-construction of the arches." This is a fair statement of fact, the greater property of elasticity in this material guarding against cracking. This style of arch when weakened on the bottom (if same had occurred) by falling of the lower slab still retains its strength, as all the partitions vertical as well as horizontal constitute a part of its strength.

The damage to the partitions in this building was due to a faulty system of construction — the use of a wood strip at bottom for nailing. Where these occurred they burned out, and consequently the partition fell. Had these partitions been built entirely without wood and reaching from masonry to masonry, they would not have fallen even from the force of water from a hose.

About all this time the firemen had used the Methodist Book Building as a point of vantage to extinguish the flames from the other buildings, and had been successful in preventing the spread of the fire.

Although the Horne building had been converted into a chaldron and fire had consumed all the wood and inflammable material, little damage had been done to adjoining and near-by buildings, except the dwelling located between them. When the Methodist Book Building took fire, the fire and damage was most serious in the upper stories, but to consider the fire in this building in the same sense as that in the Horne Buildings is wrong, as the fire was never severe enough to burn all the woodwork in the rooms most seriously burned. The floors of wood were not wholly consumed, the wood partitions, where the wire lath and plaster fell from the studs, were but charred, the light wood and glass office-partitions were not consumed, and in rooms most seriously damaged, some of the furniture was hardly "blistered" by the heat. Paper boxes were found on the floor, having fallen from a wooden shelf, which were still intact, while a calendar on the wall showed no discoloration from heat.

Much of this satisfactory outcome is alleged to be the result of the use of concrete arches, but good sense compels one to admit that a fire that did not consume the woodwork, furniture or a paper calendar, is no test of fireproofing and not to be compared with the Horne building, where steel bicycle-frames were contorted into shapeless masses, glass run molten, and woodwork reduced to heaps of ashes. The concrete floors, with no greater test than a load of water and this incipient heat, were deflected many inches in their span and the material disintegrated for a considerable portion of its thickness.

That concrete is used, is not because of its fireproof qualities, but for its cheapness. That it will stand some heat when dry, no one denies, but to maintain that it can stand the effects of fire and water simultaneously is a mistake.

Yours truly, H. H. FERNALD.

BROOKLYN, N. Y., June 7, 1897.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I note, with interest, in your issue of June 5th, a letter from Messrs. Henry Maurer & Sons, manufacturers of porous terra-cotta, in which they challenge contradiction of a certain circular compiled and promulgated by themselves, in which they purport to give the facts in relation to the Pittsburgh fire.

This circular, which has been distributed broadcast, and which is reproduced in your paper, bears no other evidence of authenticity as to facts than the signature of "Henry Maurer & Sons," and the most unprejudiced would, of course, know that as manufacturers of porous terra-cotta they can possibly have no interest in the matter under discussion; in fact, the whole circular, unsupported as it is by any evidence, to any fair-minded man will fall of its own weight.

Having challenged my former letter, as they do, I feel constrained, however, to give the following "facts," which are supported by letters of prominent Pittsburgh authorities who were most interested in the results of this fire:

[Extract from Editorial, Pittsburgh *Dispatch*.]

"There is little inducement to fireproof construction, if it means loss on the fireproof building, and safety beyond it. But the fact suggests that if the Horne Buildings had been as well defended in their front as in the rear, the fire might not have crossed Penn Avenue, and their contents might have been safe to-day. Beyond this, rival forms of construction claim more perfect protection of the steel beams from heat; but whether it is to be accounted to them for virtue or not, *they have not yet suffered such disastrous defeat as in this case.*"

[Telegram from Adam Wilson, of A. & S. Wilson, *Builders, who constructed the Methodist Book Building.*]

"Arches are in apparent good shape, with the exception of two in eighth floor, which are sagged more than originally."

[Letter of F. J. Osterling, *Architect, Pittsburgh, Pa.*]

"I have investigated the condition of the floors in the Methodist Book Building since the fire, and can state that I do not see where there has been any change whatever from their original condition, thus proving that the concrete construction is absolutely fireproof and superior to terra-cotta lumber, it being subjected to the same conflagration in this instance."

[Telegram of Joseph Horner, *Owner of Building.*]

"Seventh and eighth floors severely tested by fire and water. Building stood like a rock. Will write more when floors are cleaned off and thoroughly examined."

[Letter of Charles Bickel, *Architect of Building.*]

"Your telegram asking information regarding the Concrete Fireproofing in the M. E. Building and how it withstood the recent fire, just received. The test under the intense fire of the T. C. Jenkins' Building was a severe one and I attribute the saving of the building solely to the fireproofing; had it in any way been defective, the building would have been a complete loss.

"In speaking to Chief Steele, of the Local Fire Department, he stated that in his large experience as a fireman he had never seen or worked on a building which had withstood the effects of a fire as this building had."

Further than this, the records will show that the Board of Fire Underwriters settled for the loss of this building without any allowance for damage to floors.

This, I think, constitutes a conclusive chain of evidence as to the damage to the Methodist Book Building. Photographs and all records show that this building was gutted, so far as the partitions and woodwork were concerned, from the fourth to the eighth floor. On the other hand, the damage to the Horne store-building, which is so lightly disposed of by Messrs. Henry Maurer & Sons, was so great as to require a complete reconstruction of the floors and steel-work.

Photographs and other evidence which I have, show that the damage in most cases was irreparable

The quotation from editorial in the Pittsburgh *Dispatch* certainly establishes this fact beyond controversy.

As to the location of these two buildings, the Methodist was considerably closer to the point of origin of the fire than either the Horne office or the Horne store building.

Very truly yours, Jno. T. Simpson, *Engineer.*

Boston Board of Fire Underwriters,
Boston, Mass., June 8, 1897.

To the Editors of the American Architect: —

Dear Sirs, — In relation to the late fire in Pittsburgh, Pa., the following points seem to me of special interest:

The Horne Building, so called, which was occupied throughout as a retail dry-goods store, had three inherent weaknesses in its construction.

1. The flanges of the roof-beams were not protected from exposure to heat, although the flanges of the beams on all other floors were, apparently, adequately covered with terra-cotta block.

2. The communication of heat from one part of the risk to another was provided for in a most excellent manner by a very large light-well and open stair and elevator wells.

3. Almost the entire front of the building on two streets was of glass, there being simply sufficient iron to support the frame, with a covering of terra-cotta.

I have talked with Mr. Oliver H. P. LeFarge, inspector of fireproof buildings for the New York Tariff Association, who went to the scene of the fire immediately on hearing of the occurrence. He assures me that a large proportion of the damage done was, so far as he could judge from appearances, the result of the falling of the large water-tank which was carried on the roof. This he thinks was, at least in part, caused by the lack of protection on the flanges of the roof-beams, and he is further of the opinion that much of the damage to the floor construction which now appears, is the result of the shock of the falling of this tank rather than of the expansion of the beams from heat. I find, however, that he agrees with me in the feeling that serious damage to the building would probably have resulted even with these upper beams protected, and that this is always likely to take place where a very large amount of combustible material is consumed at a rapid rate, as it was in this building.

Yours very sincerely, F. E. Cabot.

June 9, 1897.

To the Editors of the American Architect: —

Dear Sirs, — The statements of Jno. T. Simpson in your issue of May 29th, and of Henry Maurer & Sons in your issue of June 5th, regarding the relative merits of concrete and hollow-tile fireproofing at the Pittsburgh fire are so contradictory that we wish you, as an impartial judge, would tell us just which construction withstood the fire more successfully.

Yours truly, H. & H.

[The weight of evidence seems to show clearly that the concrete flooring was not subjected to so severe a test as the fireproofing in the Horne buildings, and we are disposed to feel that, as a test of the ultimate possibilities of concrete and iron for fireproofing, the experience of the Methodist Book Company's building was wholly inconclusive. Perhaps the one great lesson of the fire is that plate-glass is a poor defence in case of an "exposure fire," and that where owners insist on having plate-glass fronts they must do something to minimize the risk by using rolling-shutters or introducing a complete sprinkler system. — Eds. American Architect.]

NOTES AND CLIPPINGS

Electric Power from the St. Lawrence. — The enormous electric-power station at Niagara is about to be eclipsed by a still larger plant on the St. Lawrence River. This splendid stream runs through a series of rapids near the township of Messena, and in the course of 7 miles it falls upwards of 56 feet. This, of itself, would not render the position applicable for the generation of water-power on a very large scale; but it happens that at a distance of 3 1-2 miles from the main river there runs another — the Grass River — which takes its course through a gorge nearly 50 feet deep. The Grass River, although trifling compared with the St. Lawrence, would be accounted large here. It is 300 feet wide, and its gradient is so flat that although it joins the St. Lawrence below the falls, there is, as stated above, an available fall of 50 feet between the two. All that is required is to cut a canal through the level plateau, and to establish a power-house on the banks of the smaller river. The long and expensive tunnel which carries away the tail water at Niagara is not needed here, and as the fall is of comparatively moderate depth, the engineering problem presents fewer difficulties. The canal, which is to be 220 feet in width at the surface, and about 26 feet in depth, will run through clay soil, with limestone rock underneath. The quantity of water which can be withdrawn from the St. Lawrence is only limited by the requirements of the navigation, which passes the rapids in a canal, and practically there is more than can be used. It is proposed to make the canal of dimensions to develop 150,000 horse-power, of which one-half will be rendered available in the first instance. For this purpose, 15 sets of turbines and electrical generators will be installed. The head of water in the turbine flumes will be about 19 feet, while the draught tubes below the turbines, with 21 feet to the water in tail-race, make 40 feet in all. The turbines will be on horizontal shafts, two wheels on each shaft. The generator-house will, in each case, be divided from the turbine-flume by a well, through which the shaft will pass in a stuffing-box. This plan of duplicating the turbines enables the diameter to be kept small and the speed proportionately high. The outside diameter of the generators will be about 20 feet, and the shaft connecting them to the turbines 22 inches in diameter. The total length of the power-house, to accommodate the 15 main generators, will be 525 feet, whilst in an annex there will be exciters representing 2,000 horse-power. It is estimated that the entire plant, including machinery for 75,000 horse-power, and a canal representing 150,000 horse-power, will cost about half a million sterling, and that the power can be sold at from 48s to 60s per year per horse-power, running 24 hours per day. It is anticipated that a large amount will be used in the manufacture of aluminium, which ought to be very cheap in the near future. The engineers to the scheme are Messrs. Kincaid, Waller and Manville, of Westminster, and Mr. John Bogart, of New York. The following is a list of the chief electric water-power plants in America, besides that at Niagara: Macon, 5,000 horse-power; Weldon River, North Carolina, 10,000; Knoxville, 5,000; Mechanicsville, 5,000; Corral, Hollow Mines, California, 9,000; Sacramento, 11,000; The Pelzer Manufacturing Company, 7,610; Big Cotton-wood Hower Company, 6,800; Columbia Water-Power Company, 5,000; Lachine Rapids Hydraulic Company, 12,000; Pioneer Electric Power Company, 11,000. — *Engineering.*

Lien Laws and the Constitution. — The contention that a mechanic's lien law makes a contract in behalf of the owner of premises without the consent of such owner, and that for this reason the statute violates the constitutional provision that no person shall be deprived of life, liberty, or property without due process of law, has been again passed upon judicially, this time by Judge Gibbons of Illinois. Contention over mechanics' lien laws, the Judge said, arises largely from the fact that courts hold statutes of this nature to be in derogation of the common law, and as such to be strictly construed. This was not, he continued, in harmony with the reason or philosophy of the statutes. They simply extend the old common-law lien, which the mechanic acquired upon chattel property, to embrace real estate. Proceeding upon this reasoning, Judge Gibbons pronounced the law constitutional, expressing also the belief that it should be liberally construed by the courts, in order that every person who claims rights thereunder may be able to ascertain the nature and extent of such rights.—*N. Y. Evening Post.*

Wages fixed by Ordinance Unconstitutional. — The expected has happened in Cleveland, in connection with the attempt to enforce an ordinance requiring contractors who bid for city work to pay a fixed rate of wages. Members of the Council passed the ordinance, of course, to please the walking-delegates, but they sinned with the light, as the Corporation Counsel informed them, when the ordinance was pending, that it was unconstitutional and had no more reason for its existence than would an ordinance compelling contractors to pay a fixed price for their materials and supplies. In the contention, the Corporation Counsel has the long end of the stick. Contracts cannot be approved by the Council unless they have the endorsement of the Corporation Counsel. That official refuses to stultify himself, and public improvements must wait until the Common Council repents with a repeal of the ordinance. — *N. Y. Evening Post.*

Energy from Volcanic Heat. — In a Colorado mining town an interesting combination was recently observed which a little ingenuity might have converted into a considerable source of power. Within twenty feet of each other were two springs, one of a temperature of nearly 200° Fahr. and the other not over 60, the flow of each being very uniform and the temperature quite constant. The theoretical efficiency might readily be determined from the well-known law of thermodynamics, and the use of one stream to vaporize and the other to condense some volatile liquid, such as ammonia or bisulphide of carbon, might enable a fair percentage of the energy to be utilized which is now running to waste. — *Cassier's Magazine.*

Bronze Tablet to Gilbert Stuart. — A bronze tablet to the memory of Gilbert Stuart, the famous portrait-painter, has been placed on the Common, near Boylston Street, to replace a temporary one contributed by a Grand Army post about a year ago. The new memorial is the gift of the Paint and Clay Club. A graceful palm branch falls across the palette-shaped tablet, and the inscription is: "Gilbert Stuart, Artist, 1755–1828. Painter of Portraits of Washington, Louis XVI and George III. This tablet placed by the Paint and Clay Club." The tablet was designed and executed by Hugh Cairne.

Fatal Panic in a Cathedral. — During a special service at the Cathedral of Pisa, on May 29, upon the occasion of the unveiling of an image of the Virgin, a candle fell, setting fire to the decorations and causing a great panic among the many persons present. During the rush for the doors seven persons were killed and seventeen others wounded, three of them seriously. The fire was immediately extinguished. The damage was slight.

"The Bacchante." — Mr. McKim has withdrawn his offer to present to the Boston Public Library the bronze statue of the "Bacchante" by MacMonnies, which for a few days last fall was shown in the court-yard of the Library, to the delight and dismay of equally interested observers. The public is not likely, however, to lose sight of the graceful creation, since Mr. McKim has offered the bronze to the Metropolitan Museum.

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