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DECORATION

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CONTENTS.

ILLUSTRATIONS.

Additional Illustrations in the International Edition.

NOTICE.

OWING to unexplained delays in the New York Custom-House we are obliged to omit from this issue a portion of our imported plates. They will be added to the illustrations of the next week's issue, provided they have not been lost or destroyed in transit.

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CONTENTS

A STRIKE of carpenters has been ordered in Chicago, to take effect September 1, on the ground that the agreement entered into by the contractors and the men, last May, through representatives duly appointed by both sides, under which the journeymen's wages were fixed at thirty-five cents an hour until August 1, and thirty-seven and one-half cents an hour from that time to the first of March next, has been violated by the contractors since August 1. The strike is ordered, not by a secret committee, or a "Master Workman," but by vote of the Carpenters' Council, representing all the carpenters and joiners of the city, and if it is true that the contractors have taken advantage of the dullness in building to violate a solemn agreement, we hope that the strike will be effectual in bringing them to their senses without delay; and we should not be sorry if the Carpenters' Council could find means to impose a tolerably heavy penalty on the individual contractors who have done so much discredit to themselves, and so much injury to the more honorable contractors who have the misfortune to be associated with them. We need not say that we are always in favor of anything which will improve the income, and consequent comfort, of an honest mechanic, so long as it can be secured without needless injury to other people, who are just as much entitled to consideration as he is. An arrangement like the one described, under which the carpenters agree with their employers to work for three months at a given rate, with the understanding that after that time a small addition should be made to the rate, is perfectly fair to all parties, as it gives the contractors ample opportunity for estimating so as to save themselves from loss; and it ought to be enforced by law, as we think it might be, if it should be taken before the courts. It makes no difference whether the contractors can now hire help cheaper than the established rate, or not; they have themselves consented to a certain market price for labor after a fixed date, and have made their contracts with owners accordingly, and they have no more right to make an additional profit by repudiating their obligations than a merchant would have to refuse to accept a cargo of wheat which he had contracted for at a given price, on the ground that he had found some one else who would sell it cheaper. The only thing to be regretted about the matter is that the journeymen should have to be idle, as cold weather is approaching, and we hope that the more honorable contractors will join heartily with the men in giving their faithless brethren a sharp and short lesson in honesty.

MR. POWDERLY is enjoying a delightful season of prominence before the public, and it will apparently not be his fault if it is not prolonged as much as possible. Only a few months ago he was the discredited head of an order which was losing its members by thousands, while those who remained were not only unruly, but sometimes forgetful of their duties in regard to the salaries of their chiefs; now, thousands of newspapers publish daily what purport to be interviews with him, Wall Street and Lombard Street wait anxiously to hear what he is going to do, and any enterprising broker would pay him his salary ten times over to have the privilege of being admitted to his counsels. All this has come about through the lucky chance by which some mischief-makers, who owed a sort of allegiance to him, were enabled for a few days to stop the traffic on a great railroad, to the annoyance and loss of many thousand innocent people. It happened that the officials of the railroad discharged some men who were careless or incompetent, and out of these a few belonged to an organization affiliated to the Knights of Labor, although practically independent. The dictator of the subordinate organization ordered a strike, which was, as usual in railroad strikes, maliciously arranged to give as much trouble as possible, and demanded that the discharged men should be reinstated before he would allow business to be resumed. It would be hard to think of anything more dangerous to the public safety than to have the officials of a railroad deprived of the power of discharging incompetent men, and the manager of this road deserves the gratitude of the community for refusing absolutely to entertain such a proposition. The places of the strikers were soon filled, and the local mischief-maker, finding that he would not be able to accomplish anything, applied to Mr. Powderly, in the hope of stirring up a more extensive commotion, and putting myriads of other innocent people in peril of their lives or property. Mr. Powderly answered the appeal with an alacrity which was only partially concealed by the dignity with which he entered upon the scene. His first remarks were almost insupportably patronizing. If "Chauncey Depew" were at hand, he thought the whole business could be settled at once. As that individual was not within reach, however, it would be necessary, unless the enemy surrendered immediately, to take steps of a portentous nature, the exact character of which he refused to reveal. Mr. Powderly is a person of rather transparent ways, and his own expressions show pretty clearly what really took place afterward. A few days later, after delegates and committeemen had been kept flying about, without visible result, the great chief lost his blandly patronizing air, and indulged in vicious sallies about "oppression," and so on. A few days more elapsed, and the impotence and disappointment of the mischief-makers began to be apparent from their unconscionable bragging, and the imaginative effort which their remarks displayed. The question whether a few undesirable switchmen should be forced on a particular railroad or not was entirely forgotten, and it appeared that "all the railroads in the country" had entered into a compact "to root out organized labor," and that "a death-struggle" was about to begin between the labor organizations and the entire railway system of the United States. Any broker could have comforted the labor chiefs by telling them that the railroads never kept any compacts, even supposing them to have entered into one so ridiculous, so that there was no need of preparing for death-struggles; but the suggestion of them proved so successful in depressing the value of railway shares in the stock-market and in frightening timid travellers, that it is even now persistently repeated, although its effect is rapidly diminishing. We should be sorry to say that the same people who devised this cry for influencing the public knowingly used more forcible reasonings to prevent men from filling the places of the strikers, but it is, nevertheless, true, according to the newspaper accounts, that one man who had been employed to take the place of a striker was found murdered near the place where he was employed; while another, when on his way home from his work in the evening, was attacked, beaten and kicked until he was insensible, and then thrown into the harbor. Fortunately, the cold water revived him, and he had strength enough to crawl out on the bank, where he was found by the police and taken to a hospital.

THE history of the Worcester High-school competition has so much interest for architects that we need not apologize for giving a little more of it. Our readers will remember that after the architects of the city had united in adopting the Institute scale of charges, the City Committee on Public

Buildings offered, for the architects' services on the new building, about one-third of the usual fee. Most of the architects of the city at once declined to have anything to do with the affair, but the committee sent for a young firm, Messrs. Barker & Nourse, and, as the latter say, informed them that "four of the oldest and most prominent architects in the city had offered to take the commission at the Committee's terms," but that they had been favored with the first chance at it. Older architects, who frequently have occasion to hear the "able business men" among their clients trying to beat down mechanics by allusions to apocryphal individuals who "stand ready to take the job" at a lower price, would not have swallowed such a bait; but young men are credulous and hopeful, and Messrs. Barker & Nourse agreed to the terms offered them. When they described afterwards the argument which had been used to induce them to consent to the miserable offer, their associates thought the matter serious enough to be investigated by a committee, and the report of the latter, signed by three of the best and most honorable men in any profession in any city, ought to make some one tolerably uncomfortable. As to the assertion that four of the oldest and most prominent architects in the city had offered to take the work at the terms offered by the Committee on Public Buildings, they say that, "if the committee made that statement, it was false in every particular," as is proved beyond question by the direct testimony of every practising architect in the city. "We do not believe," the report concludes, "that the paltry sum thus saved in architects' commission was any excuse for violating honorable methods in business," especially in regard to "one of the most important interests of the city;" nor do the authors think that the idea of trying to save one or two per cent on an expenditure of a hundred and fifty thousand dollars by deluding a pair of young architects into undertaking to control that expenditure at a starvation price "will be generally commended." Unfortunately, we fear that no one except the architects and the Public Buildings Committee will spend another thought on the affair. Every one else in Worcester finds his time fully occupied with his own business, and thinks that people who cannot defend themselves without appealing to the public are bores. For our own part, our sympathies are rather with Messrs. Barker & Nourse. The investigating committee are satisfied that they were grossly deceived, and by a trick which would disgrace a horse-jockey, although, for some mysterious reason, it is just such as most delights a certain sort of city and town officials; and we hope that their professional brethren, instead of turning the cold shoulder to them on account of conduct which, if not very magnanimous, was quite natural, will help them out of the difficulties into which their commission will bring them. The building operations of a client who begins them with a fraud are not likely to be pleasant to regulate, and the architect in such cases is usually cheated at the end, as well as deceived at the beginning; so that the aid and countenance of the older men will be gratefully appreciated, while it will help to stiffen the moral backbone of the young architects to resist the temptation to "get even" with their deceivers by taking advantage of the innumerable opportunities which will be offered them for secretly profiting by their responsible position.

A RATHER important case is reported, not very clearly, in the San Francisco *Contractor*. There is a law in California, as in several other States, which requires the filing of building contracts in the Recorder's Office. This law has been much altered and amended, and by a recent Act it is made sufficient to file a memorandum of the contract, instead of the document itself. Moreover, a decision of the Supreme Court of the State holds that the plans and specifications are a part of the contract, and, under the statute, must be filed with it, but are not a part of the memorandum which the law allows to be substituted for the contract. A certain architect was employed to prepare plans and specifications for a house, to award the contract, to attend to preparing and filing the agreement as provided by law, to superintend the construction, and to advise the owner in regard to all matters connected therewith. The architect awarded the work to a man named Farnum, taking a bond with sureties as security for performance, and filed in the Recorder's Office a copy of the contract, without the plans and specifications. Farnum managed to get nine hundred dollars paid him before the first instalment was due under the contract, and disappeared, leaving all his bills for work and materials unpaid. His bondsmen declined to complete the building, on the ground that the contract, having been filed without the plans and specifications, was void, and they were not liable; and the owner was obliged to make a new contract, under which his house cost him some two thousand dollars more than the original contract price. Probably the original contract price was two thousand dollars less than the house was worth, but the owner was aggrieved at losing his advantageous bargain, and, when the architect sent in his bill for services, he refused to pay it, on the ground that the architect's negligence in not filing the contract in proper form had injured him to such an extent that he did not owe him anything. One might, with some show of reason, claim that an architect ought to know how to file contracts in a legal manner; but the judge, when this architect sued for his money, held that "if an architect gave an opinion or advice in a matter of law, he was not acting within the scope of his employment, and the plaintiff (the architect) was not chargeable with negligence."

ANOTHER sale of a great English estate has taken place recently, and, as usually happens, the price paid was, according to our notions, extremely small. The property was that known as Worksop Manor, belonging to the Duke of Newcastle, who bought it in 1840 from the Duke of Norfolk, and was one of the group of five splendid estates, very near Nottingham, known as the "Dukeries," the others being Welbeck Abbey, the seat of the Duke of Portland, Thoresby Park, belonging to Earl Manvers, Kiveton, formerly the seat of the Duke of Leeds, and Clumber Park, which was the residence of the Dukes of Newcastle before their purchase of Worksop from the Duke of Norfolk. The soil and climate of the neighborhood are both excellent, yet the manor-house, the residence successively of two ducal families, with sixteen hundred and forty-four acres of land, including the park of two hundred and sixty acres in which the house stands, was sold to Mr. John Robinson, a brewer, of Nottingham, for thirty thousand pounds, or less than one hundred and fifty thousand dollars, the timber on the estate being sold separately to the same purchaser for twenty-five thousand pounds. Aside from the timber, which could probably be sold again at once for more than the price paid, the expense to Mr. Robinson of succeeding to one of the noblest of those great landed estates which are supposed to confer aristocratic distinction in England, was less than a month's income of many Americans, and less than the cost of most of the recently built "cottages" at Newport, or any of the best class of "uptown" houses in New York. Moreover, while a Newport cottager pays cheerfully a dollar a square foot, or forty-four thousand dollars an acre, for the lawn on which he builds a five-hundred-thousand-dollar house to live in for three months of the year, the successor of the Dukes of Norfolk and Newcastle gets his land, which is close to an important station on the Midland Railway, for less than eighty-eight dollars an acre, or one-fifth of a cent a square foot, with the mansion-house thrown in; or, as the mansion-house could probably not be built for anything like the sum paid for the whole estate, he gets his house at a bargain, and his two and one-half square miles of land as a gift. Of historical interest there is an ample fund attached to the estate and its neighborhood. The mansion-house was built, on a splendid scale, by the first Earl of Shrewsbury, the "stout Lord Talbot" of Shakspeare's King Henry VI, and remained in possession of the family for many generations. Under George, the sixth earl, it was for a time the residence of Mary Queen of Scots, who was kept there, by order of her royal cousin, in a sort of polite captivity, under Lord Shrewsbury's care. The eleventh Earl of Shrewsbury, Francis, was shot by the Duke of Buckingham in the celebrated duel in which his faithless wife, on whose account the duel was fought, assisted, disguised as a page, and held her paramour's horse while he killed her husband. Soon after this, the estate passed into possession of the Dukes of Norfolk, and while the ancient mansion-house was being magnificently restored, in 1761, it took fire, and was in great part destroyed. On its transfer to the Dukes of Newcastle, the ruined part of the old building was removed, and a smaller mansion erected near it, but the new possessor, if he is inclined to sentiment, will still find himself surrounded by innumerable memories of the Nevilles, Talbots, Howards and Pelhams who for five hundred years have lived there before him.

RELIGIOUS ARCHITECTURE.[1] — XXI.

INDIAN ARCHITECTURE. — II.

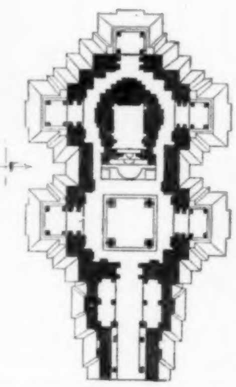


Fig. 6. Plan of the Kandariya Temple, at Khajuraho [9th Century].

WE will now note the chief temples belonging to the second Brahminical period; that is, to the period beginning at the time when Brahminism resumed complete supremacy over Buddhism.

1. In the north of India, must be cited the temples of Bhuvaneswar, constructed between the sixth and tenth centuries; those of Khajuraho (Figures 6, 7), between the eighth and tenth centuries; of Nagda, tenth century; of Gwalior, tenth and eleventh centuries; of Mount Abu, eleventh and twelfth centuries; of Jagannath and Omkargi, twelfth century; and lastly, those of Bindrabund, of the sixteenth and seventeenth centuries.

With slight variations, the same design appears in all these temples; it is extremely simple, and includes rectangular halls adorned with porches, which are often flanked with chapels and surmounted with a lofty dome, whose ovoid form is that of the sacred *lingam*. The principal façade is usually on the east, and the orientation is made with great precision; the proportions of the various parts of the temple are fixed with extreme rigor by traditional canons. Thus, the walls of the edifice must occupy four-tenths of the total space, six-tenths only being left open. This enormous mass of material, while imparting an aspect of majesty to the temple, at the same time renders it almost indestructible.[2] The general rules imposed upon Indian architects have been collected by Ram Raz, an Indian *savant* and member of the Asiatic Society;[3] his work shows how rigidly the proportions of even the smallest details of ornamentation were fixed.

These temples are constructed of stone or marble; most of them are of sandstone, laid with great nicety. The vault is absolutely prohibited to the Hindoo builder: for the covering of spaces too broad to admit of the use of the beam, recourse is had to the successive corbelling of the horizontal courses.

2. In Central India, a great many remains of this Brahmini-

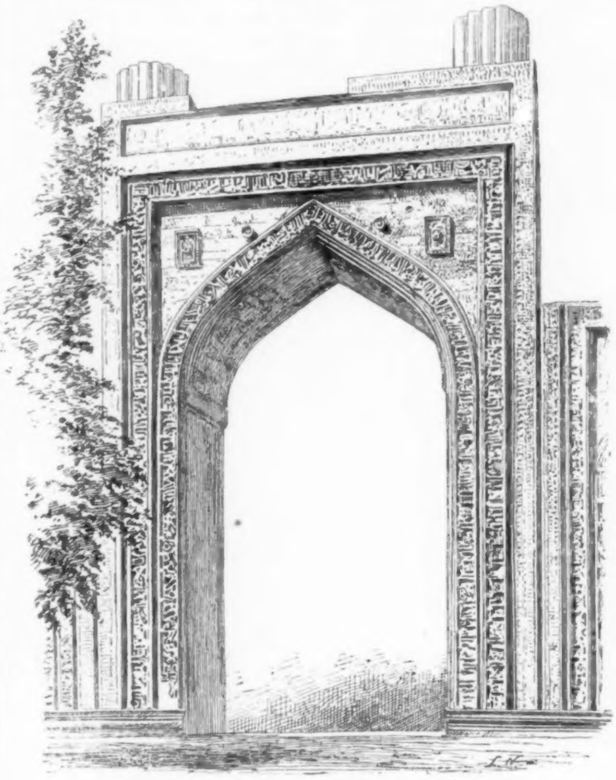


Fig. 8. Entrance to the Great Mosque of Ajmir [13th Century].

cal period still exist. Among them we cite the temples of Ellora, constructed between the sixth and eighth centuries; those of Elephanta, belonging to the same time; and those of Ambernath, of the ninth century.

Fig. 7. View of the Kandariya Temple, at Khajuraho [9th Century].

3. Southern India is especially rich in religious edifices whose dispositions offer characteristic peculiarities. The

[1] From the French of P. Planat, in Planat's "*Encyclopédie de l'Architecture et de la Construction.*" Continued from page 113, No. 765.
[2] G. Lebon: "*La Civilisation dans l'Inde.*"
[3] "*Essay on the Architecture of the Indus.*"

temple proper here retains its conical shape, but the arrises are rectilineal instead of convex, the form common in the North. The pillars and columns are much more massive and overgrown, as it were, owing to their huge, fantastic carvings. The temple is, moreover, always surrounded with a wall, and sometimes with several concentric enclosures; these are pierced with gates of monumental proportions, called "gopuras." The gopuras are in the form of a truncated pyramid, raised on a lofty basement, sometimes fully two hundred feet high. They are decorated with a profusion of sculptures in granite and stone, or in cement and terra-cotta. They are in distinct stories, each of which consists of several colonnaded, dome-covered pavilions. The pavilion is, in a way, the primitive element, the indefinite repetitions of which constitute the gopura.

When there are several enclosing walls, the gopuras form a sort of avenue, reminding us of the Egyptian pylons.

Within the enclosure are numerous dwellings for the priests, bazaars of all kinds, a sacred pool for ablutions, and colonnaded vestibules, called "*mantapams*," preceding the various sanctuaries.

In Southern India may be cited: the temples or pagodas of Tanjore, of the eleventh century; of Hullabid, thirteenth century; of Vellore, fourteenth century; of Conjeveram (Figure 9), Chillambaram and Bijanagur, fifteenth and sixteenth centuries; of Madura, sixteenth century; and of Srirangam (Figure 10), Kombakum and Ramisseram, belonging to the seventeenth century.

Such are the chief edifices which have preserved the Indian architectural characteristics in their purity. Others bear witness to the Arabic influence in the twelfth century, which began to be exerted on Hindoo art. The blending of these two styles of architecture produced a series of mixed types, which we will briefly notice.

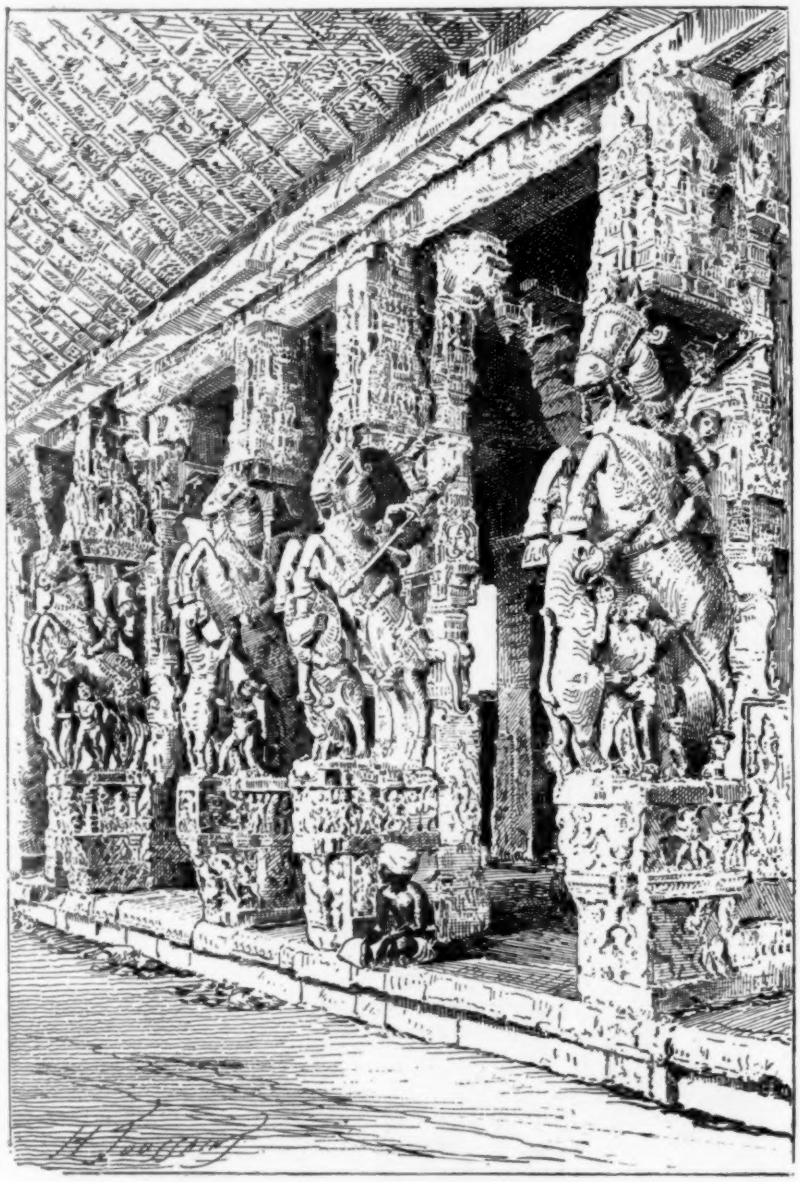


Fig. 10. Interior of the Temple of Srirangam [17th Century].

In some of these mixed structures we find only Indian and Arabic elements combined: as, for example, the temples or mosques of Delhi, belonging to the twelfth century; those of Ajmir (Figure 8), thirteenth century; of Bijapur and Gaur, sixteenth century.

In others, reared under Mogul rule, a Persian element is added, as in the mosques of Agra, of the sixteenth and seventeenth centuries; of Fatehpur, sixteenth century; of Lahore, seventeenth century; of Delhi (Figure 12), eighteenth century. The introduction of this third element is explained by the fact that the Moguls had dwelt in Persia previous to their conquest of India.

Lastly, in the frontier province of Nepal, the local architecture has been greatly modified, from earliest times, by Thibetan and Chinese influences. The great temple of Patan (Figure 11) furnishes an example of this; also the temples of Buddnath and Kathmandu, the latter of which is built of brick and carved wood.

It remains for us to add a few words concerning the decoration peculiar to Indian art. If religious symbolism has determined the external form of the principal edifice — a form subject to but slight variations, it may also be said that, under the exuberant wealth of ornamentation, there reigns a unity which is easily discerned.

The most striking features of Indian art, at least down to very recent times, are the marked predominance of horizontal projections and the heavy, squat form of the supports. These two peculiarities, to which the entire decorative system is subordinated, are due, apparently, to the same cause.

As we have seen, the people of India started out with an underground architecture; then came a period of monolithic constructions before building in ordinary materials was attempted. The subterranean hall, burdened with the weight of the mountain above it, necessarily had to be supported by broad, short, solid pillars.

The same requirement existed for the monolithic hall. Its form preserved somewhat of the character of the earlier temple in the mountain-side, and the architect could not rely too implicitly upon the strength of the rock when it had been hollowed out in all directions.

Again, there was the same demand when recourse was had to the ordinary process of construction, since the inner halls were overburdened with the immense pyramids exacted by religious symbolism. It is then logical that the aspect of the primitive subterranean temple should have been preserved in the interior of the later Hindoo temple.

While in Gothic edifices constructive expediency led to a predominance of vertical lines for both the exterior and interior, here a like cause brought about a predominance of horizontals. In one case the arches soar aloft, light and airy, followed, as it were, by their columns, which rise with them; in the other, a mighty mass weighs on the supporting pillars, crushing them down upon themselves.

The Indian architect, when hewing his temples out of the rock, encountered natural stratifications of varying degrees of hardness, according to the depth. Some were soft and crumbled easily, a fact which accounts for the *thumbed* appearance, so characteristic later in Indian temples. If the archæologist is unwilling to go so far as to admit that the inevitable ravages of time furnished the Hindoos with a decorative model, he must, at least, concede that the alternation of hard and soft strata naturally led them to work each course according to its nature and constitution, and to render the successive layers of

Fig. 9. Gopura of the Temple of Conjeveram [15th Century].

rock evident in the ornamentation; this naturally supplied the theme on which their architects worked.

If we study the decorative details, we find that the geometric and floral elements have given place here almost exclusively to the human face and form — a fact easily explained when we remember that not only the countless figures of Hindoo divine mythology, but also the fantastic scenes of the Vedic epic, are pictured on the walls and supports of the religious edifices of India.

Lastly, in order to understand fully the peculiar character of Indian ornamentation, it is necessary to take into account

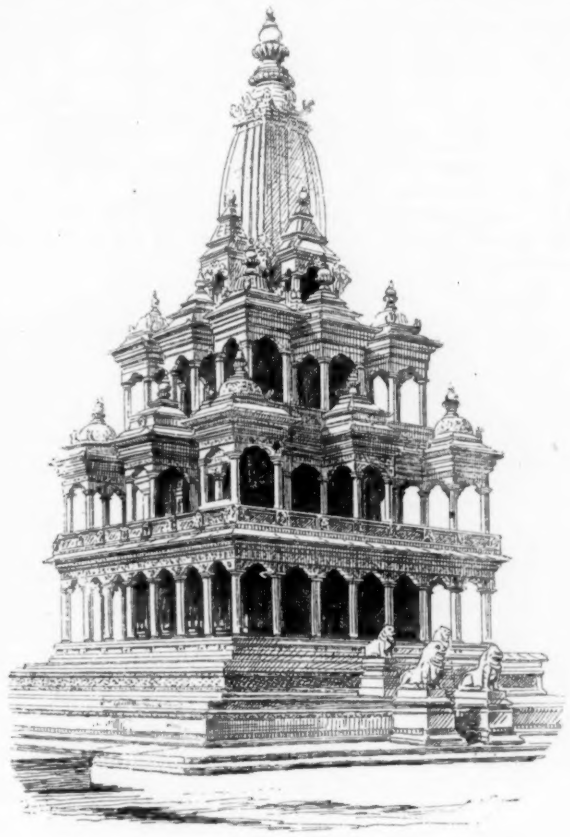


Fig. 11. View of the Temple of Patan [17th Century].

the intellectual and spiritual nature of the people, as it is expressed in their mythological and philosophical conceptions: here nothing is bounded or limited; on the contrary, we find everywhere the conception of the fluent, the intangible, the

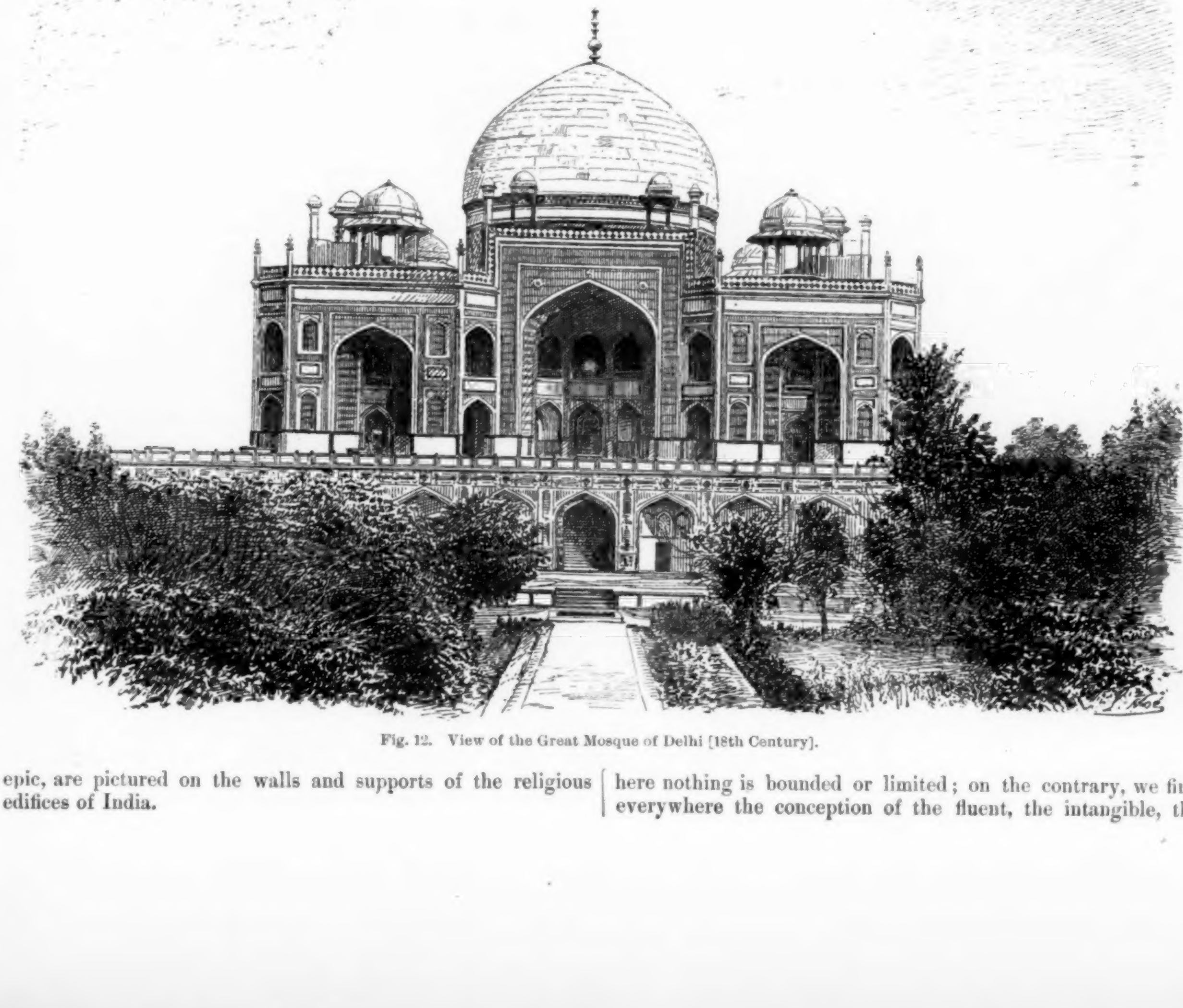


Fig. 12. View of the Great Mosque of Delhi [18th Century].

infinite. Such a people would feel no pleasure in the contemplation of a single, harmonious, calm figure, freed from all accessory details, in order to be more completely apprehended and to appear more perfect. Beauty, as a Hindoo conceives it, dwells in the perfection of the infinite chaos of things and beings; it is figured to him in infinite multiplicity. It is not surprising, then, that Indian art and European Classical art have reached such widely different results; it is impossible to compare Indian beauty with Classic beauty, as they have nothing in common. And yet, if we will but soar above our Western traditions, and quit the usual current of our more impractically philosophic minds, we must concede that both arts are indeed beautiful, because both embrace a portion of the universal truth.

[To be continued.]

ARCHITECTURAL SHADES AND SHADOWS.[1] — XI.

CHAPTER VIII.

Shadows on other than plane surfaces of incidence; "true-section" shadows of right lines cast on mouldings; shadows of chimney and dormer on slope of roof; of square abacus upon shaft; general method of shadows on mouldings. Shadows on 45° oblique planes; Pilet's method; shadow of circular abacus on shaft; shadow on interior of hollow cylinder and half-cylinder, The circular scotia, or gorge, by Pilet's method. The hollow hemisphere; the upright and inverted niche. Architectural examples.

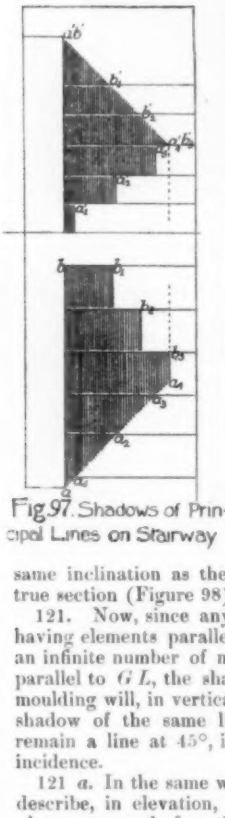


Fig. 97. Shadows of Principal Lines on Stairway

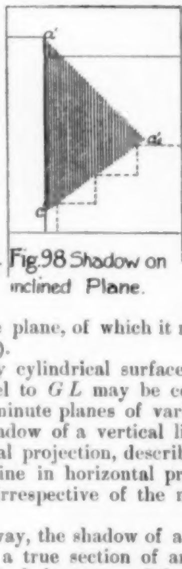


Fig. 98 Shadow on inclined Plane.

120. If the shadow of a vertical line fall upon a series of planes parallel to V^tP (as, for example, upon the risers of a flight of steps), it will appear in elevation as a series of vertical lines successively separated by a distance equal to the width of each tread. As the oblique 45° shadows which cross these treads and connect the vertical shadows together are invisible in elevation, the shadow of the line appears to describe a true section of the flight of steps (Figure 97; see also Figure 37[2]). If, for the steps, we substitute a plane touching their upper edges, the shadow becomes an oblique line passing through all the points which correspond to the upper ends of the shadows that originally fell upon the stair-risers. The shadow, therefore, has the same inclination as the plane, of which it may be said to present a true section (Figure 98).

121. Now, since any cylindrical surface or horizontal moulding having elements parallel to $G\,L$ may be considered as made up of an infinite number of minute planes of various inclinations, but all parallel to $G\,L$, the shadow of a vertical line falling across such a moulding will, in vertical projection, describe its true section. The shadow of the same line in horizontal projection will, of course, remain a line at 45°, irrespective of the nature of the surface of incidence.

121 *a*. In the same way, the shadow of a line parallel to $G\,L$ will describe, in elevation, a true section of any moulding or oblique plane composed of vertical elements; while in horizontal projection, the shadow of a line perpendicular to V^tP cast upon mouldings parallel to $G\,L$, or of a line parallel to $G\,L$ across mouldings perpendicular to V^tP, will describe the true or normal section of such mouldings. We may summarize these propositions in a rule as follows:

(*XVI*) — *If the shadow of a principal line parallel to the plane of projection be cast upon any cylindrical surface whose elements are principal lines parallel to the same plane, but perpendicular to the direction of the line casting the shadow, it describes a true or normal section of such surface.*

[1] By A. D. F. Hamlin, Assistant Professor of Architecture in the School of Mines, Columbia College. Continued from page 165, No. 755.

Note. — [In view of the inconvenience of having to refer to back-numbers for explanations of the notation used in these papers, the following memorandum will be found of service.]

$H\,P$ = horizontal plane of projection; $V^t\,P$ = vertical plane of projection; $G\,L$ = ground-line or horizon. Capital letters designate points and lines in space, small italics their horizontal projections, and the same accented or "primed," their vertical projections. Subscript figures indicate points of shadow; small figures above the line indicate points of shade. Greek letters (α, β, γ, θ, δ,) designate angles. The *diagonal* of a line or dimension is its length multplied by $\sqrt{2}$. Shadows are indicated by vertical shading; shades by horizontal shading; shearing light by oblique shading parallel to the projections of the luminous ray.

[2] In No. 698 of the *American Architect*.

122. This rule has the widest application in architectural drawing. The vertical corner of a projecting wing of a building casts upon the wall further back a shadow which breaks over each belt-course, sill and cornice into a true section of each; so that, knowing the depth of the wing, we do not require the plan in order to delineate this broken shadow correctly. The shadow of the vertical stile of a panel describes a true section of the horizontal mouldings of the panel (Figure 99), and the horizontal shadow of the architrave of a porch in Figure 100 in the same way breaks downward into true sections of the niche and door which it crosses. This is one of the

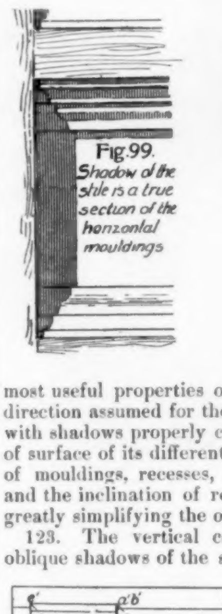


Fig. 99. Shadow of the stile is a true section of the horizontal mouldings

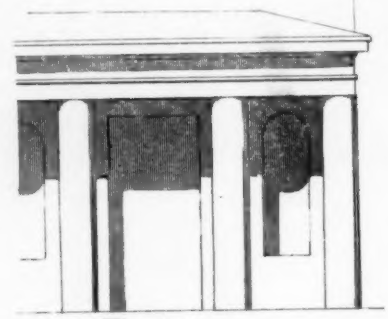
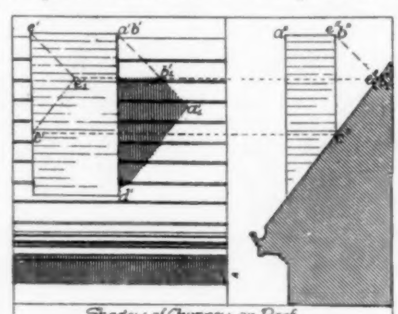


Fig 100

Shadow of Architrave shows true section of posts doorway and niches

most useful properties of architectural shadows resulting from the direction assumed for the luminous rays, since it makes an elevation with shadows properly cast a true record of the form and variations of surface of its different parts; giving the true depth or projection of mouldings, recesses, niches, cornices, sills, doors and windows, and the inclination of roofs and oblique surfaces generally, besides greatly simplifying the operations of architectural sciography.

123. The vertical corners of a chimney cast upon the roof oblique shadows of the same slope as the roof itself. The shadows of the other lines of shade of the chimney, as shown in Figure 101, are as easily found: one of these ($a'\,b'$), being perpendicular to the plane of projection, casts its shadow at 45°, while the other ($e'\,b'$) is parallel to the roof, and has for its shadow the horizontal line $e'_1\,b'_1$.



Shadow of Chimney on Roof

Shadow of corner ad is $a'_1d'_1$ parallel to slope of Roof in section and terminating where crossed by $a'_1d'_1$ drawn at 45° from a.

Fig. 101.

124. The shadow of the dormer-window in Figure 102 is a little more complicated, but presents no special difficulty. It shows the shadow of the vertical corner at d' drawn to the true slope of the roof, as found from the section, from which we also ascertain the levels of the shadows of the other chief points of the dormer. These levels are projected across upon the elevation where their intersections with the rays passing through the several points to

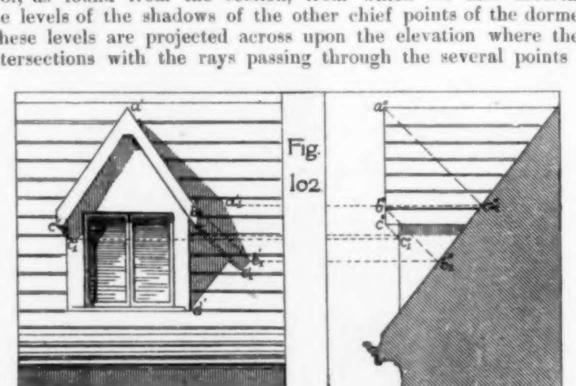


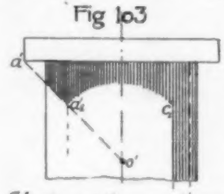
Fig. 102

Shadow of Dormer on inclined Plane of the Roof

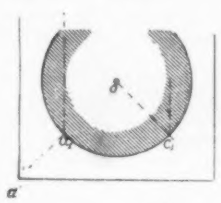
which they belong mark the shadows of those points. It may be noticed that in the shadow of the barge-board we have again a vertical line ($b'c'$) casting a shadow of the same slope as the roof, and a very short horizontal line at its lower corner, which casts a horizontal shadow on the roof because parallel to it. Another illustration of our rule may be found in the shadows of the lintel and jamb of the window, which, in crossing the window-sash, are broken into true sections of the sash-bars.

125. The shadow of the front edge of an abacus or lintel over a cylindrical or polygonal post or shaft is another of the common applications of this rule, and it describes a true section of the shaft as far as it goes. If this shaft is cylindrical, the shadow is a circular arc of the same radius as the cylinder. When the abacus is square, this arc is limited at the left by the shadow of the corner of the abacus which falls on the "corner" of the cylinder (Figure 103). The returning lower left-hand edge of the abacus casts its shadow at 45° as far as to this corner: if this line be prolonged, its intersection with the axis of the shaft gives the centre (o') of the arc of shadow of the front edge.[1] This oblique shadow of the returning edge of the abacus is the projection of another circular arc similar to that on the front, the two being symmetrical with respect to the axial plane of rays.

Fig 103



Shadow of Square Abacus on Circular Shaft



126. There is a very convenient application of Rule XVI, by which one may easily find the shadow cast by any object upon a cylindrical surface or group of mouldings whose elements are principal lines parallel to the plane of projection. This application of the rule involves a further principle, which may be stated as follows: If we consider the shadow of any given object as cast first upon one surface, and then upon a second surface more remote, the second shadow may be considered, geometrically, as the shadow of the first. In other words, if the first shadow were cast upon a plane, it is evident that a plane figure exactly coinciding with it would cast upon the second surface precisely the same shadow as the given object, since both would be sections of the same cylinder of invisible shadow.

127. Let us now suppose the shadow of a solid — a sphere, for example — to fall upon a group of horizontal mouldings. The shadow of the sphere upon a vertical plane is an ellipse of the form shown in Figure 104;[2] we may, therefore, consider such a shadow, cast upon an imaginary plane between the sphere and the mouldings, as substituted for the sphere, since its shadow will coincide with that of the sphere, whatever the surface of incidence. Any vertical line in the ellipse will then cast a shadow describing a true section of the mouldings, as, for example, the diameter $i'k'$ would cast the shadow $i'_1k'_1$, and, since the elements of the mouldings are all horizontal, the shadows of horizontal lines in the ellipse will be horizontal lines of the same length with them; so that, as the shadows of 1, 2, 3, 4, 5, 6, etc., evidently fall at 1, 2, 3, 4, 5, 6, etc., on $i'_1k'_1$, by laying off to right and left of these shadows distances equal, respectively, to the distances from 1, 2, 3, 4, etc., to the circumference of the ellipse, we have as many points as we may choose to get of the outline of shadow on the mouldings. Whatever portions of the shadow fall upon vertical faces in the group of mouldings (as, for example, its highest and its lowest segments) will be identical in form with the corresponding parts of the ellipse of shadow which we have substituted for the sphere.

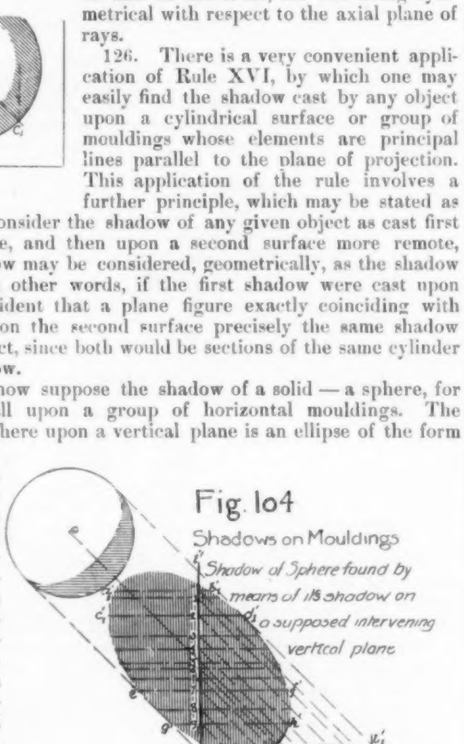


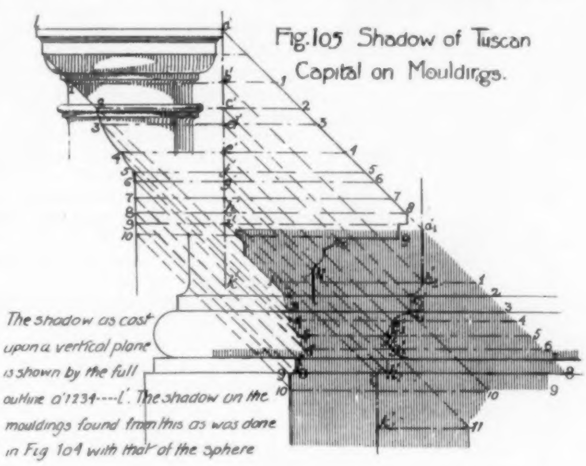
Fig. 104
Shadows on Mouldings

128. It is evident that this method may be applied to the shadow of any solid whatever, since its shadow may be first found as it would be cast upon the plane of projection or a plane parallel to it, and then the procedure becomes the same as in the example just explained. Figure 105 shows the shadow of a Tuscan capital cast upon a group of mouldings in this manner.

129. Another very useful method for finding the shadow of circles of revolution upon other parts of the solids of revolution to which they belong is known as *Pilet's Method.* It depends upon the principle that the shadow of a horizontal circle upon a vertical diagonal plane turned towards the light is projected vertically as a smaller circle, whose diameter is equal to the half-diagonal of the horizontal circle.[3] This is made clear in Figure 106, where the same relation of dimension is also seen to exist between the horizontal square and its shadow on the oblique plane, though the shadow in this case assumes the position of a vertical lozenge.

130. In order to understand Pilet's method, it is also necessary to recall the fact that whenever two lines of shadow cross, their intersection is the shadow of the point where the line of shade of one

Fig. 105 Shadow of Tuscan Capital on Mouldings.



of the two objects casting the shadows is crossed by the shadow of the other. In other words, if the shadows of A and B on a given surface cross each other, their intersection x_1 is the shadow of a point x on A, the ray through which is tangent to the line of shade of B in a point which we may call x^1.[4] If the objects are plane figures, as circles, the points x and x^1 are both on the circumferences of the circles.

131. Let as now suppose a circular abacus on a cylindrical shaft (Figure 107). Part of the shadow of the abacus falls upon the shaft. The shadow of the lower edge of the abacus upon the vertical oblique plane is a small circle, and, if the plane be supposed to pass through the axis of the shaft and abacus, the smaller circle will have the same centre as the lower edge of the abacus, and may be drawn as shown in Figure 107, in which $o's'$ is the half-diagonal of the radius $o'r'$. If, now, we take a circle of revolution, $o''r''$, of the shaft, its shadow on the same oblique plane will be a smaller circle, $o''s''$, which intersects the first shadow in the points a'_2 and b'_2. These are shadows of a'_1 and b'_1, points on the edge of $o''r''$, where

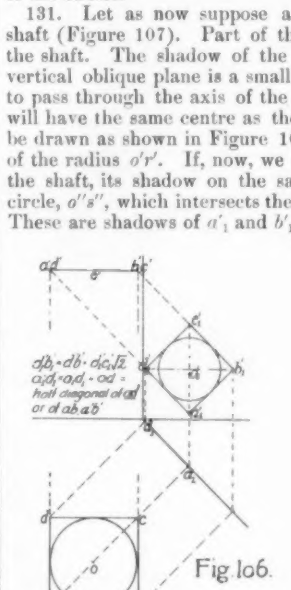
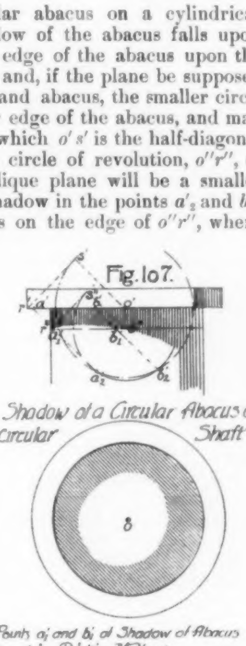


Fig. 106.

Shadow of Horizontal Square and Circle cast upon vertical oblique 45° Plane

Fig. 107.



Shadow of a Circular Abacus on Circular Shaft

Points a_1 and b_1 of Shadow of Abacus found by Pilet's Method.

it is touched by the shadows of a' and b', and, therefore, points of the shadow of the abacus on the shaft. By thus assuming a number of horizontal sections of the shaft, we may find as many points as desired of the required shadow.

132. The shadow of the abacus on the shaft may, however, be approximately determined by locating its three most important points by more direct methods. The shadow of the left-hand "corner" of the abacus falls upon the left-hand "corner" of the shaft, since both are in the axial plane of rays (c'_1 in Figure 108); this is the highest point of the shadow, whose curve is therefore at this point tangent to a horizontal line. If the point of shadow on the left-hand "edge" of the shaft be now ascertained from the plan, that on the middle-front element will be on the same level.[5] The most rapid curvature of the shadow is between the middle and the right hand "corner" or line of shade of the shaft: it crosses this corner at a point formed by *revolving the "corner" of the lower edge of the abacus down upon*

[1] In reality, the plane of shadow of the front edge, being an oblique plane, intersects the cylinder in an ellipse whose axes are to each other as $\sqrt{2}$ to 1. But the major axis is foreshortened, both in plan and in elevation, in the ratio of 1 to $\sqrt{2}$, so that the ellipse is projected as a true circle equal to the circle of horizontal section of the cylinder.

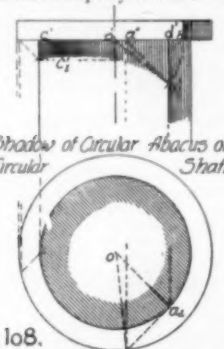
[2] This will be demonstrated in the next chapter.

[3] The same is true of the shadow of the vertical circle cast upon a plane inclined at 45° to both planes of projection, and parallel to *G L*.

[4] This principle has already been applied in finding the shadow of the porch in Plate III. See Chapter VI in No. 718, issue of September 28, 1889.

[5] This should be observed in all surfaces of revolution, since the left-hand profile and middle-front element are symmetrical with respect to the axial plane of rays.

the "corner" of the shaft.[1] If the draughtsman bears in mind the fact that the width of the shadow at the left-hand edge and at the centre of the shaft is always a little *less* than the overhang of the abacus, and that its curvature is very slight between these two points, and increases rapidly towards the right-hand "corner" of the shaft, it is quite sufficient, ordinarily, to locate the points c'_1 and a'_1 on the two "corners" of the shaft in order to draw the curve of shadow with considerable accuracy. The most common occasions for drawing this shadow are afforded by the cornices, belt-courses and eaves of circular buildings, towers, etc.



Shadow of Circular Abacus on Circular Shaft

Fig. 108.
Point a'_1 found by revolving "corner" b' of Abacus down upon corner of Shaft; using o' as centre

133. Pilet's method is applicable whenever one portion of a surface of revolution is disposed in such a manner that a sharp *edge* or circle of revolution becomes itself a line of shade casting a shadow upon other portions of the surface, as in the case of the gorge or circular scotia, the hollow cylinder, the hollow cone, etc. In each case the axis is supposed to be a principal line. The hollow cylinder is the simplest among these surfaces and will be considered first.

134. *The hollow cylinder.* Since all the reduced circles of oblique shadow are in this case equal, the problem becomes very simple. The shadow begins at a' (Figure 109) where the first reduced circle crosses the plane of the circle whose shadow it is, and at a'_1 (on the inside of the nearer half of the cylinder) where it emerges again from it, the shadow terminates. It is a half-ellipse (being generated by the intersection of an oblique elliptical cylinder of invisible shadow

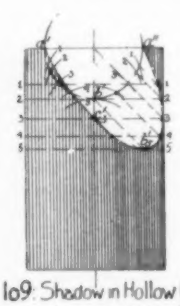


Fig 109: Shadow in Hollow Cylinder
Top of Cylinder casts semi-elliptic shadow on inside surface, outline found by Pilet's method

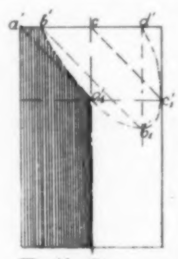


Fig 110. Shadow on Half Cylinder. a'_1 is on 45° line from a', and on middle element: b' is on corner of cylinder

with the cylinder itself), and touches the right-hand element at 3, at the end of the 45° line drawn from the top of the middle-element of cylinder; and the point c'_3 symmetrical with it, is at the same level on the middle-element. The lowest point b'_5 is on the right-hand corner at a distance from the top equal to the diameter of the reduced circle, or $\frac{1}{\sqrt{2}}$ if the diameter of the cylinder is 1.

135. *The hollow half-cylinder.* The above shadow, from a'_1 to c'_3 is cast by the nearer half of the top-circle of the cylinder. If the nearer half of the cylinder be removed, the left-hand edge casts its shadow along the middle-element (Figure 110) until it meets the shadow of the arc a' b' of the top semicircle. This shadow is of course an arc of the ellipse of shadow in Figure 109. It may be drawn with a very near approach to accuracy by locating a'_1 at the intersection of the middle-element with the ray drawn through a'; b' is the "corner" of the half-cylinder, and the curve from b' to a'_1 is very flat, tangent at a'_1 to the 45° line, and therefore easy to draw with very tolerable exactness. This "short-cut" method is of greatest service to the draughtsman, for the shadow on the hollow half or quarter cylinder whose axis is parallel to $G\,L$, a shadow precisely like that in Figure 110, is simply the oft occurring shadow on the soffit of the *arch in section*. When the arch is thinner than its own radius, it is necessary to suppose its cylindrical surface prolonged sufficiently to allow of drawing the whole curve of the shadow upon it, retaining finally only so much of this curve as lies upon the soffit of the actual arch in question (Figure 111). The shadow of the arch upon a wall parallel to $V\,P$ is cast as already explained in Chapter VI, and it will be noticed that the portion of shadow of the outer edge of the arch cast upon the wall is precisely that portion which does not fall upon the soffit, and which if the surface of the arch were indefinitely extended like a barrel-vault, would form upon that surface the completed shadow of Figure 110. The most common mistake of draughtsmen in delineating the shadow on the soffit is to greatly exaggerate its curvature which, as seen in Figures 110 and 111 is very slight indeed.

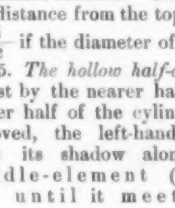


Fig. 111.
Shadow on Arch-Soffit

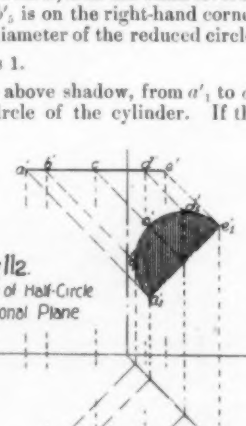


Fig 112.
Shadow of Half-Circle on Diagonal Plane

136. In the same way we may apply Pilet's method to the upright and inverted cone and half-cone, and to the shadow cast on the inner surface of a dome by a lunette or "eye" at the top. Having once learned the complete shadow on the whole surface of revolution, the shadow on the half-surface (the interior of the surface in section with the nearer half removed), may easily be worked out, as was done with the hollow half-cylinder. Or the shadow on these half-surfaces may be directly ascertained by applying Pilet's method to the shadows of the half-circles of revolution, remembering that their reduced half-circles of shadow are drawn upon 45° oblique diameters, as shown in Figure 112. Figure 113 shows the half-ellipse of the shadow of the half-lunette on the interior surface of the half-dome. The method for drawing the shadow of the front edge of a half-dome on its interior surface will be explained further on in this chapter.

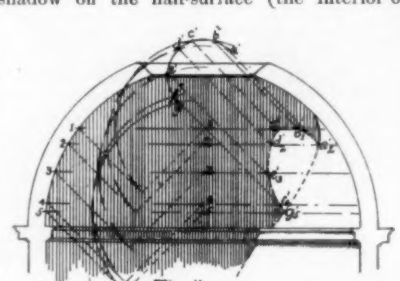


Fig. 113.
Shadow of Half-lunette on interior of Half-Dome
Line of Shadow by Pilet's method: it is a semi-ellipse, terminated (or intersected) by shadow of front of half-dome on the spherical interior.

137. Before going on to other forms and methods, the scotia or gorge should engage our attention briefly (Figures 114 and 115). The examples of this surface vary so greatly in profile and proportions that no general rule can be framed for the curves of its shade and shadow, and in general these are ascertained most accurately by the "method of slicing" described briefly in Chapter III.[2] But Pilet's method may be applied if preferred, and justifies our considering these forms here, at least in a summary manner. They may be broadly divided into two classes, those in which the broad overhang of the upper part casts upon the lower portion a wide shadow which completely covers up the shade (Figure 114); and those in which the narrower shadow of the less-projecting upper portions leaves the lower part of the horn-shaped shade in view (Figure 115). The visible half of the shadow is a line whose curvative varies in different examples; it is tangent to the right and left-hand profiles of the scotia, at the points where it passes to the farther side of the object (as is the case with all shades and shadows on surfaces of revolution, with the one exception of the shadow at 45° cast by a line normal to the plane of projection). Its highest point is on the left-hand

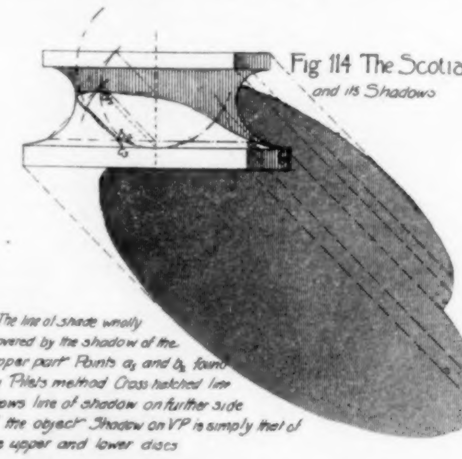


Fig 114 The Scotia and its Shadows

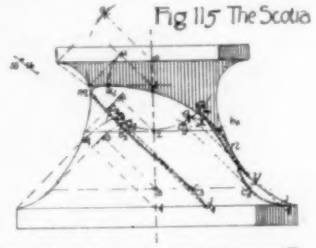
The line of shade wholly covered by the shadow of the upper part. Points a_1 and b_1 found by Pilet's method. Cross hatched line shows line of shadow on further side of the object. Shadow on VP is simply that of the upper and lower discs

[1] That this locates the point correctly may be proved by comparing the triangles $o'\,d'\,a'_1$ and $o\,a\,a_1$: these are similar triangles since the sides adjacent to the right angle at d' are half diagonals (or diagonal projections), of those adjacent to the right angle at a'_1. For $o'\,d'$ is the diagonal projection of a radius of the shaft, and $a'_1\,d' = a'\,d' =$ diagonal projection of $a\,a_1$. Therefore, the third sides of the triangles are proportional, that is, $o'\,a'_1$ is the half-diagonal of $o\,a$ and therefore, equal to $o'\,b'$ which is also the half-diagonal (or diagonal projection) of a radius of the abacus.

[2] See No. 694, issue of April 13, 1889.

corner element or meridian of the surface, and may be found by revolving that element around till it coincides with the left-hand profile, the ray being then projected at 35° 16′, casting a point of shadow on the profile, which point we then revolve back to the corner of the circle of revolution on which it lies (Figure 116). In Figure 115

Fig 115 The Scotia



Here the line of shade is visible from x to y. The line of shadow tangent at m and n to the profile follows on further side the cross-hatched line. Point a_1 found by method of Fig 116. Points b_3, c_3 and d_3 found by Pilet's method, the reduced circles 2, 3, and 4 intersecting the circle Q at the points Q_2, Q_3, Q_4.

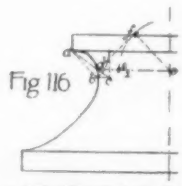


Fig 116

e_1 is highest point of shadow. From ab at 45° we obtain ac at 35° 16′; it intersects profile at d. e_1 is on corner of circle of revolution passing through d, and may be found by revolving bd (the ½ diag onal of ab) down upon da.

the shadow of the upper edge of the scotia terminates at x where it encounters the line of shade, which in turn passes off tangent to the right-hand profile at y, the point of contact of 45°.

138. The line of shade once ascertained, the shadow may be easily cast on $V P$ or on $H P$. Evidently so much of the shadow of the upper circular edge as does not fall on the scotia itself, is cast upon the plane of incidence, together with that of so much of the line of shade of the scotia as is left uncovered by the shadow of the upper edge. In Figure 114 since no line of shade appears upon the concave surface of the scotia, the shadow cast by the whole object becomes simply that of the two discs which form its upper and lower parts.

139. The hollow hemisphere receives upon its inner surface the shadow of one-half its own edge. When this edge is parallel to the plane of projection, the half-circle casting the shadow is limited by the diameter inclined at right angles to the projection of a ray of light (Figure 117). The middle point a' of this semicircle casts its shadow at a'_1, the extremity of the semi-minor axis of the ellipse of shadow, whose major axis is obviously $c' d'$, since at c' and d' the line of shade terminates and the shadow begins, the light first reaching the interior at these points.[1] The whole shadow forms a semi-ellipse, whose semi-minor axis $o' a'_1$ is one-third the radius of the hemisphere; it can be drawn free-hand with sufficient accuracy for ordinary requirements. The distances of b'' and c'' (Figure 118) from c' and b' respectively are very nearly equal to $c' b'$, the error being about $\frac{8}{100}$; if this distance be laid off vertically and horizontally from c' and b', the points b'' and c'' come a hair's breath beyond the points thus found, and we have, with an inconsiderable error, five points instead of three, of the semi-ellipse, and its direction at three of them.

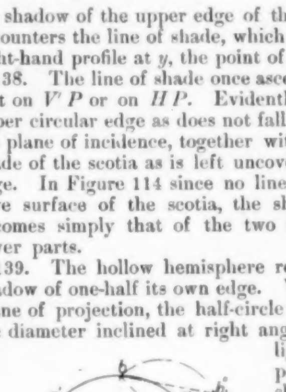


Fig 117 The Hollow Hemisphere

$oa_1 = \frac{1}{3}$ of ox; $ob_1 = \frac{1}{3}$ of of, or of oy; ca_1d is therefore a semi ellipse

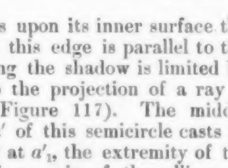


Fig 118

The Hollow Hemisphere

$ob_1 = \frac{1}{\sqrt{2}}$; $co + ob = 1 + \frac{1}{\sqrt{2}} = 1.447$; $cb = \sqrt{2} = 1.414$

140. If we cut off the lower half of this figure, we have the *half-dome*, whose occurrence in architectural drawing is sufficiently frequent to make familiarity with its shadow desirable. But the hollow quarter-sphere occurs with far greater frequency as the cap of a niche, of which the central groove of a fluted shaft is an extreme but very common example. The niche, terminated by a quarter-sphere at either end, is shown in Figure 119. On the spherical surface, from c' to b'_1 the shadow is drawn as explained in the last paragraph. From b'_1 to c'_1 the shadow of the edge of the quarter-sphere falls upon the surface of the cylinder; it is a curve which may be drawn free-hand with sufficient accuracy if made tangent to the preceding shadow at b'_1 and to the vertical shadow of the vertical edge of the niche at its highest point e'_1; it passes outside of a'_1 which only serves as a point by means of which to construct the quarter-ellipse $a'_1 b'_1 c'_1$. At the lower end of the niche we have a line of shadow composed of parts two intersecting half-ellipses: one, the shadow of the vertical edge $e' f'$ on the spherical surface, and the other the shadow of the curve $f' d'$ on the same surface. The former is an arc of a vertical semi-ellipse having for its minor axis $f' o''$, which is the radius of the hemisphere or niche, and for its semi-major axis a vertical line equal to the diagonal of that radius. The second part of the shadow, from f_1 to d', is the lower part of the ordinary shadow on the hollow hemisphere, drawn by laying off its semi-minor axis $o'' a''_1$, according to rule, equal to one-third of the radius.

141. Figure 120 shows the shadow in the square-headed semicircular niche; the shadow $a'_1 b_1$, is a true section of half the niche, being cast by the horizontal front edge of the head of the niche.

142. The architectural applications of the various forms discussed in the preceding paragraphs are exceedingly varied; some of these have already been mentioned, others easily suggest themselves. The scotia is a part of nearly every column-base; in the "attic" and the Corinthian bases of Classic architecture, and in many of the bases of piers and columns in the Romanesque and early Gothic styles, it occurs between two toruses, which are usually treated by the five-point method. In Figure 113 is an example of the shadow of a lunette or "eye" on the interior of a half-dome, and of a cornice on the cylindrical surface of the drum. Points of this shadow may be worked out either by the five-point method or by Pilet's method; the curve of shadow is precisely the reverse of the line which would be cast by an external cornice of the same profile, upon the exterior of a cylinder of the same radius as the interior of this drum.

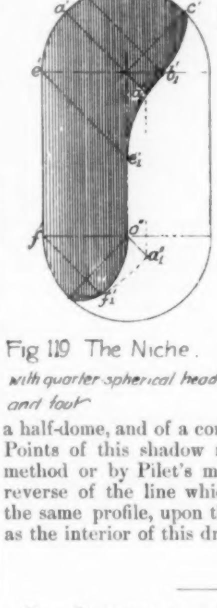


Fig 119 The Niche. with quarter-spherical head and foot

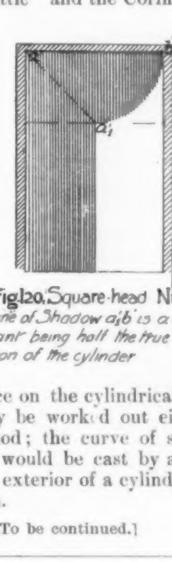


Fig 120. Square-head Niche

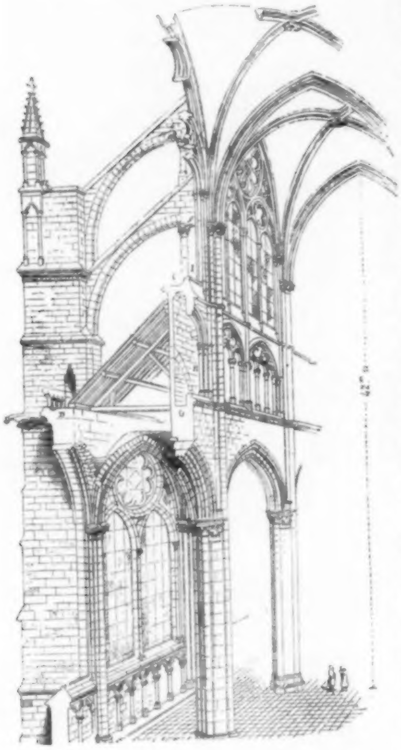
Line of Shadow $a_1 b$ is a quadrant being half the true section of the cylinder

[To be continued.]

NEW DISCOVERIES AT TROY. — The *Neue Freie Presse*, of Vienna, publishes a letter from Dr. Schliemann, dated "Troy, June 1," in which he describes all the work done by him at Hissarlik, with his three railroads and seventy men, since he began operations on November 1 of last year. His object was to lay bare the three entrance roads of the lower town to the south and west of the citadel in order to throw light on the latter. As the rubbish from successive layers of débris from fallen houses had covered the site to the depth of sixteen metres, the excavation has on no spot yet reached the original level. Moreover, as all the ground removed had to be carefully sifted and every object found photographed, progress could be only slow. Yet the discoveries made have been of great importance. Outside the old fortress wall, marked in the author's "Troy" *b*, and the later wall *c*, Dr. Dörpfeld has discerned a much older enclosure wall of the second or burnt city, which, it is evident, some great catastrophe befell. This wall, with its towers, is well preserved, though the upper part is made of unbaked bricks. The town thus destroyed seems to have possessed only six or seven large buildings, which are all parallel, running from southeast to northwest. The house walls, 0.85 to 1.45 metres thick, were all provided with porticos or verandas, and only their lower portion was built of stone, with clay used for mortar, or else of unbaked bricks. The rest must have been wood. The largest building (marked A in Plan vii.) has a hall 20 metres long by 10 metres wide; the other houses are somewhat smaller. To the south and east the town walls of the latest period of this second prehistoric town, with their towers, have now been laid bare in almost their whole length, and there is little doubt that they were provided, as at Athens, with a covered gallery in wood. The wall marked B C in Plan vii. is proved now to be a ramp giving access, as at Tiryns, to the town, the steps leading up to the ramp being of very primitive character, though still older ones have now been found on the south side of the citadel outside the southeast gate. To the southeast of the Roman acropolis a small but well preserved theatre has now been discovered, of the time of Tiberius, a kind of odeion with the roof fallen in, the lower seats being of marble, the upper ones of hard limestone. Inside two life-sized marble statues have been found, of which one may be that of Claudius. — *N. Y. Commercial Advertiser.*

[1] The shadow of a' is thus found; the profile-plane of rays passing through a' and o' intersects the hemisphere in a semicircle which, revolved around $a' x'$ until parallel with $V' P$, coincides with the edge of the sphere. The ray passing through a' now appears at its true angle of 35° 16′ with $a' o'$, and, therefore, is drawn through o''; it is found to intersect the edge of the revolved profile-section at a''_1 which, when this section is revolved back to its original position, obviously takes the position a'_1, which is the shadow required. In the same way the shadow of b' is found; the profile-section revolved parallel to $V' P$ is the semicircle $b' b''_1 f'$; b''_1 is the revolved shadow of b' which, when revolved back again into its original position, falls b'_1. It can be proved by trigonometry that the distance of each shadow (a'_1, b'_1, etc.) from $c' d'$ is one-third the distance of the corresponding points x', y', etc., from the same line. That is, the ordinates of the line of shadow are proportional to those of the semicircle; the line of shadow is, therefore, a semi-ellipse, whose semi-minor is to its semi-major axis as 1 to 3.

ARCHITECTURE UNDER NATIONALISM.[1] — IV.



Section of the Nave of Amiens Cathedral. From Viollet-le-Duc.

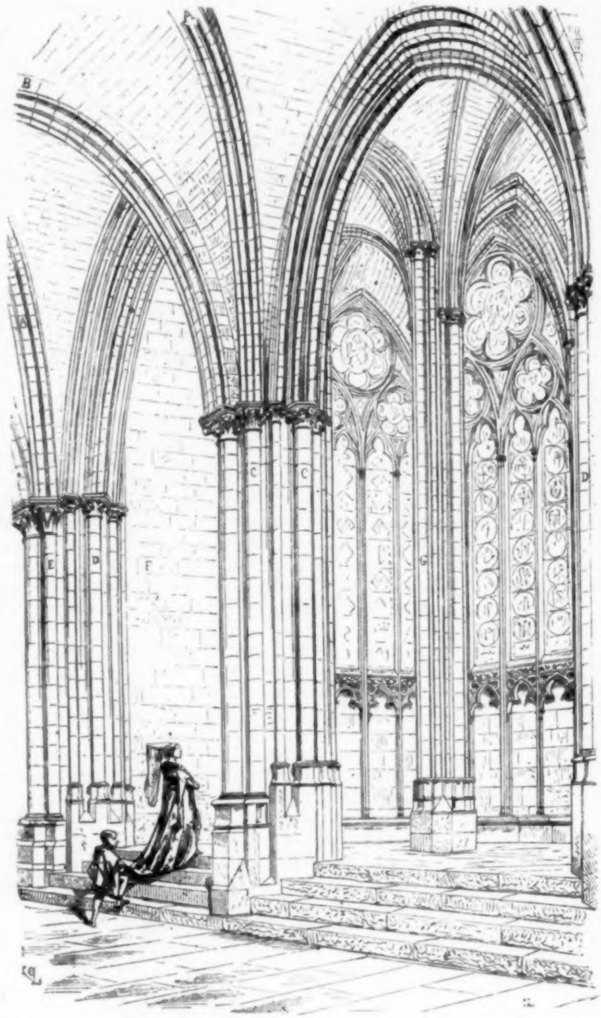
THE union of artist and engineer is particularly noticeable in the architects of the twelfth century. Their great cathedrals are marvels of engineering skill handled with consummate art. The problem before them was almost the reverse of that presented to the ancient Greek. A vast hall must be built and roofed-in with materials so small as to resemble rubble more than blocks of masonry. The supports of the roof vaulting must occupy a minimum of ground area, not only for the purpose of giving the greatest possible amount of unobstructed room for the performance and view of the sacred ceremonies and grand processions held within them, but also to provide a maximum of open space for the gorgeous stained-glass windows which form a leading characteristic of the Gothic style. The initial-cut shows the construction of a part of a Gothic cathedral.

Only a perfect mastery of the laws of statics and dynamics, as affecting the materials employed and a marvellous skill in their application, enabled the architect to erect such daring structures, which have already stood the test of five centuries and now seem capable of standing as many more. The Gothic represents the dynamics and the ancient Greek the statics of architectural construction, and the resultant forms are correspondingly diametrically opposite to each other. Equilibrium, the opposition of compressile to tensile forces, and the reduction of the horizontal section of the points of support to a minimum are the principles of Gothic construction. Iron, had it been obtainable in large masses for building, would have been enthusiastically used by the Gothic architects as a means of obtaining points of support still more rigid and condensed.

The Gothic architecture did not attain its highest perfection until emancipated entirely from the control of the church. This took place at the end of the twelfth century, when a real national spirit began to make itself felt in the gradual enfranchisement of the commons, in scholastic discussions and in the study of ancient philosophy. Then throughout France a truly national style arose with a general thirst for knowledge, independence and national union among all the people of the middle classes, and under this influence it developed with great rapidity. The artists were then entirely independent, neither the clergy nor the nobility interfering. The whole people took an intense interest in their architecture. They were not, in the modern sense, highly educated. Books were rare, since the printing-press did not then exist. Therefore, the painting and sculpture of their cathedrals formed almost their only literature, and this made these buildings all and all to those who erected, as well as to those who worshipped in them, and thus the appreciation and love for art grew strong among the whole people and was not confined to the richer classes.

The accompanying cut represents in perspective a part of the interior of the Cathedral of Mayence, and gives some idea of the marvellous beauty of these noble creations, the highest work of art ever produced by man. Such interiors as these, blazing with harmonious colors and rich with sculpture, could only be the work of love of a whole community inspired by one feeling and a universal sympathy for their national art, and could have no other effect upon those who worshipped in them than to civilize and elevate them to a still higher degree. This cut illustrates clearly the method of construction of mediæval architects. Not a stone over a foot thick is shown in the whole design, and yet the stability both actual and apparent of the structure is absolute, even though the horizontal area of the supporting columns is reduced to the smallest amount possible with stone, and the walls are cut away to mere points of support in order to make room for whole volumes of history in stained glass.

"An epoch," says Viollet-le-Duc, "which regards art as a mere matter of luxury, an appurtenance of the privileged classes, or an envelope proper only for certain public monuments, may be a well administered epoch, but it does not possess the highest element of civilization, and perhaps one of the most essential qualities of public tranquility. There are intellectual enjoyments, as well as material enjoyments, and the former, like the latter, when they become exclusive and priviledged, create envy and ill feeling. If but a few know how to read, the ignorant crowd, when it chances to get the



Interior of Gothic Cathedral. From Viollet-le-Duc.

upper hand, burns books with as much passion as it burns sumptuous châteaux, where all the material pleasures of life are brought together. If everybody can read, books will accumulate and remain uninsulted upon the library shelves. In the same manner to make art a matter of luxury or to associate it only with wealth is dangerous alike for art and for the exclusive few who patronize it. It is important, therefore, to render art catholic, and to restore it to its proper influence over all things and its proper place everywhere; it is important that the minds of all, and of artists more especially, should be penetrated with the truth that art, in architecture, does not consist in the employment of precious marbles or in the accumulation of ornaments, but in distinction of form, in the most graceful and most honest way of doing practical things; for it costs no more in money, although it may in thought, to cut stones or to lay bricks according to judicious principles, and with a proper regard for æsthetic proprieties, than to cut and lay them without duly considering the place they are to occupy in the building, and the part they are to bear in its general effect. Now the art of the lay school in the thirteenth century was essentially democratic; it was everywhere and in everything; and the villager had as much right to be proud of his little church, or the country gentleman of his manor-house, as the citizen of his cathedral or the nobleman of his palace."

The architect of the best Gothic period made his own details and superintended the construction of the building. He was the master of the works. The great cathedrals of the Middle Ages were not designed and executed in a few months. They were the work of years and even centuries. They represent the aggregate experience of a whole people working for generations in the same direction. A single mind, however talented, cannot invent a new style. Architecture is a useful art; an adaptation to habitations of all the countless developments of science in methods of construction, warming, ventilating, lighting, draining, and protection of all kinds, and every advance or modification in any one of these elements which make

[1] Continued from No. 764, page 99.

up the building, must have its effect upon its form. Accordingly architecture must of necessity develop slowly and only in conformity with the progress of the various elements of which it is composed. In a purely useful art, like ship-building, for instance, this necessity of slow development is instinctively felt and accepted by every one without question. Each individual, each generation, is content to add the merest atom to the general progress, the smallest detail to the grand aggregate of effort which has converted the canoe of the savage into the great ocean steamer of to-day. So it was in the architecture of the Middle Ages and so must it always be in the development of another national style.

But the architect of to-day is not satisfied to perform so humble a part; he must distinguish himself by producing some striking originality; he must tickle some eccentric client, or be left behind in the present slavish race for existence and position. Thus it is that in Art the age of gold is the reverse of the "Golden Age," and we have in the abnormal *craving for originality* a *fourth* reason why, so long as the competitive money struggle exists, a great national style of architecture is an impossibility. Unfortunately, too, the evil increases and must continue to increase under this system each year, for as one by one the various small manufacturing and distributing firms are crushed out of existence by the great monopolies, other occupations will be sought and the professions must inevitably become correspondingly overcrowded. As competition grows hotter, the independence of the artist so indispensable for the progress of art, must diminish until artists and architects will be degraded to the position of lackeys to a haughty and ostentatious plutocracy, and as has under such conditions always been the case in history, the degradation of art will be absolute.

A *fifth* great evil, resulting from the competitive system, pregnant with danger to the art of architecture, comes from the custom of instituting architectural competitions for the award of the most desirable building commissions. However necessary they may be under the competitive system of industry, from which they are a direct outgrowth, and they certainly are necessary under this system, nevertheless, considered from a broad standpoint they are an unalloyed evil, and the fact that under nationalism all need and excuse for them will absolutely disappear is not the least of the countless practical advantages of this system.

To avoid misunderstanding it is proper to say at the outset, that the writer has no unusual personal prejudice against competitions, inasmuch as in the five competitions for public buildings in which he has participated he has, largely, no doubt, through good fortune, been successful in four, and partially successful in the fifth, and his most lucrative commissions having come from these, his condemnation of the principle is in no respect due to any personal bitterness.

Architectural competitions are of two kinds, the first being for the selection of the architect and the second for the selection of the various contractors who are to execute his designs.

The first evident objection to the competition of architects is the encouragement of unstudied but effective and flashy design, of the attempt to produce that superficial and dangerous *originality* to which we have just referred — an effort to capture the jury, rather than an earnest and thorough study of the problem from the highest standpoint of art, through which alone a national style can ever be developed. It often happens that a month, or even a fortnight, is all the time given the architect to make his competitive drawings for a most important building. Even if the architect had no other work on hand to be "rushed," how could a design truthfully representing all the requirements of the case, and worthy of living for centuries in monumental stone, be created in these few days? In the evident impossibility of studying all the constructive and utilitarian requirements of the case, which ought evidently to govern the form of the structure, the architect is obliged to select arbitrarily in advance some style of architecture belonging to past ages which happens at the time to be, in his opinion, most fashionable or appropriate, and afterwards mould the requirements to suit these forms as best he can.

But if it is difficult for architects to prepare their designs in so short a time, it is still more difficult for a jury to decide justly upon their merits, and a truly satisfactory decision is rarely attained.

Finally, the temptation to unfairness of all kinds, conscious and unconscious, on the part of the competitors as well as of the judges, is so great that many of the ablest and most conscientious architects refuse to participate in competitions, even though under our present system of industry they seem to be almost a necessary institution.

Competition among contractors for building is equally to be condemned, as productive of the most serious evils to the public, the architect, the building, and the contractor himself.

The general rule is that the contract shall fall to the *lowest bidder*. Under the sharp competition of the building trades to-day, a contractor can only obtain a contract by offering to do the work for a sum below what all the other competitors consider safe. Work he must have, however, or go into bankruptcy. He is not even permitted to know how low he must figure to get it. Considering the tremendous amount of detail and the great chances of error attending the specification, valuation and execution of an important building to-day, the risk on the part of the contractor is very great, and the temptation to dishonesty, in order to save himself and family from ruin, when he discovers he has estimated below the cost to him, is terrible. The result is endless opportunity for litigation and the need of increasing vigilance on the part of the architect to detect carelessness and fraud.

All this will be avoided under Nationalism. All buildings will belong to, and be built by, the nation. When architecture becomes truly national, a true national style will be the result.

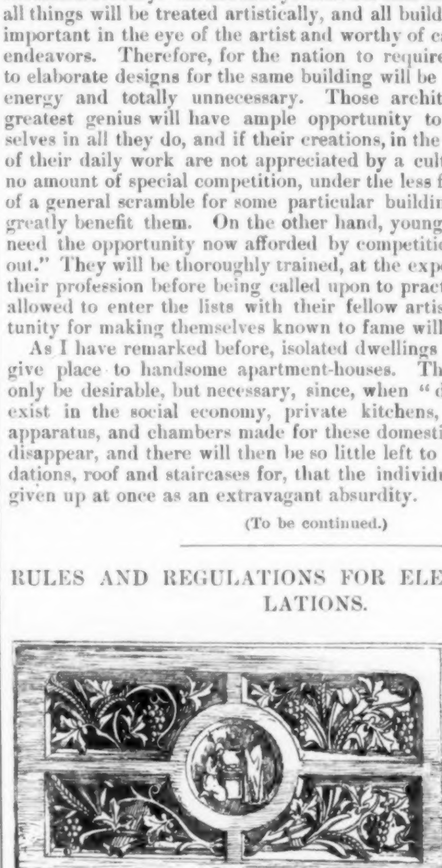
The national-buildings will consist in magnificent libraries, churches, art-galleries, music-halls, theatres, baths, gymnasiums, warehouses, sample-stores, museums, memorial buildings, academies of science, art and literature, school-houses, apartment-houses, railroad-stations, and the like. There will be no mean or unimportant buildings, because there will be no necessity nor excuse for such.

Competition among architects will then take the form of constant emulation in designing all these great buildings in the truest, and, therefore, most artistic manner, and without haste, each artist being ambitious to execute the commissions entrusted to him in such a manner as to deserve the approbation of his fellow-citizens, and to contribute something to the progress of his national art. The undignified and degrading occupation of catering to the whim of unartistic and irresponsible individuals will not mortify the artist of the twentieth century. As has always been the case in the best ages of art, all things will be treated artistically, and all buildings will be equally important in the eye of the artist and worthy of calling forth his best endeavors. Therefore, for the nation to require several architects to elaborate designs for the same building will be a useless waste of energy and totally unnecessary. Those architects who have the greatest genius will have ample opportunity to distinguish themselves in all they do, and if their creations, in the constant emulation of their daily work are not appreciated by a cultivated people, then no amount of special competition, under the less favorable conditions of a general scramble for some particular building, will be likely to greatly benefit them. On the other hand, young architects will not need the opportunity now afforded by competitions to "bring them out." They will be thoroughly trained, at the expense of the State, in their profession before being called upon to practise, and when once allowed to enter the lists with their fellow artists, abundant opportunity for making themselves known to fame will be afforded them.

As I have remarked before, isolated dwellings for individuals will give place to handsome apartment-houses. This, indeed, will not only be desirable, but necessary, since, when "domestics" cease to exist in the social economy, private kitchens, laundries, heating apparatus, and chambers made for these domestics will of necessity disappear, and there will then be so little left to build separate foundations, roof and staircases for, that the individual dwelling will be given up at once as an extravagant absurdity. J. P. PUTNAM.

(To be continued.)

RULES AND REGULATIONS FOR ELECTRIC INSTALLATIONS.



PULPIT PANEL DES. BY THE REV E GELDART.

THE following rules and regulations for the installations of electric lighting and motive power apparatus were prepared by C. J. H. Woodbury, F. E. Cabot, C. M. Goddard and S. E. Barton, all of them expert electricians. They have been adopted by the Boston Manufacturers Mutual Fire Insurance Company, the Boston Fire Underwriters Union, and the Electrical Mutual Insurance Company. While there is so much discussion going on as to the dangers of electrical appliances, and especially as to the methods to be adopted for introducing electric lights, these rules will be of value to all fire underwriters, and especially those whose duty it is to inspect such installations.

DYNAMOS AND SWITCH-BOARDS.

(1) Dynamos must be located in dry places, not exposed to flyings or combustible material, and must be insulated upon dry wood, filled to prevent absorption of moisture. They must be kept thoroughly clean and dry. They must be provided with a reliable, automatic regulating device, or a competent person must be in attendance near the machine whenever it is in operation. In wiring for motive power the same precautions should be taken as with a current of the same volume and potential for lighting.

Each machine should be provided with a water-proof cover, which should be used whenever the machine is not in operation.

(2) Switch-boards or other apparatus near the dynamos for controlling circuits and currents, should be so located that they will be accessible and open on all sides, and entirely disconnected from all woodwork or combustible material; also kept free from moisture. They should be incombustible and rendered non-absorbent of water.

MOTORS.

(3) They must be located in dry places, not exposed to flyings or combustible material, and must be insulated on dry wood, filled to prevent absorption of moisture. They must be kept thoroughly clean and dry. They must be self-regulating, or a competent person must be in attendance near the machine whenever it is in operation. All

resistance boxes or devices should be made of non-combustible material, or so located that they cannot communicate fire to any surrounding combustible material. In wiring for motive power the same precautions should be taken as with a current of the same volume and potential for lighting. The motor (and resistance-box) should be protected by a cut-out and controlled by a switch.

(4) Motor cars driven by electricity from a single wire with earth or floor return circuit, will not be approved in any building insured by this company. The use of such single trolley tracks may be permitted, after special inspection, in mill yards where there is no liability of other conductors coming in contact with the trolley-wire, and where the conditions of the position of the generator are such that the ground circuit will not impose any fire hazard on the property.

(5) Wires for electric lighting or stationary motors will not be permitted in the same circuit with trolley wires with ground return — the stock insurance companies will permit such installations, subject to special inspection and agreement, on payment of a suitable charge for the permit covering this increased hazard — although the same dynamo can be used if desired, for both purposes, provided that the connection from the dynamo to each of the two circuits shall be by a double-throw switch, so that only one of the circuits shall be in service at the same time. In such cases the wires for lighting or stationary motors shall be in the usual manner, entirely on a metallic circuit without ground.

TESTING.

(6) All circuits should be tested at least twice a day with a suitable magneto, or other improved device, in order to discover any escapes to ground that may exist. One test should be made in the morning and another before starting in ample time to remove any defect, should it be found to exist. The rules for testing should be observed in any separate or isolated plant the same as in central stations.

ARC SYSTEM. — OUTSIDE WIRES.

(7) — All outside overhead wires must be covered with some material of high insulating power not easily abraded; they must be firmly secured to properly insulated and substantially built supports. All tie wires must have an insulation equal to that of the conducting wires.

(8) All the joints must be so made that a perfectly secure and unvarying connection, fully equal to the cross section of the conducting wire, will be secured — and they should be soldered. All joints must be securely wrapped with an approved tape.

The following formula for soldering fluid is recommended: Saturated solution of zinc, 5 parts; alcohol, 4 parts; glycerine, 1 part.

(9) Care must be taken that conducting wires are not placed in such position that it would be easy for water or any liquid to form cross connection between them, and they should not approach each other nearer than one foot. The wires must never be allowed in contact with any substance other than air and their proper insulating supports; except that service wires with special insulation may be permitted to touch foreign substances.

(10) Conducting wires carried over or attached to buildings must be at least seven feet above the highest point of flat roofs, and one foot above the ridge of pitched roofs. Lines constructed subsequent to the adoption of these regulations should not be run over and attached to buildings other than those in which the light or power is being, or is to be used, should be on separate poles or structures, where they can be easily reached for inspection.

(11) When they are in proximity to other conducting wires or any substance likely to divert any portion of the current, dead, insulated guard irons must be placed so as to prevent any possibility of contact in case of accident to the wires or their supports. The same precautions must be taken where sharp angles occur in the line wires, and also where any wires (telegraph, telephone or others) could possibly, owing to their position, come in contact with the electric-light wires.

(12) Overhead wires from the main circuit or pole in the street to the terminal insulators attached to buildings, and at the point where they enter a building, must not be less than twelve inches apart. They must be rigidly and neatly run and supported by glass or porcelain insulators or rubber hooks.

(13) Service blocks must be protected by at least two coats of waterproof paint over their entire surface, and when used to support rubber hooks, must have at least one inch of wood between the inner end of the hook and the back of the block.

(14) For entering buildings, wires with an extra heavy water-proof insulation must be used from the terminal insulators through the walls from the outside to the inside of the building. They must loop down, so that water may drip off, without entering the building, and the holes through which they enter should, where possible, slant upward.

(15) Wires must enter and leave the building through an approved cut-out switch, which must be "double contact," and should effectually close the main circuit and cut off the interior when turned "off." It must be so constructed that there shall be no arc between the points when thrown "on" or "off." It should be automatic in its action in either direction, not stopping between points when once started. It should indicate upon inspection whether current be "on" or "off." It must be mounted on a non-conducting base kept free from moisture and easy of access to firemen and police.

INSIDE WIRES.

(16) Wires must not be concealed, and they must be rigidly kept apart at least one foot, unless an approved, moisture-proof, non-conducting, non-inflammable tubing is used. This tubing must be sufficiently strong to protect the wires from mechanical injury. It may be fastened to the wall by staples, provided the tubing is not broken or injured thereby. Wires in this class of tubing may be run as near as three inches to each other.

(17) Conductors in building must be thoroughly well insulated with non absorbent water-proof material, as incombustible as possible, which will adhere to the wire and not fray by friction, and will stand a temperature of 150 degrees without softening. In places liable to dampness, wires must be thoroughly and carefully run on glass insulators, rubber hooks and porcelain knobs of suitable size and shape, and the wires must be separated at least eighteen inches. They must also be provided with an approved water-proof insulation or encased in an approved tubing. When wires pass through walls, floors, partitions, timbers, etc., in-doors, glass tubing or so-called "floor-insulators," or other moisture-proof, non-inflammable, insulating tubing must be used.

(18) All lightning arresters must be grounded outside of building and preferably connected to a water-pipe.

ARC LAMPS.

(19) The frames and other exposed parts of arc lamps must be carefully insulated from the circuit. Each lamp must be provided with a proper hand switch and also with an automatic switch that will shunt the current around the carbons should they fail to feed properly. Stops of some kind must be provided to prevent the carbons from falling out in case their clamps fail to hold them, and these stops must always be in place.

(20) For inside use the light must be surrounded by a globe resting in a tight stand so that no particles of melted copper or heated carbon can escape. When any inflammable material is near or under the lamp the globe must be protected by a wire netting. Unless a very high globe, which closes in, as far as possible, at the top, is used, it must be provided with some protector or spark-arrester, reaching to a safe distance above the light. Broken or cracked globes must be replaced by perfect ones immediately. (By inflammable material is meant dry-goods, clothing, millinery and the like in stores; flyings or goods in fabric factories; shavings and sawdust in wood-working shops; or any other substance that can be readily ignited by droppings or flyings from the lamp.)

INCANDESCENT LAMPS ON HIGH-TENSION CIRCUITS.

(21) The rules for running wires for arc lamps apply also to incandescent lamps on circuits having a potential of over 350 volts. Incandescent lamps in single series on high-tension circuits must be provided with a suitable hand switch and also with an automatic device capable of shunting the circuit across the terminals of the lamp should the carbon filament break. When incandescent lamps are in multiple series the hand switches must not control less than a single group of lamps, each of which may be provided with an automatic shunt as above. Electro-magnetic devices will not be accepted as suitable for this purpose. Any method of distributing current to incandescent lamps on high-tension circuits, other than as above provided for, must receive approval before being put to use.

OUTSIDE WIRES.

(22) The rules 7 to 15 for outside arc wires also apply to outside incandescant wires, except that a cut-out switch in the circuit entering the building will not be required, but the wires from main circuit to main cut-out, inside of building, must be separated by a distance of not less than six inches, for currents having an electro-motive force of 350 volts or less, and this distance must be increased for currents of higher potential. They must also be rigidly and neatly run, and must be supported by glass or porcelain insulators or by rubber hooks.

UNDERGROUND SERVICES.

(23) Where underground-service conductors enter a building special care is necessary that they shall not come in contact with each other or be placed where there is any risk of disturbance by moisture or mechanical injury. There shall not be any free opening from underground wire conduits to buildings. The service must not end in any place where it would be unsafe or undesirable to place a cut-out, but should be continued by means of specially insulated conductors (and a space of ten inches should be maintained between them) to a suitable location.

INSIDE WIRING.

(24) For inside work no wire smaller than No. 16 "B. & S.," or No. 18 "B. W. G.," will be approved. Before using any new form of insulation the approval for its use under the proposed circumstances must be secured. The use of lead-covered wire, or wire the covering of which contains paraffine, is prohibited.

(25) Mouldings with open grooves laid against the walls or ceilings will not be approved. A wood moulding with dividing strips between the grooves at least half an inch in thickness and having a backing of at least one-fourth inch thickness to intervene between the wire and the wall or ceiling of the building, the backing to be protected by at least two coats of waterproof paint, and the moulding of such shape as to protect the wire from moisture, will be approved. Mouldings must not be used in wet places.

(26) Wires laid in plaster, cement or other similar finish, or run over surfaces furred off for plastering, will not be approved, no matter what insulating covering is used. An approved moisture-proof, non-inflammable, insulating tubing or conduit may be used in such places. This tubing must be of sufficient size and so placed that the wires may be withdrawn and replaced at will. All joints and bends in this tubing must be made with suitable devices adapted especially for the purpose. Where this is done in such a way that the joints are moisture-proof, a double-braided cotton insulation rendered non-inflammable, may be used. A separate tube must be laid for each wire, except in the case of "taps" for not more than fifteen ampères, in which case conductors having insulation of cotton or other material which will readily carbonize, will be required. If a moisture-proof covering is desired, it must be placed outside the two conductors, and not between them. In other concealed places, such as unfinished lofts, between floor and ceiling, in partitions, etc., all wires must be covered with approved moisture-proof insulation, and fastened at distances not exceeding ten feet, so as to preserve at least two and one-half inches between the wires or any other electrical conductor. In lieu of such construction an approved moisture-proof, non-inflammable, insulating tubing or conduit with approved moisture-proof joints may be used, and the same rule as to insulation will be applied as in the case where the tubing is buried in plaster or similar material. Tubing

passing through walls or ceilings must extend at least one inch beyond the finished surface, until the mortar or other similar material is entirely dry, when the projection may be reduced to one-half inch. Tubes of such approved make may be laid side by side when imbedded in plaster or otherwise. At all outlets to and from cut-outs, switches, fixtures, etc., wires must be separated from gas-pipes or parts of the building by porcelain, glass or other non-inflammable insulating tubing, and should be left in such a way as not to be disturbed by plasterers. Wires of whatever insulation must not in any case be taped or otherwise fastened to gas-piping. If no gas-pipes are installed at the outlets, an approved substantial support must be provided for the fixtures. Wires of the same polarity, but belonging to the different circuits, or leading to and from a double-pole switch, must not run in one groove, through the same tube, nor in the same slot in a cleat.

(27) In dye-houses, paper and pulp mills, and other buildings specially liable to moisture, all wires (except those used for pendants) must be separated at least six inches. The wire must be thoroughly and carefully put up, and must be supported by glass or porcelain insulators or by rubber hooks. An approved moisture-proof, non-inflammable, insulating tubing will be accepted in lieu of such construction.

(28) In crossing any metal pipes, or any other conductor, wires must be separated from the same by a block of wood or other non-conductor of at least one-half inch, and so arranged that they cannot come in contact with each other by accident. Wires should go over water-pipes where possible. When wires pass through walls, floors, partitions, timbers, etc., in-doors, glass tubing, or so-called "floor insulators," or other moisture-proof, non-inflammable, insulating tubing must be used. Wires must never be left exposed to mechanical injury, or to disturbance of any kind. Wires of the same polarity, but belonging to different circuits, or leading to and from a double-pole switch, must not run in one groove, through the same tube, or in the same slot in a cleat. Cleats should be made of well-seasoned hard wood (filled to prevent the absorption of moisture), porcelain or other approved material, and so made as to separate the wire at least one-fourth inch from the building. When secured by cleats not over four feet apart and tightly stretched, wires having a difference of potential of 120 volts or less, and carrying not over ten amperes, should be separated at least one and one-half inches; when they are confined in a moulding, a half-inch space is sufficient. Mains carrying currents of larger volume should be separated a greater distance. The use of metal staples for securing wire will not be approved.

(29) Where exposed to corrosive fumes, wires should be provided with an insulation that will not be injured thereby; and should be put up in the manner described in Rule 27.

(30) All splices in wires must be soldered in accordance with Rule 8. A soldering bolt should be used for this purpose, if possible. Care must be taken not to render the wire brittle by overheating. The insulation of any joint must be equal to that of other parts of the same wire.

SAFETY CUT-OUTS AND SWITCHES.

(31) Every portion of each installation must be equipped with double-pole, safety cut-outs, that will interrupt the passage of a current in excess of the amount which any portion of the apparatus is adequate to transmit. A cut-out must be placed where the underground or overhead service joins the inside wires, and at every point where a change is made in the size of the wire (unless the cut-out in the larger wire is intended to protect the smaller). The plug or other device for enclosing or supporting the fusible strip or wire should be incombustible and moisture-proof, and so constructed that an arc cannot be maintained across its terminals by the fusing of the metal. No lead or composition strips carrying more than ten amperes before melting shall be used, unless provided with contact surfaces of some harder metal having perfect electrical connection with the fusible part of the strip. On any combination fixture no group of lamps requiring a current of seven amperes or over shall be ultimately dependent on one cut-out. But there shall be a cut-out to each pendant and fixture.

(32) Switch-boards and cut-outs should be made of incombustible material, and arranged so that there will not be any leakage of electricity across them. They should be put in places not liable to contact with foreign substances, nor exposed to moisture.

(33) All switches except those in lamp sockets should be double-pole. They must have a firm and secure contact that will make and break readily, and that will not stick between full "on" and "off," nor get out of repair easily in other ways. The points of contact must not be allowed to scrape or rub the entire surface of an insulating material between the contact strips; an air-space must intervene. The carrying capacity of the different parts must be sufficient to prevent heating.

FIXTURE WORK.

(34) In all cases where wires are concealed within or attached to fixtures, the latter must be insulated from the gas-pipe by some approved device. When holes are drilled in fixtures, all burs or fins must be removed from the edge of the holes before the conductors are drawn through. When wired outside, the conductors used must be so secured as not to be cut or abraded by the pressure of the fastenings or motion of the fixture. All wire used for fixture work must have an insulation that is durable, and not easily abraded; and must not, in any case, be smaller than No. 19 "B & S.," or No. 20 "B. W. G." Each fixture must be tested for possible "contact" between wire and fixture, and for "short circuit," before current is turned on. The tendency to condensation within the pipes or fixtures should be guarded against by sealing the upper end. No combination fixture with less than one-fourth inch clear space between the inside pipe and the outside casing will be approved.

PENDANTS AND SOCKETS.

(35) Cord pendants must be composed of stranded wire, and protected by rubber bushings, or something equally good, where they enter the socket. When exposed to weather, or used in wet rooms, care must be taken to keep moisture from the inside of sockets. The weight of every socket and lamp suspended by a cord must be borne by a ceiling block, rosette, or cleat, and by a knot under the bushing in the socket, in order to take all strain from the joints and binding-screws. Flexible cord must not be used except for pendants, wiring of fixtures, and portable lamps.

SECONDARY GENERATORS OR CONVERTERS.

(36) Converters must not be placed inside of any building except central stations, and should be enclosed in a metallic or non-combustible case. They may be placed on the outer walls when in plain sight and easy of access, but must be thoroughly insulated from them. If placed on wooden walls, or the woodwork of stone or brick buildings, the insulation must be fireproof. When an underground service is used, the converter may be put in any convenient place that is dry and does not open into the interior of the building; this location must have the approval of the inspector before the current is turned on.

(37) If for any reason it becomes necessary that the primary wires leading to and from the converter should enter a building, they must be kept apart a distance of not less than twelve inches, and the same distance from all other conducting bodies.

(38) Safety-fuses must be placed at the junction of all feeders and mains, and at the junction of mains and branches when necessary; also in both the primary and secondary wires of the converter, in such manner as not to be affected by the heating of the coils. Secondary wires, after leaving the converter, will be subject to rules already given for inside wiring for incandescent lighting. The secondary circuit may be provided with a film cut-out, which connects to the earth outside of the building; but permanently grounding the secondary circuit is unsafe and will not be sanctioned.

FOREIGN WIRES.[1]

(39) No foreign wires of any kind shall be attached to buildings insured by this company, for the purpose of carrying electric currents across the yard to any point.

(40) All electric wires which may be required by the insured shall enter the premises at one point, preferably near the headquarters of the night-watchman, where they can be kept under supervision; each of said wires shall be guarded by a protector against strong currents, operating by opening the circuit, and by a lightning-arrester.

(41) Such protectors against strong currents shall be located in a dry, accessible place inside the building, and as near the point of entrance of wires as possible, and shall be without ground connection; such protectors shall be mounted on non-combustible and insulated supports, which shall be provided with a receptacle for the burning or melted parts of such apparatus.

(42) The lightning-arresters on all wires must be placed between the protector against strong currents and the electrical portion of the apparatus within the building to which such wires are connected. No ground wires for such lightning-arrester shall be attached to gas-pipes within the premises of the insured.

(43) All electric wires which may enter the premises of the insured must be insulated between the line wire on the insulator attached to the buildings outside and the protecting device within, with the best quality of water-proof insulation. Moreover, such wires must enter at a distance of not less than three inches from any other wire or any conducting material.

(44) If any wires carrying high-tension or strong currents are to be carried over or under other wires on the property of the insured, they shall be attached to poles so near to each other, with one wire so far above the other, that if a break should occur the pendant wire between these poles may not be long enough to come in contact with the wire below, or, if not carried on poles, these wires shall be so placed or protected with guard-wires as to render a contact between different wires impossible.

(45) If the high and low tension systems are in use in the same yard, even when developed within the works, the wires must be kept separate, and so wide apart that no contact or cross arc can be made.

NOTICE.

(46) The Underwriters reserve the right at any time to add to, change, or modify these rules, and to enforce such modifications, changes, etc., as shall be deemed necessary for safety. All reasonable efforts will be made to notify promptly all electric-light companies of any change.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF M. JEAN BAES, ARCHITECT, RUE VAN MOER, BRUSSELS, BELGIUM.

[Helio-chrome issued with the International and Imperial Editions only.]

It is always interesting to discover the kind of building an architect designs for his own use. It is to be expected that foreign architects should house themselves after their national custom; this, ordinarily, is not such as would influence an architect's design in this country. In this case there are many points of the treatment which might be adopted in this country. The fact that M. Baes is Sous-directeur de l'Ecole des Arts decoratifs may account for the

[1] The position of the stock insurance companies is merely advisory upon this clause.

chromatic treatment of the façade — a treatment which is extremely successful in the original, and might be followed here with similar building materials. The painting of the iron oriel a light brown ties it to the general design, while a heavier color would have detached it as an excrescence.

NEW ADDITIONAL BUILDING FOR THE WORCESTER, MASS., FREE PUBLIC LIBRARY. MR. STEPHEN C. EARLE, ARCHITECT, WORCESTER, MASS.

The new building, required on account of the great growth of the library and its use, is built with special reference to safety from fire. The stack-rooms are of fireproof construction, and in the front part where wooden floor joists are used, the ceilings are wire-lathed and the walls have fireproof lining. The fronts are of Longmeadow brownstone and Pompeian brick on a basement of granite. The medallions in the arched panels are of red terra-cotta, and represent Thucydides, Cicero, Shakespeare and Franklin. The reference or "Green" Library will be in this building, together with small and large study and reading rooms, rooms for the librarian and assistants, etc., leaving the older building to be occupied by the circulating department, reading-rooms for magazines, etc.

NEW STORE OF MESSRS. SHREVE, CRUMP & LOW, BOSTON, MASS. MESSRS. WINSLOW & WETHERELL, ARCHITECTS, BOSTON, MASS.

HOUSE OF L. S. TAINTER, ESQ., MENOMONEE, WIS. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

OLD HOUSES ON THE RUE DE PARIS, VITRÉ, FRANCE.

[Additional Illustrations in the International Edition.]

THE CHURCH OF NOTRE DAME, HAL, BELGIUM.

[Gelatine Print.]

Those who see this church for the first time and note the curious balloon with which Flemish fancy has chosen to place upon the apex of the baptistery roof on the south side of the tower would hardly expect that further investigation would show that the building, with this exception, is one of the most perfect examples of fourteenth-century Gothic. The building was begun in 1341 and consecrated in 1409. Off the direct route of travel, this little town is probably not much visited by the ordinary traveller, and for artist and architect it has not many attractions though its streets are narrow and crooked, and now and then a picturesque group or isolated subject can be found; but it is much frequented by the natives who make pilgrimages to the shrine of the Virgin, in evidence of whose substantial powers is preserved in one of the chapels of the church a collection of thirty-three cannon-balls which she caught in her robe during a certain siege of the town. A lady possessing such saving grace is naturally highly esteemed, and the windows of the little shops of the town are filled with an extraordinary number of images and medals manufactured in her honor in every size and every degree of artistic finish and cost: nothing particulary notable in this, perhaps, but the fact that in every case the Virgin is shown with a black face makes these window displays more noticeable than such collections usually are.

CITY-HALL, WINTERTHUR, SWITZERLAND. HEER SEMPER, ARCHITECT.

[Gelatine Print.]

HOUSE AT GRATZ, STYRIA, AUSTRIA. PROFESSOR WAGNER, ARCHITECT.

[Gelatine Print.]

NOTICE.

Owing to unexplained delays in the New York Custom-house we are obliged to omit from this issue a portion of our imported plates. They will be added to the illustrations of the next week's issue, provided they have not been lost or destroyed in transit.

Architectural Exhibition at Turin.— A special exhibition for architects will be held at Turin from the 28th of September to the 28th of November. One section will show restorations of ancient monuments and designs for their rehabilitation. Another will contain pottery, glass, mosaic, decorative paintings, bronzes, carvings, and other objects used in the adornment of the house. Still another will be devoted to publications on architecture and the allied arts, together with photographs and other reproductions.— *N. Y. Times.*

THE CLARK MEDAL COMPETITION.

Chicago, August 20, 1890.

The Committee in charge of the Annual Competition for the Clark Medals submits to the draughtsmen of the United States the following problem:

It is required to design for the equestrian statue of General Robert E. Lee, recently erected at Richmond, Virginia, a pedestal which shall be unlike the one upon which the statue is now set. The design shall comprise the pedestal and the approaches and surroundings of the monument, and no limitation as to the cost or material or dimensions of the pedestal and its accessories are imposed by the Committee.

The site of the monument for the purposes of this competition shall be immediately outside of the entrance to a public park, and at the end of a broad boulevard, on each side of which are tall and elegant buildings, apartment-houses, hotels, etc.

Drawings shall be rendered on two sheets, one containing such ground plans, elevations and sections as may be required to illustrate fully the intention of the designer, and the other a perspective drawn to any scale and rendered in any manner desired by the individual competitors. The size of the sheets shall be sixteen by twenty-three inches, and they are not to be rolled for purposes of shipment.

Drawings will be received until and not later than noon of the first day of November, at the office of the Chairman of the Committee, Room 1,600 Auditorium Tower, Chicago.

An excellent illustration of the statue for which the pedestal is to be designed can be found in the supplement to *Harper's Weekly* of March 29th, 1890.

D. Adler, *Chairman*,
Henry Ives Cobb,
N. Clifford Ricker,
Lorado Taft,
Samuel A. Treat, *Committee.*

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.*]

THE DOME AS AN ARCH.

August 14, 1890.

To the Editors of the American Architect:—

Dear Sirs, — Mr. Berg fails to see the point of my inquiry of July 25.

The question is: How can a dome be looked upon as an arch?

An arch has the same horizontal thrust throughout its span; the dome has a constantly diminishing horizontal thrust toward the crown.

In the arch the key receives the thrust of each half of the span; in the dome the crown receives no horizontal thrust, and can be removed without affecting the stability of the structure. Each successive ring from crown to springing can be removed in the same manner, as each ring exerts a thrust on the rings towards abutments, but none on any towards the crown; each ring acting as a circular flat arch.

The only hypothesis under which the dome can be considered as an arch is when it is so loaded at the crown as to cause all vertical joints to open slightly and give a uniformly horizontal thrust. Has Mr. Berg assumed this condition, which would certainly be conducive to "safe building," or has he other reasons that he will kindly state? Most respectfully, D.

August 21, 1890.

To the Editors of the American Architect:—

Dear Sirs, — Mr. D states his objection to the application of the theory of the arch to a dome in so taking a way that it would seem almost convincing; his principal argument states, in fact, that in a dome certain successive rings can be removed from the top without the structure failing, which, he claims, cannot be done in an arch. He forgets that in such a case the horizontal thrust which ordinarily would pass through the key block is transferred in a horizontal plane around the circle through the last complete circular ring remaining in place. We can in an ordinary arch remove the key block, and in its place substitute a hollow cylindrical ring of sufficient strength to resist the horizontal thrust, and then we should have exactly the same condition as that of a dome with part of its upper rings removed.

At the request of the New York Building Department, the writer was present at a test of Spanish floor arches, which, in this case were only three inches thick. The arch in question was some ten or twelve feet span, and the contractor had removed from its centre, for a distance of nearly ten feet, a section of the arch some four feet wide. After doing this, he loaded the haunches each side of the opening with brick several feet high, and still the arch did not fail. Now, according to Mr. D, the theory of the arch must be wrong, because here was an arch some ten feet long without any kev block carrying a load; but the simple explanation of the matter was that the tiles, all being cemented together, formed a square box of sufficient stiffness to resist the horizontal thrust of the mutilated part of the arch, and to transfer this thrust to parts beyond which remained intact, those parts being, of course, sufficiently strong, not only to take up their own horizontal thrust, but that of the mutilated parts as well.

Or, perhaps, to make the matter still more clear, let us take the case of a spire. We will say the spire is built with four wooden hip rafters. Now, were we to saw off a part of this spire at some distance from the top, it stands to reason that the four hip rafters would tumble inward and the spire collapse; but if we were to insert just below the point at which we had sawed off the rafters four purlins, formed into a square concentric box of sufficient strength to resist the thrust of the rafters, the rafters would still remain standing, for the purlins would resist their inward thrust. From this we can pass to a spire built of stone. This, as we know, consists simply of a series of layers of stone and, as we know from practical experience, in every stone spire we can remove any number of layers from the top down without the spire failing, because the last complete layer resists the inward thrust of the layers below. This, I think, meets Mr. D's claim that the theory of the arch does not apply to the dome, because it is possible to remove certain rings from the top of the dome.

Mr. D admits that my theory is correct when the dome is loaded to a certain extent, but claims that it is not correct when the dome is not so loaded. I think he will find it exceedingly difficult to draw the line at the exact point where we can consider the dome loaded or unloaded — i. e., a certain line where on one side of it a certain theory applies, and on the other side of the line another theory. This is a condition which, I believe, does not exist in the entire study of mechanics; viz, that we can draw an arbitrary line, separating two theories. He may as well claim that there should be one theory for the ordinary arch loaded, and another theory for the ordinary arch unloaded; or that there should be one theory for transverse strains in girders and beams that are loaded, and another theory for those that are unloaded.

Mr. D is evidently anxious to get a "process of reasoning" by which a dome can be treated similarly to an arch. There are several ways in which we can arrive at this result, and I will mention two in this letter, if I am not tresspassing too much upon your space.

Let us go back to the case of the stone spire, taking the square spire, in which certainly Mr. D will admit that we can apply the ordinary theories of obtaining the horizontal thrusts, both the inward thrust at the top and the outward thrust at the base, as well as the compression in the spire itself. Now from the square spire, let us pass to an octagonal one, then to one of say 20 sides, and so on until we get to a perfect cone. Having arrived so far, we can now truncate it, then make a section of say three different slanting surfaces, and so on continue the argument until we have got a complete dome, and he will find that the same line of reasoning by which we obtained the strains for the ordinary arch (as given on pages 75 to 79, Volume I of "*Safe Building*") can be applied to the dome without any undue stretch of the reasoning powers.

Or, let us get at it in another way. We will say that we have a square vaulted dome with angle ribs supporting the same, the spandrels being merely loaded onto the ribs. This certainly is the condition of two ordinary arches at right angles to each other, but with a common key block. Whether that key block is solid, or is hollow and made of a concentrated ring, or square with sides or ribs, of sufficient strength to resist the thrust, will not alter the argument. Certainly the theory of the arch will apply to these four ribs, forming the two full arches at right angles to each other. Now pass to an octagonal vaulted dome, with eight ribs forming four complete arches with a common key block. From this we pass to a twelve sided vaulted dome, etc., until we come to the circular dome with an infinitesimal number of small ribs, all with a common key block. We certainly have not stretched the reasoning powers in arriving at this result. Now whether we consider the spandrels between these infinitesimally thin ribs as loaded on them, or whether we consider the ribs as filling the entire spandrel, — i. e., being thin at the apex and larger at the base, — will not alter the calculation.

I trust that the above is sufficiently clear to give Mr. D the desired information; but if not, if he will make the following experiment, I think that it will overcome all doubts as to whether there is an inward horizontal thrust at the top of a dome or not. Let him cut out of paper eight spherical trapezoids, or parallelopipedons, which when placed together will form a complete octagonal dome, with part of its crown missing. Now let him make out of paper an octagonal ring of section A. and of sufficient size to receive the base of his octagonal dome. Placing his eight strips of paper inside of this octagon, let him see whether he can make them stand up. He will find that each attempt they will fall inwardly, showing conclusively that there is an inward horizontal thrust at their top; if, however, he will make another octagonal ring of paper (Section B.), so arranged that it cannot slip down vertically, and will then place his eight pieces of paper, abutting against this collar *B*, at their tops, he will find that his dome will stand up, and why? because the ring at the top resists the horizontal thrust at their top.

I think this experiment will convince Mr. D fully that a dome has an inward horizontal thrust, just as much as any ordinary arch.

Very respectfully yours, Louis DeCoppet Berg.

BRICK-MACHINERY.

Albuquerque, New Mexico, August 18, 1890.

To the Editors of the American Architect: —

Dear Sirs, — Would you kindly furnish me with the address of the manufacturers of the latest and improved clay-working machinery: for pressed-brick and sewer-pipe: also patent kilns for burning vitrified pipe, and oblige. Yours truly,

E. W. Spencer.

[Address the Frey-Sheckler Co., Bucyrus, O., for information. — Eds. American Architect.]

STABLE FLOORS.

New York, August 19, 1890.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly inform me through your journal the best construction and drainage for floors of country stables.

Yours respectfully, W. Johnston.

[W. L. Dolbeare, Atlantic Ave., Boston, Mass., makes a very excellent stable floor. — Eds. American Architect.]

NOTES AND CLIPPINGS

Marcellan, Barricader, Founder of the Cabinet Makers' School. — M. Marcellan's name is unknown in London. Yet M. Marcellan is one of the most remarkable men in Paris, and the oldest ornament of its town council. But those of us who are engaged in the direct investigation of technical instruction—such as the artisan delegates who visited Paris during the late Exhibition—may have made his interesting acquaintance. M. Marcellan is the principal founder of the cabinet-making school in Rue Reuilly, by far the most remarkable institution of the kind in Paris. Not the least remarkable thing about it is the career of M. Marcellan. M. Marcellan learned the art of barricading while he was still in pinafores. He points out the spot where, as a child, he picked up his first paving-stone. He points out the shop in which Victor Hugo took refuge during the fighting of the *coup d'etat*—the spot and the incident which the great novelist describes with such minuteness and realistic force in his "*History of a Crime.*" M. Marcellan has piled up many a paving-stone since his infantine "baptism of fire." The Commune came, and, like the horse in Job, M. Marcellan, "smelled the battle afar off, the thunder of the Captains and the shouting, and he exclaimed, among the trumpets, 'Ha, ha!'" But unlike the war-horse, he rejoiced not in his strength; for an unlucky — or was it a lucky? — Prussian bullet laid him low. All that M. Marcellan could do was to give the insurrectionists outside what the diplomatists call "moral support." He had his bed placed by his window, and from that position he exhorted his fellow-citizens outside One can see him at it — waving his nightcap as he lay on his elbow; perhaps, too, joining in the "Marseillaise." The "idea" of M. Marcellan's school is Communistic. Founded nearly four years ago, it is in the centre of the Faubourg St. Antoine, still, what it has been so long, the most revolutionary quarter of Paris. Close to the school are the house of Santerre, the brewer, and the remains of the Maison Reveillon, noted places in the years 1789–93. The very air which the pupils breathe savors of revolution. Scholars are admitted by competition. Last year there were 120 candidates for the 60 places; each successful competitor costs the community about £73 a year during the three years of his tuition. A French Minister of Public Instruction has said that "the State owes to every man every kind of education." So that if the community were to take the Minister at his word, the teaching of lads from fourteen to seventeen years old would cost £15,000,000 for Paris alone. By all accounts the technical training in the Rue Reuilly School — in cabinet-making, wood-carving, turning, chair and table making, and upholstery — is thoroughly efficient. M. Marcellan, described as "the most radical member of the town council," has held his seat for twelve years. If he is the representative man he claims and is believed to be, Paris may yet witness some striking developments in Communistic education. — *London Daily News.*

The Two Salons of 1890. — The receipts of the two *Salons* of this year prove that this double event stimulated public curiousity, since the joint receipts of the two exhibitions were 410,000 francs(240,000 for the old *Salon* and 170,000 for the new), while in 1888 the takings of the Palais d'Industrie *Salon* only amounted to 320,000 francs. The effect, however, has been to reduce the amount of funds available for the charitable foundations of the Société des Artistes Francaise (the old *Salon*). This is only one of the regretable results of this schism; and in the discourses delivered on the occasion of the distribution of the "récompenses" in connection with the Palais de l'Industrie exhibition, the various official orators vainly implored the adoption of a peace policy; and vainly also did the Ministére des Beaux-Arts preach conciliation and offer its services as arbitrator. These attempts were made, it is feared, with no success. The venerable M. Bailly has used all his efforts in this direction; but M. Bouguereau still sulks, and M. Meissonier, like Achilles, withdraws himself to his tent. It is even said that he has made a formal demand for a perpetual use of the Palais des Beaux-Arts for the exhibitions of his Society, a request which, if made, seems to indicate a determination to a complete and permanent rupture. — *The Builder.*

London Cemeteries. — The dangerous overcrowding of the London cemeteries has been often commented on by the medical press of that city, says the *Medical Press*, but the evil remains almost wholly unabated. The Sanitary Committee of the London County Council has reported that no time should be lost in closing burial grounds such as the Brompton, which contains 155,000 bodies, and the Tower Hamlets Cemetery, with its 247,000 bodies crowded into only seventeen acres. The average grave is seven by three feet, and contains eight adults or fourteen children, the covering of earth being about one foot. In one instance, a committee of inquiry regarding this cemetery found eighty infants in a grave or trench of less dimensions than that of the average grave. There are twenty-one burial places, with a total extent of less than three hundred acres, holding a million and a quarter of bodies. The soil in most of these places is clay, and the process of decomposition goes on so slowly that bodies buried for a dozen years remain remarkably well perserved. — *Science.*

The Late James W. Queen. — James W. Queen, founder of the house of James W. Queen & Co., Philadelphia, died on July 12, at Cresson, Pa. Mr. Queen was about seventy-eight years old. When a boy Mr. Queen entered the employment of John McAllister, then a well-known optician on Chestnut Street. When McAllister retired, Mr. Queen, together with W. Y. McAllister and Walter B. Dick, succeeded to the business under the firm name of McAllister & Co. In 1853 this firm was dissolved and J. W. Queen started at 924 Chestnut Street. In 1855 Samuel L. Fox was taken into partnership. The firm is now controlled by Samuel L. and Edward B. Fox. In 1868 Mr. Queen retired from business and traveled extensively, visiting nearly all civilized countries. Until last year he enjoyed excellent health. He leaves a widow, but no children.

James W. Queen's reputation was of the highest, and he was noted for his integrity. Mr. Queen was very skilful as a manufacturer of delicate instruments for scientists, surveyors, and chemists, and his reputation in that direction was world-wide. He had for a long time past represented in this country the leading European makes of electrical apparatus for measurements, etc., and had lately gone into the manufacture of such apparatus himself. — *Scientific American.*

Pumice Stone. — A mine of pumice stone exists on the Teneriffe Peak, of which the working was only started in 1888. The stone is found in that part of the peak called the "Canadas," at about 2,000 feet above sea level, which has an area of some 6,000 hectares, out of the middle of which rises the highest part of the peak. The Russian consul at St. Croix bought this property of the Spanish government in consideration of an annual payment for the pumice-stone working. The Russian consul has associated himself with a Belgian, and they, under the firm styled Aguilar & Valcke, commenced operations in 1888, but it was only last year exportation was really started. At the Paris exhibition, the Consul-general states that this stone obtained a silver medal, and in view of the requirements of England, France, and America, he believes it will develop a trade of great importance before many years. So far, the Lipari Islands have practically furnished the world's supply of this product, exporting about 100,000 tons per annum. The Teneriffe stone being recognized as of excellent quality, and its extraction being a much more simple matter than in the Lipari Islands, it follows that the price is much less. — *Scientific American.*

The Big Trees of California. — Gov. Waterman has received the following dispatch from Secretary of the Interior Noble in answer to a telegram sent a few days since in reference to the rumor that the land on which the big trees are was to be thrown open to settlement: Washington, D. C., August 5, 1890. To the Hon. W. R. Waterman, Governor, Sacramento, California: Your telegram received. It is not true that the lands you mention are about to be open to survey. The *Sequoia gigantea* has been protected by a very recent decision of this Department, and orders to reserve all of the ground upon which they are growing, both in Tulare County and in Yosemite, for the latter of which, as you state, a bill is pending in Congress. I have written you this day showing the full correspondence on this subject, which is most positive and energetic in defence of the *Sequoia gigantea.* John W. Noble, Secretary." — *San Francisco Call, August 7.*

The Height-limit for London. — Henceforth no building within the jurisdiction of the London County Council can exceed ninety feet in height. So the Lords' committee on the Council's bill has ordained, and its decision is eminently sensible. The limit of seventy feet, which the Council wished to fix, would have been too low, but in ninety feet there is nothing to complain of. We cannot afford to build more Queen Anne mansions 140 feet high, nor to imitate the enormously high blocks of buildings which are in such favor in America. They may be all very well in streets as wide as the Nevsky Prospekt, but in our narrow thoroughfares buildings of the New York type would shut out sun and air. Even our newest streets, such as Northumberland Avenue, are not wide, while, to take more recent instances, Shaftsbury Avenue is miserably narrow. — *St. James's Gazette.*

A Plan to roof the Sidewalks. — The idea is being seriously discussed as to the value of a glass roof or awning, thrown over the sidewalk at the height of the first story, its purpose being primarily to protect pedestrians from the rain; and secondly, from the brilliancy of the sun. So practical and feasible does this plan appear that it has been decided to test it by erecting such an awning on the streets of Queensgate. A number of business men, who have large stores along the principal avenues in that section of London, have determined to combine, and undertake to put up such a structure as this. — *London Correspondence of the N. Y. Commercial Advertiser.*

Temperature of Chicago Sewers. — The New York Steam Company has submitted for Commissioner of Public Works Gilroy's attention, and that of the Health Board and public, a statement of the temperatures in the sewers of Chicago, taken on August 6, to compare with the temperatures which the Health Board complains of as existing in the sewers of this city and due to the Steam Company's pipes. The statement is certified as correct by Chicago's Superintendent of Sewers, O. H. Chaney. Among a score of places where the temperature was ascertained temperatures were found varying from 78° to 164°. Temperatures of 156°, 136½°, 125°, 119° and several of 86° are noted. The comparison, it is asserted, furnishes a refutation of the assertion that the sewers of this city are the hottest in the country. — *N. Y. Commercial Advertiser.*

TRADE SURVEYS

While there is as much money in the country as ever, as great a consumption of goods, as heavy a production, as much traffic on railroads, and as great a consuming ability upon the part of the people, conditions are not so favorable as a short time ago, and that, too, in spite of almost universal predictions, in all kinds of newspapers, that everything would move along swimmingly, and that there was not a cloud in the commercial horizon. Heavy imports, unsettled tariff duties and one or two other causes are assigned by some parties as a reason for the financial flurry and unrest. These superficial views are all wrong. The latent cause and difficulty is that the need of money is growing faster than the supply, and the controllers of large amounts of currency see in this fact and condition a favorable opportunity, provided they are not interfered with by the Government, of exacting unusual rates of compensation for financial assistance. If the politicians would let the business men speak, the next national issue that would be raised would be the establishment of a sufficient financial system. If the business situation is not doctored every few weeks, merchants and bankers cry for money as a feverish invalid would cry for water. That this is wrong and dangerous is apparent to every intelligent business man. That it cannot go on forever is equally apparent. It may continue with safety so long as the Government has bonds to buy, and money to pay for them; but conditions sometimes suddenly change. The business interests of the United States are too vast to rest on such insecure foundations. There are many far-seeing public men who are anxiously awaiting the opportunity for correcting this evil, but those in control of party machinery are more concerned with laying wires for future political conventions than in laying any broad foundation of statesmanship for the protection of the mighty interests of capital and labor. Corporations, manufacturers and employers of labor generally are in a more secure condition from invasions of organized labor than ever. Recent events have shown that employers have regained much of their jeopardized control over their own affairs, and that labor has, by the force of circumstances and frequent failures, become more conservative. While there is a vast amount of discontent, it is safe to assert that there will be few strikes. The rank and file of labor recognizes the fact that the work of organization has only begun; that there must be a larger percentage of workers within the pale of organization before demands can be successfully made, and that it will probably be years before such a compactness can be brought about. Meanwhile, a depression more or less intense and general will probably result in the more or less general disemployment of labor, and result, as it always has, in a breaking-up of labor organizations. Those who fear a tyranny of labor in any event have only to study the history of labor organizations and movements for twenty years past to see the natural limits which such organizations are likely to reach. The laborers themselves are learning the possibilities of organizations, and are recognizing the impossibilities of accomplishing or working out certain planks of their platform, and of realizing certain theories and conditions which, a few years ago, they regarded as quite feasible. The outcome of the wisdom acquired has been, in the first place, a falling off in membership of one powerful organization; and, on the other hand, the outcome has been a developed indifference on the part of a vast number of workers, who prefer to take their chances in the ranks of what are called non-unionists; that is to say, the non-union sentiment is now growing, in spite of all assertions to the contrary. One reason for its growth is that unionism has not been able to redeem its pledges, to retain its power, to control and protect the interests of its membership, or to do those things which it promised to do as an inducement to membership. It must not be forgotten, however, that despite all these facts and discouragements, upheaval after upheaval will take place, and organization will succeed organization. Employers will never feel at ease — will never have that full power over their own affairs to which they think they are entitled — and will be obliged, year by year, to yield little by little of what they claim to be their exclusive right. Merchants and manufacturers are very much concerned over the heavy production going on, and large stocks of goods in warehouses. Importers have piled up an unusual amount of goods, in anticipation of tariff changes. Business is hardly at a standstill, because railroad traffic returns show that the volume of traffic is in excess of corresponding weeks last year; bank clearings show that a larger amount of business is being done. On the other hand, travelling salesmen report scarcely any sales, and small stocks in the hands of retailers throughout the country. Within the past few days money has brought extraordinary rates of interest for short times, but the Government spigot has been turned on, and relief will be experienced as soon as the circulation can be effected. The textile manufacturing interests are doing a pretty good business; corporation dividends are up to the average. Fall River shut down a week, and a few other towns followed suit; but the restriction, as compared to the total production, is a mere trifle. The boot and shoe manufacturing interests, despite large stocks on hand, are making no complaint, having faith that the fall and winter distribution will be all right. Hosiery and knit-goods manufacturers are complaining of extraordinary importations; but it does not appear that there is any diminution in output, as compared to last year.

S. J. Parkhill & Co., Printers, Boston.

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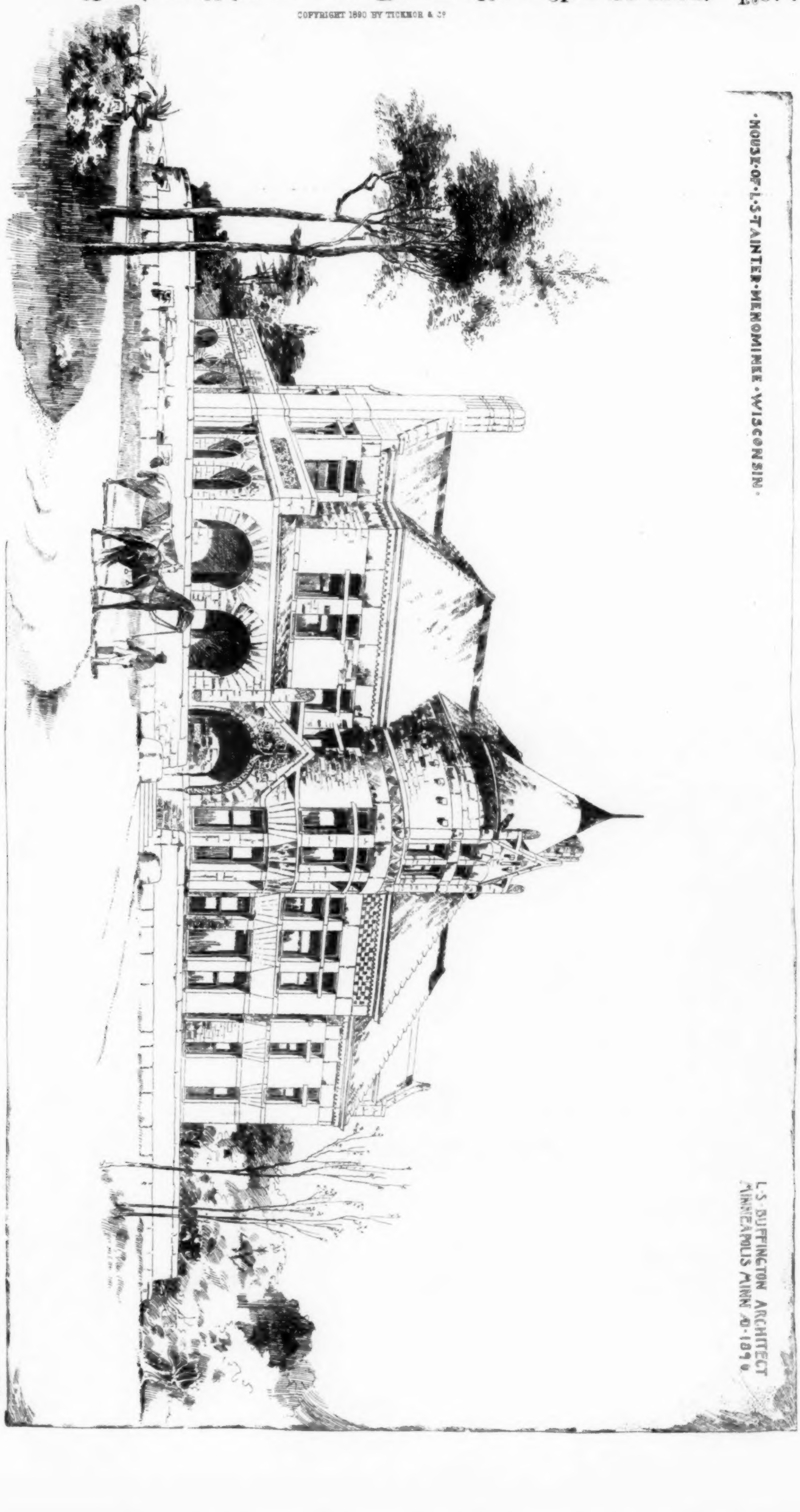
OLD HOUSES IN THE RUE DE PARIS, VITRÉ, FRANCE.

AMERICAN ARCHITECT AND BUILDING NEWS, AUG. 30 1890. No. 766.



HELIOTYPE PRINTING CO. BOSTON.

NEW STORE FOR MESSRS SHREVE CRUMP & LOW
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WINSLOW & WETHERELL, ARCHITECTS.

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NEW ADDITIONAL BUILDING FOR THE WORCESTER FREE PUBLIC LIBRARY.

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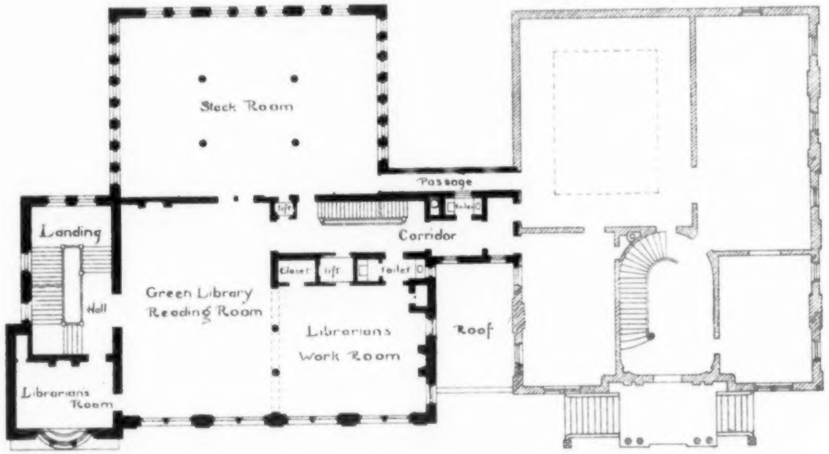
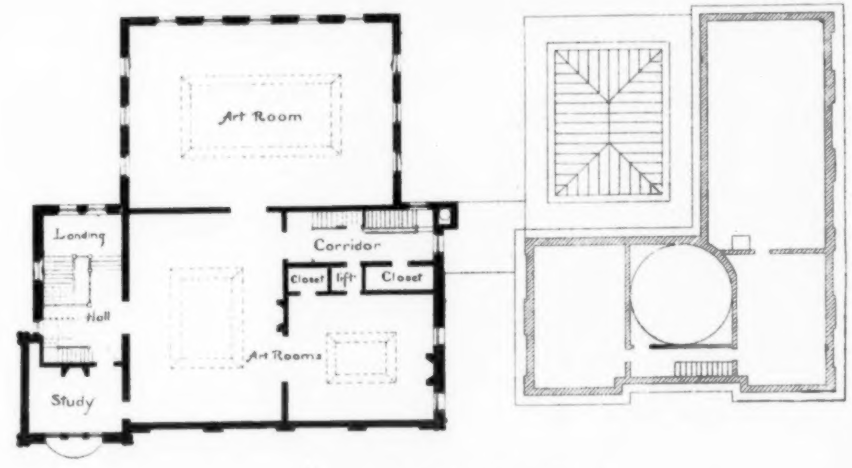


Plan of First Story.



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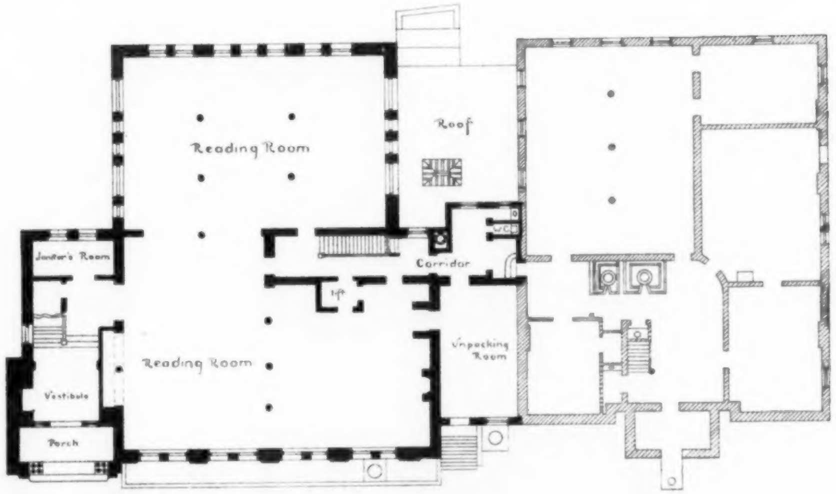
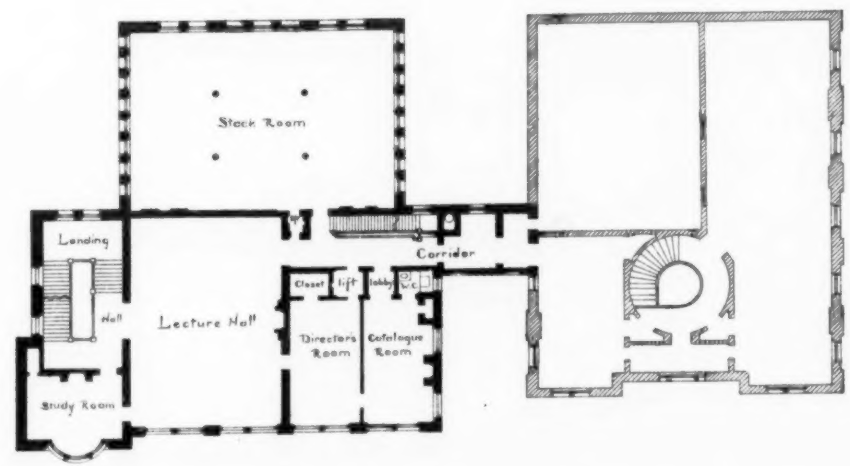


Plan of Basement.



Plan of Second Story.

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