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BEFORE the agitation in Boston over the recent great fires there has died away, we think that some one ought to call attention to the possibility, or, rather, the imminent probability, that a fire may occur there at any moment which will be so murderous, so appalling in its destruction of life, as to make the name of Boston infamous throughout the civilized world. Two weeks ago, a large building, solidly constructed, and unusually well provided with fire-escapes, was set on fire, by the breaking of a gas-pipe, or from other trivial accident in one of the toilet-rooms. The building is said to have been provided with automatic alarms; at all events, the alarm was given very promptly; yet in two minutes after the alarm-bell sounded, the occupants were jumping from the third and fourth story windows, to escape the flames which were pressing upon them. One of the rooms was occupied by a dealer in cordage, yet the dealer and his clerks were compelled to jump from the windows, because the flames did not give them sufficient time to snatch one of the ropes which lay in convenient coils within thirty feet of them. Now, within a few hundred feet of the building which was thus filled with a whirlwind of fire in three or four moments from an insignificant beginning are several other buildings, very much larger, less solidly built, provided with open galleries, ready to carry fire in a moment to every portion of the structure, and filled from cellar to roof with what can best be described as tinder, displayed on wooden counters, or piled up in boxes of wood or pasteboard. A match, accidentally trodden upon in any part of these structures, or a spark from a cigar, if it should set fire to a piece of loose wrapping-paper, or an end of hanging lace, might, and probably would, send one surge of fire to every corner of the building, and with what result? In the Ames building there were marble stairs, between brick walls, and several fire-escapes at different points; the occupants were few in number, perfectly familiar with the building, and were to a great extent protected by the plaster partitions which subdivided the floors into offices, yet they had to run and jump for their lives; in these other buildings the stairs are of wood, without protection of any kind; the passages between the counters are so tortuous, and the exits so remote, that customers very frequently have to appeal to the clerks and floor-walkers to show them the way out; the entire structure, from cellar to roof, is practically one room, without either vertical or horizontal divisions to check the flames from penetrating every part of it; and, in place of about a hundred occupants, mostly brave and cool men, the buildings of which we now speak are crowded from morning till night with women and children, and at certain seasons the throng is so great that it requires many minutes of elbowing to make one's way anywhere about the store. In a single one of these large Boston stores twenty-five hundred girls and men are regularly employed, and thirty thousand people are known to have entered the same store in one day. Most of these come in the latter portion of the day, so that it is probably an underestimate to say that fifteen thousand people, in the holiday season, are sometimes in the building at once. What would become of these fifteen thousand people, or of at least two-thirds of them, if fire should break out, it is not difficult to predict. The great Paris dry-goods store, the "Printemps," was built with galleries, much after the manner of the Boston stores, but it was of moderate size, compared with some of the Boston stores, and was constructed entirely of stone, brick and iron. Nevertheless, although it took fire out of business hours, when there was no one in it except a few clerks, perfectly familiar with the exits, of which there were many, opening on the wide streets which surrounded it on three sides, the fire spread so fast that the clerks barely escaped, without their coats, which they did not have time enough to take down from the hooks. In the Boston stores, instead of a comparatively moderate area, as there was in Paris, with ample and conspicuous doors on three sides, we have a vast floor-space, with one main front, and a few remote and not very noticeable side-doors; and the floors, roofs, partitions and staircases, which, in Boston, are of wood, in Paris were of masonry and iron. If, then, a dozen clerks barely escaped with their lives from the Paris building, what hope could there be for fifteen thousand women and children in a great Boston store?

IT is gratifying to note that the daily press in all parts of the country — those members at least which express an interest in matters of art — have commented with high approbation on the unusual step taken by the Boston Society of Architects toward securing the remodelling and embellishing of Copley Square in that city. The movement is regarded by these commentators not as purely local but as one having a broad significance and general application. This being so, — and it was certainly the Society's hope that it should be so considered, — they justly entertain the hope that designers in all parts of the country will not feel debarred from taking part in the competition though feeling that it is a small local matter in which the coöperation of outsiders is not desired. On the contrary, the assistance of outsiders is so important a desideratum that the Society has extended the date of the closing of the competition to Monday, April 24. It seems to us that this competition, at once amicable, professional and practically unhampered by conditions, affords a very unusual and very excellent opportunity for the architects of the country to make public proof of the truth of their asseveration that problems of the class in question can be treated best by men who have devoted a considerable portion of their lives to the study of structural and ornamental design.

THE University of Pennsylvania has followed the excellent examples set in other States by private munificence, and has established a travelling-scholarship in architecture, open to candidates under thirty years of age, who have worked during the whole year preceding the examination for the scholarship in the office of some architect resident in Pennsylvania, or have attended an architectural school in the State. The award of the scholarship will be determined by the result of two examinations. The first, or preliminary, test will consist of two written examinations, one in construction and the other in history of architecture, and an exercise in freehand drawing from the cast. Only those who receive more than sixty per cent of the full mark for construction, and more than seventy-five per cent of the full mark for freehand drawing, will be admitted to the second examination, which is an exercise in design only. In making the final award, the mark in design will count for fifty per cent of the total, freehand drawing for twenty, and construction and history for fifteen each. The examination in design will consist of two parts. The first part is devoted to making a sketch-plan and elevation, for which nine hours is allowed. The sketches are then handed in, and the authors of

those considered satisfactory are to be allowed two weeks to carry them out into finished drawings. To the candidate who passes the examinations most satisfactorily will be paid, by the Trustees of the Scholarship, to be expended in foreign travel and study, one thousand dollars, the payment being, however, conditional upon proper diligence and good conduct on the part of the beneficiary. It will be observed that the programme of examination follows very closely that which has answered so well in the examinations for the Rotch Scholarship in Massachusetts. In Massachusetts a tolerable knowledge of French must be shown by a special examination, and, though not required this year, it is intended to add French to the requirements in Pennsylvania hereafter. The Scholarship is not sustained by a fund, but by subscription among the friends of the profession. The interest shown by these is, however, so great that the Trustees feel justified in announcing the Scholarship as regularly established, and the prospect is now that, before long, a sufficient fund will be collected and invested to assure the necessary income permanently. Any of our readers who may wish for further particulars should address Prof. Warren P. Laird, University of Pennsylvania, Philadelphia.

THE *Railway Review* has collected some curious examples of the way in which fires may be set. In one instance, where some waste, which had been used with mineral oil, had been thrown into a safe place, an insect crawled through it, and then, carrying some pieces of the oily fibre sticking to his body, made his way to a gas-jet. The cotton fibres which adhered to him caught fire, and he dropped, blazing, to the floor, setting the building on fire. In another case, a quantity of waste was said to have been ignited by the friction of a belt running close to it. This, however, may be considered doubtful. The friction of a belt against soft cotton is by no means of a nature to produce great heat, and a much more rational explanation is to be found in the supposition that an electric spark passed from the belt to some conducting substance through the cotton, which it ignited on its way, as sparks of frictional electricity can easily do. In fact, the electrical effects accompanying the running of large belts are quite important, and it is probable that more than one fire has been due to them. Sparks can be taken by the finger from almost any large belt in motion, and we have known a case where an ingenious engineer, by fixing a metal comb near the belt, succeeded in drawing off enough high-tension electricity to enable him to light the gas-jets in and about the engine-room without matches, by simply touching them, after turning on the gas, with a wire connected with the comb.

IN two cases destructive fires have been caused by water. In one of these, a flood caused the water to rise high enough in a factory to reach a pile of iron filings. The filings, on contact with the water, oxidized so rapidly that they became intensely heated, and then set fire to the neighboring woodwork, and the building was destroyed. In the other case, the water from the engines, during a fire, found its way into a shed containing quicklime, and the heat generated by the slaking of the lime set fire to the shed, and this to other buildings. Quicklime fires, however, are not uncommon. Many vessels carrying quicklime have probably been burned by the admission of water to the lime through a trifling leak, and no architect or builder needs to be told how intense the heat of slaking lime may be. Glass globes, which act as lenses, often set fires, and it has recently been claimed, on high authority, that the convex glasses used in sidewalk-lights are dangerous, and should be abandoned in favor of lights with flat tops. As the convex glasses receive and transmit much more light than the flat ones, particularly in muddy weather, it seems hard to be obliged to give them up, and perhaps a lens might be made, convex on the outside and concave on the inside, the concavity being equal to or greater than the convexity, so that rays of sunlight would either pass through unchanged in direction, or would be dispersed instead of being concentrated, so as to unite the advantages of the convex form with complete security.

A PLAN has been proposed for covering some of the principal streets in London, such as Oxford Street, Regent Street, Cheapside and Poultry, with a glass roof; and although it is not very likely to be carried out in conservative England, the suggestion may be a good one. There are many narrow but busy streets in our own older cities, such as Broadway between Twenty-third and Seventeenth streets, Nassau or Mercer street, or Winter, West and Bromfield streets in Boston, which could be formed, without very great expense, into arcades, after the fashion of the Burlington Arcade in London, the Victor Emmanuel Gallery in Milan, and the Providence and Cleveland arcades, by the simple process of putting on glass roofs, and the undertaking would undoubtedly be a profitable one. Although London is reported to have a rainy climate, the actual annual rainfall is only about half that of New York, and a street covered with glass would be crowded with shoppers on rainy days, which, with us, occupy about half the year. Probably a rough covering of iron and glass could be put over a narrow street for less than fifty dollars a foot, or five hundred dollars for a building having twenty feet frontage on the street, and the increase in rental value ought to repay the entire cost in three months. The inequality in height of the buildings under the roof would injure the effect of the structure, but, in practice, it would furnish a very desirable ventilation, and, by excluding vehicles from these streets, which could easily be done, they could be paved uniformly with asphalt, so as to give clean, dry and spacious accommodation to an immense number of foot-passengers. It might be objected that a glass-covered street would be hot in summer; but the great arcades already in existence do not seem to be seriously heated by the sun, even in Italy, and a light shading of thin whitewash, such as florists use on greenhouse roofs, might easily be thrown on the outside with a hose in summer.

ONE of the most important events of our time is certainly the completion of the flying-machine upon which Professor Langley has been working for two or three years. Although the newspapers, for want of any other feature of the rational and scientific proceedings of Professor Langley and his assistants upon which to base a cheap sensation, have endeavored to see something secret and mysterious about them, the fact is that every person interested in the subject has known pretty accurately what was going on, and there is not, and has not been, any attempt at "mystery" about the affair other than a natural desire to carry on the necessary experiments without the presence of a crowd of ignorant intruders. As now completed, Professor Langley's flying-machine consists of a slender body, shaped like a fish, rather than the cigar of other experimenters, and carrying two crescent-shaped wings, or "aëroplanes," of steel and silk, the larger one in front, and the other, of similar shape but considerably smaller dimensions, at the rear. The machine is driven by several small propellers, power for which is furnished by an engine, which is said, with a weight of five pounds, to develop one horse-power. Four tiny copper boilers, using gasoline for fuel, and evaporating naphtha instead of water, supply vapor to the cylinders of the engine, or, rather, engines, the little machine being divided into independent portions. No substance lighter than atmosphere is used for buoyancy, the machine rising solely by the action of the air on the under side of the inclined aëroplanes as they are driven against it. No trial has yet been made in the open air, but it is understood that one is to take place soon. Whether the machine proves to be able to fly or not is of very little importance, as the object of the trial is, of course, simply to make observations for subsequent use; but Professor Langley is not a man to experiment at random, or to make mistakes in his calculations, and it is altogether likely that it will do what is expected of it. The machine is said to have cost about fifty thousand dollars, which the newspapers think is a large sum, but it must be remembered that such men and such resources have never before been devoted to the solution of this, the most important problem of the century, and a hundred times that amount could be expended with advantage. The United States, particularly, which has always led the world in original devices, ought to support the investigation with unlimited liberality. The cost of one of our new cruisers, modelled from second-hand plans presented to us by the British Admiralty, if spent under Professor Langley's direction, would probably give us a machine which could destroy all the navies in the world in a few days, and follow up this exploit by annihilating, in a few days more, all the standing armies, barracks, forts, arsenals and other military paraphernalia on the face of the earth, without receiving a single blow in return. Such an instrument of force could not be intrusted to better hands than those of the great Anglo-Saxon republic, and, as it is sure to be successfully constructed by some one sooner or later, it is worth an effort on our part to be the first.

ARCHITECTURE OF THE LOW COUNTRIES.[1]—III.

Fig. 15. Town-hall at Leyden.

THROUGHOUT the Low Countries Renaissance art triumphed over the Pointed. At Brussels, Cardinal de Granvelle erected a palace; the important Collège Vandale was built at Louvain, with a loggia above the entrance, and with a chapel surmounted by an interesting turret; at Antwerp the Maison Hanséatique was reared; at Mechlin, Margaret of Austria intrusted the construction of her palace to Rombaut Keldermans. This illustrious architect abandoned in the more modern portion the ogival style, in which he had excelled up to that time. Among the noteworthy châteaux of the period, we cite especially those of Mariemont, Binche and Bouseu; the last was constructed after the plans of Jean de Breuck and of Lambert Lombart, an architect and painter of Liège, several of whose pictures are preserved in the museums of Brussels and Antwerp; in 1558, he added an important Renaissance portal to the church of Saint-Jacques at Liège, on the northern side-aisle, which was constructed in the fifteenth century, behind the Romanesque façade and tower erected in the twelfth century.

In 1527, at Leeuwarden, the capital of Friesland, an artist was born who, in the versatility of his genius, presents the most complete personification of the new æstheticism. Hans Vredeman, surnamed de Vries (the Frieslander), painter, architect and sculptor, was one of the most gifted, the most fertile and the most original artists of his day. He was a pupil of Peter Cœcke, and made his début at Antwerp in 1582, after the example of his master, by executing the triumphal arches for the inauguration of Francis of Valois, duke of Alençon; aside from the various constructions that he directed, Vredeman published at Antwerp numerous architectural collections, drawings of furniture, fountains, gardens, etc., which had a wide popularity.

He was called the Flemish Vitruvius. His influence was considerable on the art of his time, to which he succeeded in giving a strongly national impress. It was particularly the Dutch provinces that came under his sway. The town-hall of Leyden (Fig. 15) offers the most finished and the most valuable example of his masterly conceptions, for instance in the monumental perron and the three slender delicately disposed gables that adorn the long façade.

Aside from the numerous Netherlandish monuments in this peculiar style we must call attention also to the large number of edifices built for the public-weighing service, edifices which are hardly met with except in this part of the Low Countries and which, by their special dispositions, are of unusual interest.

Fig. 16. Town-hall at the Hague.

The most important is at Alkmaar, opposite the canal; it comprises on the ground-floor, a vast space reserved for the public scales and for the accommodation of tradesmen. The structure is on a square plan, with one story above the ground-floor; richly decorated gables, particularly the one toward the canal, terminate three of the façades; on the fourth, that in the rear, there is a belfry with chimes. Town weighing-houses are generally designed in a very original fashion. Among the most interesting may be mentioned those of Deventer, Enkhuizen, Hoorn, and Nymegen. We must also note the construction in Holland of several important hospices; the principal are those of Leyden, Hoorn, Middelburg, Enkhuizen and Amsterdam. In a few large cities, noteworthy town-halls were still erected in the sixteenth century, among which, those of the Hague (Fig. 16) and of Nymegen are by artists who were as skilful in combining the masses as in working-out the details of a monument.

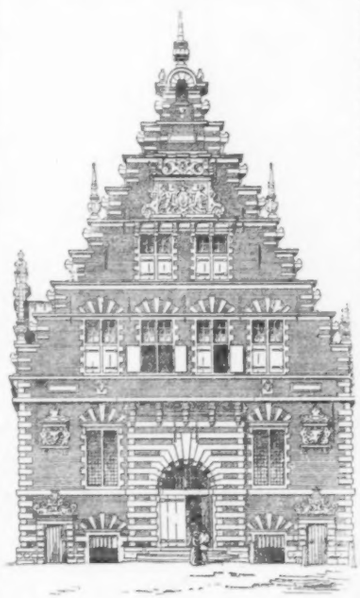


Fig. 17. Slaughter-house, Haarlem.

The Netherlandish structures of the sixteenth century were

[1] From the French of J. van Ysendyck, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 899, page 166.

usually embellished with sculptures whose ampleness did not exclude a certain degree of delicacy; in the seventeenth century, the decoration lost in part its delicacy while ampleness of form became exaggerated. This is true of the ornamentation of the Slaughter-house at Haarlem (Fig. 17); the

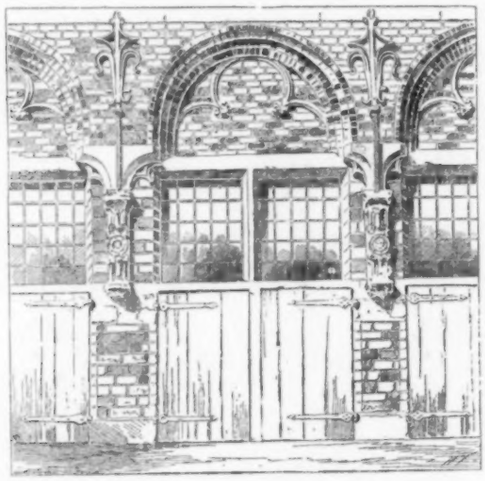


Fig. 18. Arches in the Court of the Town-hall, Nymegen.

ensemble nevertheless retains a great deal of originality and a very picturesque aspect. The town-hall of Hal is also decorated, with less distinction and masterliness, yet its *silhouette* is not without merit.

In a few Dutch provinces we remark certain typical dispositions as at Dordrecht, at Nymegen (Fig. 18) and in the principal cities of the region, where the arches are carved in trefoils and are generally uniform in shape. In other sections we find dispositions similar to those seen at Salt-Bommel (Fig. 19), and adopted for façade decoration. These are all apparently due, if not to a local school, at least to the preponderant influence of a master.

Fig. 20. House of the "Great Salmon," at Mechlin.

We have seen that already in the fifteenth century the different guilds had been able to undertake constructions of some importance at different centres; in the sixteenth and seventeenth centuries, their power and wealth increased quite rapidly, owing to the many privileges which were granted them by sovereigns and municipalities alike. It was during this period that the commercial and manufacturing cities witnessed the erection of the splendid merchant-houses and guild-houses which are still to be admired at Mechlin, Ghent, Bruges, Ypres, Antwerp, Brussels, Utrecht, Delft and elsewhere.

The house of the "Great Salmon" constructed at Mechlin (Fig. 20) by John Borremans, an architect of Brussels, for the association of Fishmongers, is one of the most remarkable of those still remaining in the city. At Antwerp, most of the guild-houses are grouped around the town-hall; at Brussels, all these precious reminders of the town's ancient prosperity are about the Grande Place, making it one of the wonders of

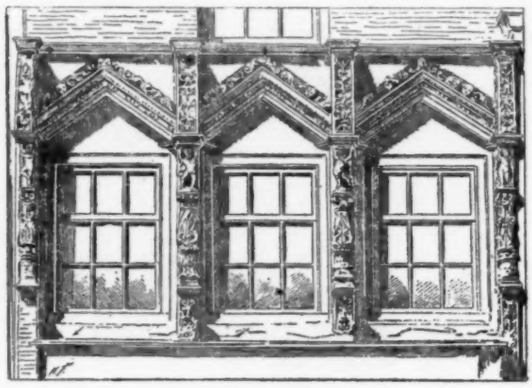


Fig. 19. Fragment of a Dutch Façade.

Europe (Fig. 21). Imagine, in fact, a vast parallelogram bordered with picturesque buildings, all differing in character and decoration, but all equally remarkable and equally sumptuous. On one side is the immense town-hall with its slender spire, the work of Jan van Ruysbrœck, the corner-stone of which was laid by Charles the Bold, then ten years of age; opposite, is the "Maison du Roi," erected by Charles V; at the right and left of this and on the other sides of the square are the beautiful houses of the craft-guilds, rebuilt for the

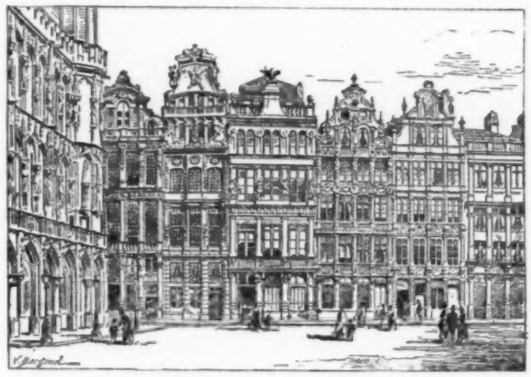


Fig. 21. Houses of the Grande Place, Brussels.

most part after the bombardment of 1695 and in the construction of which the organizations strove to outdo one another in luxuriousness and beauty.

[To be continued.]

Carbonic Acid applied to Refrigeration. — The new system of refrigeration by means of carbonic-acid gas seems likely to come into quite general favor as a substitute for the processes heretofore resorted to. The apparatus, in its improved form, consists of an evaporator, or coils, within which the liquefied carbonic acid is caused to evaporate, being afterward drawn into a compressor and raised to the liquefaction pressure; it then condenses into a liquid within the coils of a condenser, whence it flows into the evaporator and so on in a closed cycle. Liquefied carbonic anhydride evaporates under atmospheric pressure at about one hundred and twenty degrees F. below zero. In the machine, however, it is evaporated at ten degrees F., according to the temperature it is required to produce, cooling the brine surrounding the evaporator coils to within a few degrees of itself: the brine thus cooled circulates in the freezing rooms, chill-rooms, cold stores or between the ice-moulds in ice-factories, abstracting also the heat from the water or goods to be frozen or chilled. The coal-consumption and the weight of machinery required are vastly less than in any other system, and, besides this, the carbonic-acid gas employed is unattended with danger, is inodorous and non-poisonous. — *N. Y. Sun.*

CONSTRUCTION.[1] — XXI.

CIVIL CONSTRUCTION.

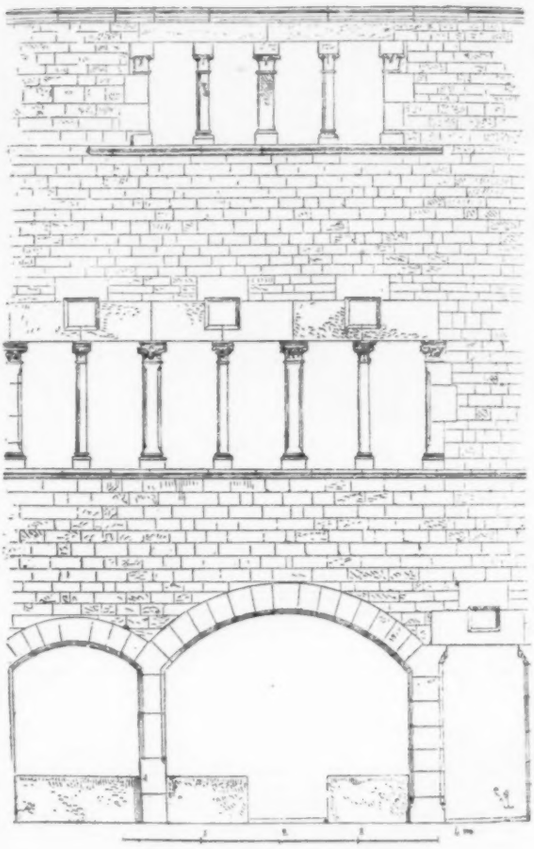


Fig. 115. A House at Cluny.

IN the early part of the Middle Ages the Roman traditions had perpetuated themselves on Gallic soil in civil as well as in military constructions; nevertheless, wood played a more important rôle than during the Gallo-Roman period. The Gallo-Roman system of construction does not differ from the Roman system; the same methods are employed, but more coarsely, so far as the execution is concerned. During the Merovingian period one meets with very frequent employment of wood, not only for roofs, but in ceilings, wainscots, porches, even the walls of dwellings. Germany and the Gauls produced timber in profusion and this material being easily employed it was natural to use it in preference to stone or brick which take time and require difficult quarrying, dressing, laborious transportation or previous burning.[2]

The conflagrations which destroyed so many towns and villages

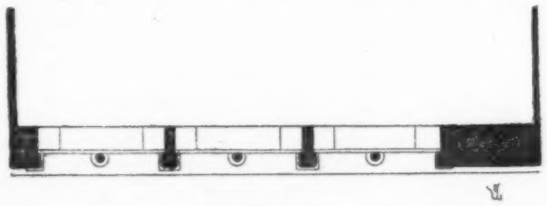


Fig. 116.

during the ninth, tenth and eleventh centuries helped to bring about the abandonment of wood in the construction of private dwellings as well as of churches. This material was no longer employed except for flooring, roofing and the partitions of dwellings. Already in the twelfth century, a number of towns showed façades of houses in dressed-stone or in rubble-work — leaving out of account certain regions deprived of quarries, like Champagne and Picardy, for example.

The monastic establishments, so wealthy in the twelfth century, set the example of civil constructions in stone and this example was followed by private individuals. It must be said to the honor of the builders of this epoch that in adopting ashlar or rubble in place of wood, they very frankly took a mode of construction suitable for these materials and did not attempt while using them to reproduce forms or arrangements which were suitable for timber construction.

Always disposed to preserve its real function and the appearance befitting it, for the material employed, they did not attempt in the least to dissimulate the nature of the materials. The means employed were, nevertheless, of an extreme simplicity and those artists who in their ecclesiastical constructions from the twelfth century onwards showed a singular subtilety, research and used such complicated methods, contented themselves in civil buildings with the most natural and the least complicated. Economical of materials, which then cost comparatively more than to-day, their dwellings are during the

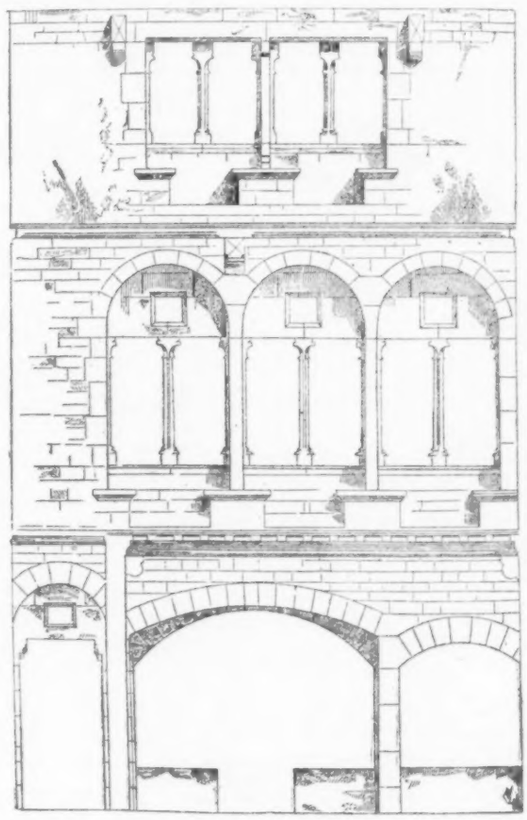


Fig. 117. Interior View of Front shown in Figure 115.

twelfth and thirteenth centuries reduced to what is strictly necessary, without pretending to appear anything more or different from what they really are, that is to say, walls, pierced with openings, carrying floors formed of exposed beams and joists, well sheltered on the street and court-yard fronts by projecting roofs, throwing the water well away from the faces. Very rarely, unless it may be in a few towns of the south and centre, the ground-floors were vaulted, consequently there were no buttresses, no projections on the exterior. Most frequently the walls are in exposed scappled rubble-work with the occasional belt-courses, the jambs and the lintels of doors and windows of cut-stone; still these lintels and these jambs are not bonded but are simply facings on the outside; — the belt-courses alone bond together the interior and exterior surfaces of the walls.

In order to give an idea of the commonest sort of civil constructions of the twelfth and of the beginning of the thirteenth centuries and of the simplicity of the means employed, we shall choose from a great number of examples one of the houses of the town of Cluny, so rich in Mediæval dwellings. Figure 115 shows the face of the exterior wall of this house on the street side. It is simply a rubble construction with a few cut stones for the belt-courses, the arches, the windows and their lintels. The lower arches open into the shops. At the right is the door to the alley which leads to the staircase. The first story shows an open gallery composed of uprights

[1] From the "*Dictionnaire raisonné de l'Architecture Française*," by M. Violllet-le-Duc, Government Architect, Inspector-General of Diocesan Edifices, translated by George Martin Huss, Architect. Continued from No. 895, page 106.

[2] It is only toward the end of the thirteenth century that the forests of the Gauls began to diminish in extent and in quality, that is to say from the moment when the feudal organization began to grow weak. During the fourteenth century many feudal lords were obliged to dispose of part of their property and the monastic establishments, the chapter-houses or the parishes cut down a notable portion of the forests of which they had become possessors. Subsequent to the wars of the fourteenth and fifteenth centuries, the forests in many localities, no longer being under the beneficial administration of the feudal system, were cruelly devastated. Those which existed on the mountains were thus lost forever in consequence of the washing-away of the soil from the steep slopes. It is thus that the south and all the centre of France at present are despoiled of the forests which once garnished the plateaus, whose existence is still noted up to the end of the thirteenth century.

and colonnettes lighting the large room. The window openings are square so as to receive movable sashes. In the lintels underneath the arches carrying the second-story wall are pierced small windows with sashes. The second story is lighted by a less important clere-story and strongly projecting roofs throw the water away from the outside walls.

In plan the first story gives Figure 116, and Figure 117 reproduces the front wall seen from the inside with its relieving arches above the lintels of the first story, the seats in the windows and the supports of the girders sustaining the joists. These principal girders placed along the front wall between the arches bond together the two parallel walls of the house and act as anchors. These were upheld at the ends by wood corbels as shown in the section Figure 118 [see "*Maison*"]. That is the simplest expression of private architecture during the Middle Ages; but civil construction did not always have such an ingenuous character. In the great dwellings, in the châteaux, the arrangements being much more complicated and the dwellers very numerous, it was necessary to provide interior divisions and separations; nevertheless, there are certain general dispositions which remained the same for the seignorial habitations as for those of the commoner. It was always necessary to have the hall, the place of reunion of the family of the commoner or the *maisnée*[1] or household, in the case of the seigneur, then the chambers with their wardrobes and their retiring-rooms and the passage-ways to reach these apartments, with private staircases. There were, then, under the same roof some very large apartments and others very small, corridors, with air and daylight everywhere. It has been imagined very wrongly that the seignorial dwellings, as well as those of the commoner in the Middle Ages, could not have been other than gloomy and sombre, badly lighted, badly ventilated.

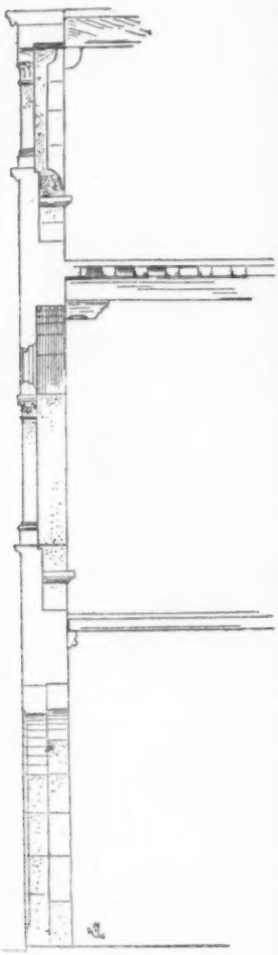


Fig. 118. Section of Figure 115.

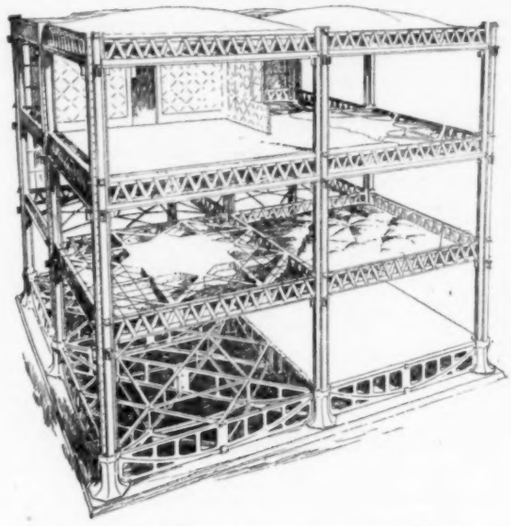
This is another of those absolute judgments which one ought not to make concerning this epoch. While the necessities of defence forbade the seigneurs piercing window openings except at rare intervals, they nevertheless sought in their châteaux light, air, view of the landscape, an outlook in various directions and the sun and breeze at will. If one will only take the trouble to reflect a moment he will readily see that men who passed the greater part of their existence in roaming over the country-side would not willingly shut themselves up, sometimes during weeks together, in gloomy rooms, without outlook, without air, without light. If the arrangements for the defence of a residence compelled the dwellers in it to get along with as few exterior windows as possible, if the court-yards of châteaux surrounded with elevated buildings were frequently gloomy and dark, these dwellers nevertheless sought in all kinds of ingenious ways to get outlooks over the country-side, air and sunshine. This accounts for the flanking turrets, the watch-towers, the battlements, the reëntrant angles which permitted windows to be made, masked from the outside.

[To be continued.]

The Method of Using the Fire-boat at Cleveland, O. — An ingenious system of fire-protection has been successfully put into practice in Cleveland, O. Four six-inch mains are laid from the Cuyahoga River to the business streets of the city, a distance of 700 feet to 1,000 feet, the mains being provided at intervals with ordinary fire-hydrants, but normally remaining quite empty, as they are laid with a slope towards the river, into which they empty themselves. In case of fire, the city fire-boat is run to the river-end of the mains, with which one of its nozzles is connected, and a good pressure is available at the hydrants, as the pumping-engines in the boat are capable of putting on a pressure of 200 pounds to 250 pounds per square inch. — *Invention.*

[1] The *Maisnée*, that is to say the household, includes not only the family but the servitors, the hired men and women and all the *personnel* of a château.

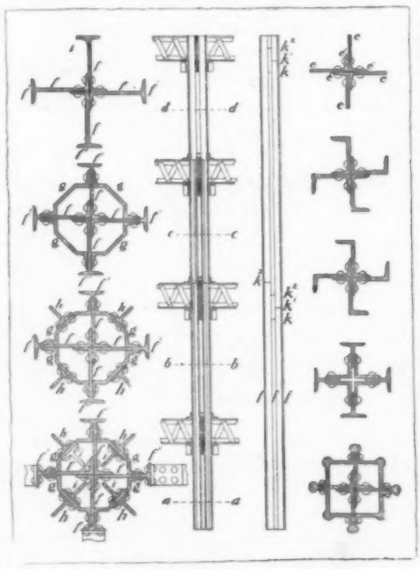
A NEW FIREPROOF CONSTRUCTION.[2]



Model showing in different stages the Construction described.

THE object of the mode of fireproof construction here shown is to build more economically than is now done. In the present construction, with columns, girders, beams, arches, etc., there is a great waste of material, which cannot be avoided. In the arch-construction here shown there need not be any waste-material and the material used is used to the best advantage. The construction is as follows: In a building in which the floors are supported upon columns, metal arches and their ties are built between the columns in such a way that the strains, compressive and tensile, are being taken care of in each bay or floor between columns, so there will be no horizontal thrust from the floor on either columns or walls. The arches are made of bar L or T iron or steel, as shown on drawings. If the floor is to be supported on four girders or four walls, there is placed on the lower flanges of the girder, or on the walls, a polygon-shaped frame, from the corners of which are sprung metal arches, and where the arches cross each other they are held together with U-bolts. These arches form a metal dome, of which all the strains from the arches are taken up by the polygon ring, so there will be no horizontal thrust on the girders or walls from the arches in the floor-construction.

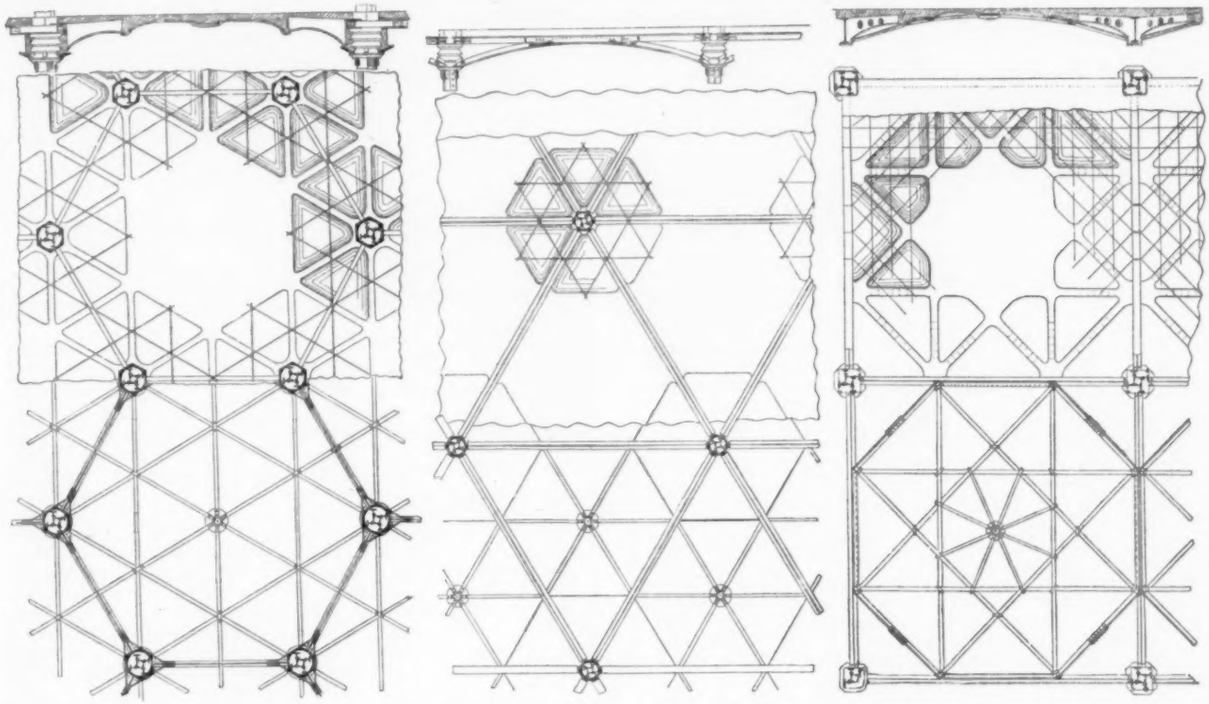
This completes the metal part of the construction. The plaster or cement part of the construction is made as follows: For a plain ceiling, with the metal arches showing underneath, there are placed in the spaces between the arches air-cushions, which are pressed up against the metal arches from underneath. The air-cushions will then form a dome in each space between the arches; on top of the air-cushions is spread plaster-of-Paris, or cement. After it has set the air-cushions can be removed and the under side of the ceiling can be finished, showing a groined ceiling. But if the metal arches are to be covered with plain or ornamental mouldings, they are first put up and then the air-cushions inserted between them. If the domed panels are to be ornamental a flexible mould, made from a flat pattern, is placed on top of the air-cushion; and this flexible mould may be of rubber, gelatine or any such material. After the



The Columns and their Connections.

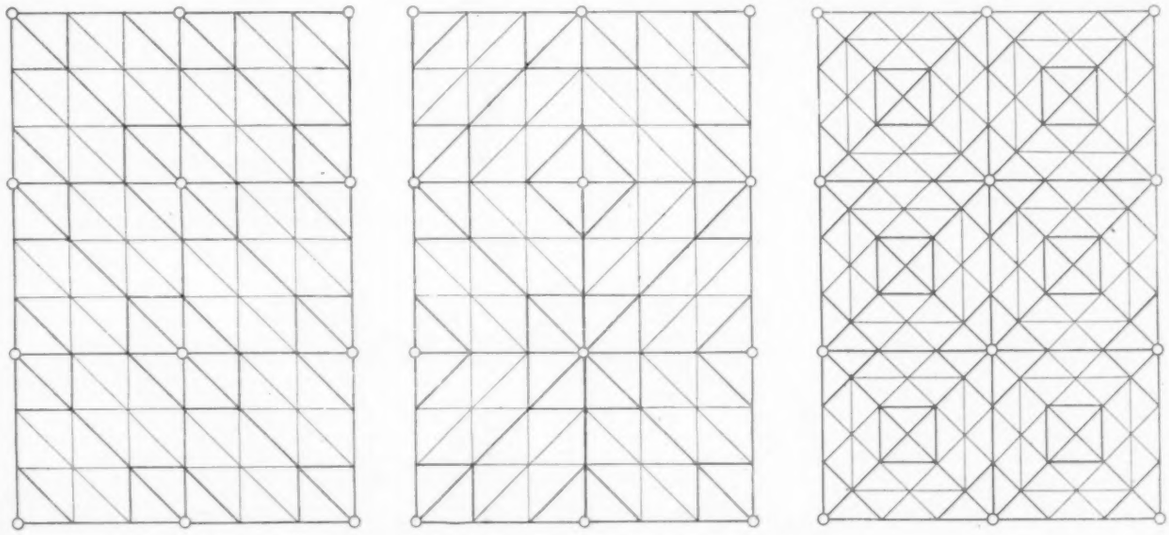
[2] A paper read before the Society of Arts at the Institute of Technology, February 23, 1893, by N. Poulson, of New York.

under side of the ceiling is finished there are constructed on top of the iron arches cement arches or ribs. They are formed by placing two boards parallel with the metal arches, five or six inches apart; the space between the boards is then filled with concrete. In these ribs may be left circular holes through which hot air may circulate and thereby heat the floor. After the ribs are made and the boards removed wire and wire-netting are stretched over the cement ribs and on top of the wire-netting is spread concrete about three inches thick. This finishes the floor, except the finished floor of wood, tile or cement.



Varieties of Ceiling. The lower part of each diagram shows the Arrangement of the Ironwork: the upper part shows the same filled with Cement, with indications of the wires for supporting the upper finished surface.

Comparing the cost of the usual fireproof floor-construction, composed of girders, beams, brick arches, etc., in which there is a great waste of material, a floor constructed of beams, girders, etc., to carry 150 pounds per square foot, first the load is supported by the beams, by them transferred to the girder, and from the girder to the column; that is, the same load is carried twice before it reaches the column. The brick arches, the filling over them, the plastering, etc., have also first to be carried by the beams and then by the girder; that is, for supporting a load of 150 pounds there has to be provided metal sufficient to carry 450 pounds. If the load of 150 pounds were carried only once, and there were no dead-load of brick arches, etc., it would cost only 33.3 cents for iron, where it now costs $1.00, to support the resultant load, which is equal to three times as much load required to be supported; and if the iron beams could be made with the web lighter towards the centre and the flanges lighter towards the ends of the beam there could be saved, of the metal in the beam, at least ten per cent without reducing the strength of the beam, and this would reduce the cost to 30 cents. If there were used for supporting the load bar L or T iron, instead of beams, the cost would be reduced thirty per cent less per inch, which would make the cost 26 cents. If the above is calculated for a floor with 12″ beams, by making the beam 24″ high instead of 12″, the same amount of iron will carry twice as much, or the amount of iron could be reduced one-half, which would make it cost 13 cents; or if made 36″ high it would reduce the cost of iron to 8.66 cents, against $1.00. The above conditions cannot be met by the beam-and-girder construction, but can by the arch-construction. There the dead-load is self-supporting; the load is only carried once. Bar L or T iron is most suitable for the construction of the floor, and can have two or three feet of rise without reducing the cubic air-space in the room below.

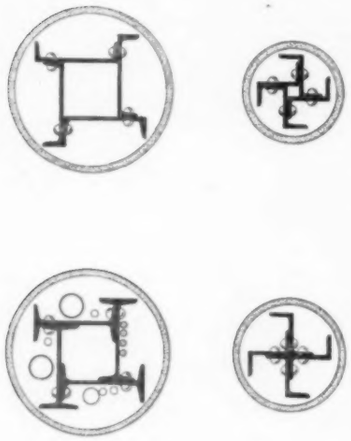


Diagrams showing a few of the Forms in which the Arches may be combined.

The cement-and-plaster part of the construction will also cost less than the usual brick arches, because there is less material used and

it is of less costly nature; and, furthermore, the labor is quickly performed, as it merely consists of spreading the materials in their proper places.

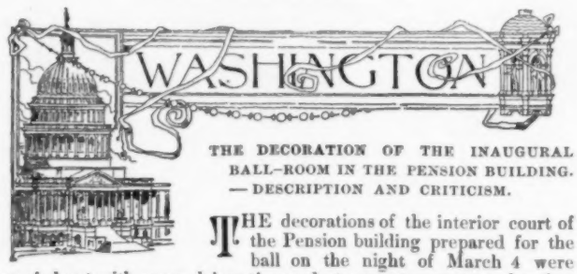
The columns are here shown. They are made of wrought-iron or steel, and are continuous from the foundation to the roof, but diminish in amount of material upwards in proportion to the loads they have to support. In starting at the foundation with a column made of four 12″ heavy beams, after one or more stories the beams can be reduced at 12″ light beams, after that to 12″, 9″ and 6″ channels. These horizontal joints are all spliced joints, so that the columns form, practically, one column from foundation to roof, thereby making the columns much stronger and stiffer with the same amount of material as would be used if a number of short columns were placed one on top of another. The continuous column is also more economical to make, as the metal can be of a uniform length and holes punched alike in each piece, so that a beam or channel cut to uniform length will fit in any column. The only place where there will be any waste is at the top of the column, where they may have to be cut to irregular lengths. This way of building a column has a great advantage, as it leaves four continuous recesses from the foundation to roof, which space can be utilized for pipes and wires. If the column is made to finish a few inches above the roof, and a removable cap put upon it, pipes and wires can be put in or removed from the recesses in the column at any time.



Mr. Poulson might easily have expanded his paper, but very likely the presence in the lecture-room of models, diagrams and drawings made needless the use of more words. Still there are some things which it may be worth while to add. Although now known only as one of the leading iron-masters in the country, Mr. Poulson was educated in his native land as a bricklayer — "educated," not "trained," is the proper word to use here, for he was taught to use his intelligence quite as much as his hands. The portion of his studies that most interested him was the theory and construction of the arch, particularly groined archwork, and he thoroughly mastered its theory of distribution of strain and load as well as the practical execution of the work. Consequently when later, in this country, he became interested in iron and its application to constructive needs, he naturally sought to inquire how far the same theory could be applied to that material. One of the early applications he sought to make was in the construction of grain-elevators, which was illustrated in the *American Architect* as long ago as November 17, 1877, but, for some reason it is not easy to understand, his proposition did not find favor with the owners.

With this as a starting-point and having every facility at hand, Mr. Poulson continued his investigations and experiments until, some three or four years ago, he determined to carry them out practically in a house he built for himself at that time on the shore of Long Island. The manner in which he carried out his idea is partly shown by the view of the hall in this house, which is published in this issue. Here the method used had not reached its latest development, since the ironwork was not everywhere protected on the underside, as the feeling was that the construction was sufficiently fireproof for a dwelling where the combustible contents cannot produce many units of heat, and that it would be safe to sacrifice something of absolute safety to decorative effect. In other particulars the construction was similar to that described in the paper above, except that in certain of the rooms the upper flooring of wood was omitted, the carpets and rugs being spread directly upon the finished cement surface.

Apart from the method of constructing the skeleton of this building, it is one of the most interesting in America and has acquired a world-wide reputation through the accounts of it, incomplete and generally inaccurate, that have been published in the technical journals of many countries. As yet, a complete and reliable description of the building has not been published. About all that we know about it is that the outer walls are of eight-inch brickwork, sheathed on the outside with sheets of copper whose surface is diapered, stippled or decorated with wavy lines in such slight relief as to merely give a texture to the surface. These sheathing-sheets are produced by a galvanoplastic process, the copper being deposited upon the mould in an ordinary bath of large size. In the same way all the decorative panels, window and door finish and cornices have been prepared. The copper-work is all riveted together, not brazed, proper allowance being made for expansion and contraction. Upon the inside, the outer walls are plastered directly upon the brickwork, so that there is no air-space of any kind in the substance of the wall. This course was adopted with some misgivings, as it appeared uncertain how such a wall would behave in the matter of condensation of atmospheric moisture within the house and the transmission of heat and cold. Careful observation during two years has demonstrated that there is no ill-effect from condensation and that the temperature of the house, at all seasons, is remarkably equable. With such absolutely solid and impervious walls the housekeeper in this house is relieved from waging constant war upon vermin, big and little, and Mr. Poulson feels entirely satisfied that he has achieved a domestic as well as a constructive success.



THE DECORATION OF THE INAUGURAL BALL-ROOM IN THE PENSION BUILDING. — DESCRIPTION AND CRITICISM.

THE decorations of the interior court of the Pension building prepared for the ball on the night of March 4 were carried out with more elaboration and at a greater expense than has been the case at any of the previous inaugural balls.

The covered court of the Pension building is 116 feet wide by 316 feet long and is divided into three nearly equal parts by rows of four large columns (which have no reason for existing) one-third of the way from each end. Directly in the centre of the court is a fountain thirty feet in diameter. The court is surrounded by two Renaissance galleries modelled strictly after similar galleries in Italian palaces. A third light wrought-iron gallery without classical feeling is the topmost horizontal feature. The central portion between the eight columns reaches a height of about one hundred and fifty feet.

In decorating, the first effort was to obliterate this great height by draping the whole interior ceiling with a canopy of white and gold-colored bunting, which reduced the height to about seventy-five or eighty feet. It will give an idea of the magnitude of this canopy to say that 10,000 yards of material and 35,000 feet of rope were used in putting it in place.

The galleries forming the features for the principal horizontal decorative effects were utilized on the second floor by draping the tiers with lambrequins of silk-plush embossed with gold, studded with groups of ancient armor. The lambrequins alternated with draped American-flag trophies and the names of the Presidents in electric lights.

The face of the balustrade was covered with shields containing the coats-of-arms of the different States, surmounted by gilded eagles and with silk American flags, over a draped red-bunting background, outlined by green garlands and trailing vines. The pedestals of the balustrade were capped with vases filled with growing palms interspersed with electric-light effects.

The fourth-story balcony carried the only foreign flags used in the decoration of the court. Here groups of all or each nation were draped alternately with groups of the United States flags.

The wall back of the gallery-arches, the normal tone of which is cream-color, was treated with festooned white-and-red bunting, below which were rich blue-silk banners, with coats-of-arms of the various States embroidered in gold. These banners were imported for the occasion.

The central space in the hall, which is bounded by the four columns east and west and the two band-stands north and south, is where the most elaborate effects were aimed at and attained. In the centre is the fountain, thirty feet in diameter, sixteen feet high, with four basins, the whole bedded with plants, trailing vines and vases around edges filled with blooming flowers.

The eight large Corinthian columns, sixty feet high, four east and four west of the centre, connected by small semicircular arches, trivial in comparison to the magnitude of the columns, were treated about the base with large vase-shaped decorations of deep-garnet and gold, from which rose palms, potted plants and flowers interspersed with which were electric flowers, lilies-of-the-valley, revolving stars and kaleidoscopic electrical effects. Just above the vases were trophies composed of shields, draped flags and the names of all the Presidents of the United States. The shafts of the columns, from cap to base, were covered with wild smilax-vine.

North and south of the centre were the raised platforms for string and promenade bands. Back of the platforms and just in front of the galleries rose triumphal arches thirty feet wide and forty-five feet high, draped with solid white bunting, gathered to simulate the architectural members of a classical entablature. The white formed a background for a delicate tracery of asparagus-vines. All the ledges

were covered with laurel, intended to convey the effect of growing vines upon any surface where earth might find a lodgement.

Over the arches themselves in electric lights were the words, on the north side, "Cleveland" on the south side "Stevenson."

Surrounding the interior court on the first floor was the dining-room simply decorated with bunting and flags. On the second story was the diplomats' reception-room, decorated with stands of United States colors and foreign flags. The room at the end of the corridor leading to the President's reception-room contained a miniature representation of the United States Capitol, terrace and all, twenty-five feet long, twelve feet high, seventeen feet wide, of white immortelles placed in front of a Nile-green background and under a white canopy with vine tracery.

The President's room was in the southeast corner (the room occupied by Commissioner Raum). The walls were covered with soft white bunting draped artistically and forming a background for an elaborate display of vines, orchids, Marechal-Neil and other fine roses, azalias, genestas, banks of maiden-hair ferns and other beautiful flowers. On the wall was the President's flag, consisting of a blue field and the United States coat-of-arms.

The decorative work was done by Koster of New York and the flower exhibit by J. H. Small of Washington. The committee in charge of decoration consisted of two architects and one artist, besides several business men.

The influence of the artistic element on the committee certainly had its effect, as all who have attended this and previous inaugural balls acknowledge the decorations to have been in better taste, more effective — a decided advance in the treatment of temporary decorations.

The usual method has been to use ropes of green, twisted snake-like around columns and hanging chain-like along balconies, assisted by long ribbons pendent radially from special points in the roof, suggesting pictures of the old May-pole and its streamers. In the present instance no ropes or streamers were used, the green was massed on the eight columns, or used as trimming or trailing vines, an effort evidently having been made to have them appear as if in natural position. The colors had a more massed effect than has been usual and the simple white triumphal arches (band-stands) with their green trimmings were very pleasing in their color effect. One of the best features of the decoration was the canopy ceiling, which was peculiarly appropriate in this case as a means of lowering the ceiling, hiding the plain iron trusses and the enormous void or open space in the centre of the building.

The points in which I think the decorative scheme was deficient may be very briefly enumerated. The dignity and effect this room commands by its great length and width should not only have been maintained but should have been emphasized in every way. A long unbroken vista would have added not only to the effect of the room and its decorations, but to the effect produced by the people on the floor.

The columns are a stumbling-block in such a vista, but in the decoration their bases were enlarged by the treatment of vases so to form an almost positive barrier to any one, no matter whether he were on the floor or in the galleries, trying to get a glimpse of more than a third of the floor at one time, and from the floor the same treatment prevented the taking-in anything but a contracted view of the gallery-decoration. The effect was further contracted by the band-stands, which projected so far out into the court that they practically divided the central portion into two parts. So in this room, magnificently proportioned in length and breadth, we find only four rather small spaces instead of one imposing and effective whole.

This arrangement must have interfered materially with the practical side of the show, *i. e.*, dancing and promenading, as well as with the striking effect which it was desirable to attain.

The method of using flags, and these being, to a certain extent, limited, was an improvement on former practices; but I think in this large building that there was still a lack of massing in colors, in effects and in flowers, which would have added to the dignity, repose and harmony of the decoration. The Capitol modelled in immortelles was a very interesting piece of work in itself, as it was a very accurate miniature of the Capitol, columns, dome, porches, terraces and all.

The decorations in the President's room were dainty and pleasing, in every way suitable to their temporary character and to the occasion.

CHICAGO

THE GARBAGE NUISANCE. — NEW FORM OF BUILDING PERMIT. — THE NEW BUILDING ORDINANCE. — FALL OF A RUINED WALL. — FALL OF A PARTLY-FINISHED BUILDING. — ACCEPTED CONTRIBUTIONS TO THE WORLD'S FAIR ARCHITECTURAL EXHIBIT.

OUR city at no time is noted for its cleanliness, but this spring it seems as if its streets and alleys quite excelled their usual selves. The horrible garbage-boxes, often placed, in accordance with the letter of the law, immediately in front of the houses to which no alley belongs, are simply overflowing. One longs to have for a few weeks the absolute power of a Roman emperor of "the good days of old," combined with that desire for "prison neatness" of the notable New England housekeeper. All this dirt and disorder is, of course, in part a natural result of the two months' of uninterrupted icy weather, which have made the usual amount of cleaning impossible. Still this does not excuse the condition of the garbage-boxes, and the man who will have an inspiration concerning their contents ought to be made the patron-saint of the city. What avails fine buildings and beautiful streets if, with ever so slight a turn of the eye, the ever-present orts-collection greets you. There is no excuse for the present method used for collecting garbage, and the men who helped to establish these filthy receptacles on the streets should have their names inscribed in blushing letters on the sides of them.

And as if people could not be satisfied with all this dirt on the streets, a movement has been set on foot lately to offset the good which is being accomplished by the Society for the Prevention of Smoke. Fortunately, this attempt has been but indifferently successful, and only a few of our rich men are guilty of having their names appear among the champions of bituminous coal.

The Board of Public Works has quite properly taken a stand in regard to the monopoly of the streets for building-purposes. Those applying for permits during the last two weeks have been confronted by a new set of rules framed by this department. They are as follows:

"The street in front of said premises shall at all times be kept free from obstacles to safe and convenient public traffic, and not more than eight feet from the curb-lines be occupied at any one time. The permanent storage of building-material on the street will not be admitted.

"The party to whom this permit is granted shall construct and maintain, or cause to be maintained, at his own expense, during the whole term for which the same is granted, a good and substantial sidewalk, and in case a permit is granted to excavate under the sidewalk space such work will be done with as much expediency as possible and the sidewalk replaced without delay.

"Stone-cutting and stone-dressing on the street is hereby prohibited.

"No dirt, rubbish or débris of any kind shall be deposited on the street except for immediate removal.

"Only such material for the construction or repair of buildings as will be used from day to day will be permitted to be placed on the street or sidewalk, and débris of every kind must be removed at once.

"Sand, lime, mortar, boxes, etc., will not be permitted on the street.

"Posts for attaching guy-ropes for derricks and for other purposes in connection with said building-operations may be erected at either curb-line of the street, within the frontage limits of said premises. Said posts shall be ample in strength and of suitable material; provided, however, said post shall not be less than eight inches square, sixteen feet long, and set at least four feet in the ground. Said guy-ropes attached to said posts shall be maintained in such position that no part thereof shall be within twelve feet of the surface of the street, and such guy posts, derricks, etc., shall be removed, at the expiration of this permit, or before if so ordered, from the front of said premises, and the street left in as good condition as found at the commencement of the work.

"All excavations or other dangerous places existing on account of said building-operation shall be securely barricaded through the day and red signal-lights shall be displayed during the night; the same precaution shall be taken to guard against accidents from stone, lumber, or any other material deposited on the street.

"This permit is issued conditionally that all materials and obstructions shall be removed from the street within six hours after notice is served.

"The party to whom this permit is issued takes and accepts this permit subject to these conditions and all liabilities, terms and conditions of a bond given for the purpose of obtaining the permit.

"The foregoing requirements and all ordinances and orders of the city bearing upon the subject shall be performed to the satisfaction of the Commissioner of Public Works, who reserves the right to revoke this permit for any violation of or neglect to observe the conditions herein prescribed, and the party to whom this permit is issued hereby expressly agrees that the expense due to any failure on his part to observe the requirements of said permit shall be paid out of any money deposited in advance for such purposes, and that the balance, if any, shall, upon the return and cancellation of this permit, be refunded by the Commissioner of Public Works."

A schedule of bonds accompanies these rules, the largest bond being required for buildings to be erected in the crowded down-town districts.

It is interesting to notice that for the first time, in at least Western architectural history — and most probably it is true all over the United States — has the local Chapter of the American Institute of Architects been recognized by the municipal powers as the authorized representatives of the profession. It is, of course, a step in the right direction towards a certain dignified recognition of the profession as an established force in the community, which would not have been possible, in this part of the country at least, ten years ago. This recognition comes from the action of the city fathers in making the president of the Illinois Chapter of the American Institute of Architects an *ex-officio* member of the Department of Buildings. The president shall be one of the members to conduct the examination of candidates for building-inspector, as well as serve as a juror on a committee when, in case of dispute, arbitration is necessary. There has several times been mentioned in these letters the plan for the new building ordinance, which for thirteen months has been in

the hands of a special committee of several of the aldermen and citizens, both architects and unprofessional men. This ordinance has at last been passed over the mayor's veto. The chief struggle has arisen over the limit to the height of buildings, those men wishing to centre the business interests within a few down-town blocks advocating the most extreme proportions for the sky-scraper, while those wishing to extend the business centre being strenuously in favor of placing the limit at one hundred and thirty feet, or ten stories. The original ordinance placed the limit of height at one hundred and sixty feet, while the one-hundred-and-thirty-foot limit was introduced as an amendment. The ordinance as at last passed establishes a department of the city government, to be known as the Department of Buildings, embracing a commissioner, a deputy commissioner, a secretary and such inspectors and other officers as the City Council may provide. The commissioner is required to be an experienced architect, civil-engineer or builder, is to be appointed by the mayor, and hold office for two years. He is given the power of inspection over elevators, fire-escapes and all classes of buildings. The inspectors are required to be skilled laborers, and, before their appointment, are required to pass an examination before a committee consisting of one member each from the Building and Traders' Exchange, Building Trades' Council, Underwriters' Association and Illinois Chapter of the American Institute of Architects. The commissioner and inspectors are empowered to enter all buildings for the purpose of ascertaining whether the ordinance has been complied with, and, in case the Department decides against the security of any building being erected, the interested parties have a chance to appeal to the Committee on Arbitration. The commissioner is given the power to order the demolishment of any building or part of building, while an appeal to the Arbitration Board is allowed. Of course, the ordinance contains specifications in detail regarding foundations, thickness of walls, etc. Concerning walls damaged by fire or explosion, the commissioner's decision is final, and no appeal to the Arbitration Board is permitted. This part of the ordinance gave rise to violent discussion. In view of the events of the last month, it would look like a wise precautionary measure to vest the commissioner with absolute power as far as the removal of ruined walls is concerned.

Unfortunately, in this month, in the report we have to make, we have to deal not so much with structures that have been put up as those that have come down. Two more edifices have fallen in our city, causing loss of life and property. Last January, a structure known as the York Building was burned, entailing considerable loss on the owner, and at the time of the fire an additional loss on the surrounding property-owners by falling walls. The ruined walls had been allowed to stand, till, finally, at the beginning of this month, during a severe wind-storm, they fell, crushing out of existence two buildings and their occupants. With this dreadful accident before us, the question "Who was to blame?" has been fresh in every one's thoughts, and the coroner's inquest has been thorough and searching. As a result, the coroner's jury recommended that the City Building Commissioner, the contractor, the architect and the owner all be held to await the action of the grand jury. It seems to be a case where every one's business was nobody's, and a frightful accident has been the result. The idea was to utilize the old walls in rebuilding, a permit having been obtained the very day of the accident. Perhaps the blame has been unjustly laid on four innocent people, but it is high time that it should be made somebody's especial duty to attend to walls made unsafe by fire. That any one of these men was responsible singly for the disaster seems hard to prove, but their combined power must have been sufficient to have hastened the work of demolishing the walls, had it been considered desirable to do so.

Reports as to their safety were of course very conflicting at the inquest. The commissioner says he was legally advised not to touch the walls, as being, by their condition, quite out of his jurisdiction. The owner says he knew nothing about it anyway, and left it to the commissioner, the insurance-adjuster and the architect. The architect says that had the work been pushed on before the occurrence of the severe gale this particular wall with surrounding supports would have been quite safe. The insurance-man says, airily, he had but little to do with the case. At least, however, he considered the north wall so uninjured that he was not willing to allow any damage on it. It simply reduces itself to a matter of dollars and cents. First, the insurance companies, with the spirit which usually characterizes their actions, refused to allow any damage on a wall that was still standing and might possibly be looked upon as safe enough to incorporate into a new building; second, the Building Commissioner, though repeatedly warned by both interested and disinterested parties that the wall was unsafe, though his own knowledge on such subjects must have been sufficient to have made him aware of the fact, was afraid to order it down for fear of a lawsuit on the part of the insurance companies; third, the owner clung to the wall in the hope that he could save himself the expense of a new one, and, fourth, the architect, evidently apprehensive that his client might turn the work over to some less honest architect than himself, failed to insist, as of course he must have known, that this old and perfectly insecure wall, weakened by fire and frost, was not fit to be incorporated into a new building. That a few hundred dollars might be saved to certain individuals, it was considered desirable to risk the safety of this ruin, which, finally, falling, wrought more financial loss than would have been the cost of itself, and crushed out of existence seven innocent beings, men, women and little children, sleeping in their own beds and homes. What especial responsibility the contractor has is scarcely perceptible, but the underwriter, Building Commissioner, architect and owner must have consciences hardened to a most comfortable condition to have been able to allow the matter, as one of them says, to have "passed from his mind." The Chief of the Fire Department seems to be the only man who dares tell the truth at such times, and he, as usual, warned the Building Department that the wall was unsafe. Probably the position of Fire Marshal, as being one surrounded by danger, is not so sought after that the man who fills it need be afraid of making himself unpopular.

Crowding on the heels of this accident comes a much less serious one in the partial collapse of a partly-finished store and flat building on the corner of 65th and State Streets. There workmen were injured and a considerable damage was done to the property. It was one of those buildings with the much-admired corner-turret, and when the crash came it was this corner portion, a section twenty-five feet square, which, with no warning, entirely gave way. The accident is attributed to the defective foundation under the corner pillars. It has been suggested that the foundation became insecure because of sewer-excavations under the portion on which rested the supporting-columns. It has been reported that the sewer-excavations went three feet lower than they should, and the result was the weakening of one of the chief supports of the corner structure. This may or may not have been the case. It is one of the very numerous buildings which has been rushed-up in cold weather, and in all probability the workmanship was not what it should be. A noticeable example has just been given by a West Side contractor who of his own accord has decided to take down an unsafe, frost-heaved brick wall, which undertaking will mean to him a loss of perhaps a thousand dollars. It is to be hoped that the one thousand dollars honestly spent will be a good investment for him.

In view of these accidents, the authorities have notified the officers of the Calumet Club that the ruined walls of their club-house are unsafe and must be pulled down. Neighbors have been warned and the Board of Directors of the Club has drawn up letters asking Superintendent McClaughy and Chief Sweeny to take steps to protect the public. In the meantime one of the building-inspectors says if the building is condemned the city is liable to be sued by the insurance companies.

Chief Sweeny of the Fire Department has also within the last few days sent in a notification to the effect that a temporary structure which is to go by the name of the Hotel Columbia, and is to be used for the accommodation of World's Fair guests, is being erected on entirely false principles, and is certainly insecure. It remains to be seen what action the Building Department will now take in this matter.

It is a relief to turn from these discouraging features in connection with the building interests of our city to the work which is being done in the Art Department of the World's Fair in passing judgment by the jury upon the works of Western artists. Out of nine hundred and ninety-seven works, one hundred and forty-six were accepted, fifty-seven belonging to Chicago artists. The jury was a representative body of American artists, selected from different parts of the country. Three different juries have in charge the works in painting, sculpture and architecture, each jury presiding over its special branch. Of sixty-three architectural studies submitted, twenty were accepted. These were as follows:

Alfred L. Evans, Chicago, fountain to commemorate discovery of America; Gilbert & Taylor, St. Paul, cottage, Manitou Island, Balcony of the Endicott Building, Little Church, St. Paul; Holabird & Roche, Chicago, residence, Grand Rapids, old country building, water-tower, Fort Sheridan; Hash & Plympton, Cincinnati, Cincinnati Crematory; Residence of Mrs. C. A. Plympton; O. C. Rixon, Chicago, Design for suburban residence, general plan, longitudinal section, front elevation, side elevation; Shepley, Rutan & Coolidge, Chicago, Ames Building, Boston, Art Institute, Chicago; Walker & Kimball, Boston and Omaha, residence, Lincoln, Nebraska, main façade Omaha Telegraph Exchange, McCague Building, Omaha, main façade Omaha Public Library; T. O. Frankel, Chicago, a Mountain Home.

The architectural jury consisted of Cass Gilbert of St. Paul, W. S. Eames of St. Louis and D. Adler, S. S. Beman and C. B. Atwood, all of Chicago. It seems a pity that a different kind of exhibition could not have occurred at this time. These twenty studies are doubtless, as to character, a fair sample of what will follow; — pen-and-ink and water-color perspectives of different buildings which will doubtless have some small attraction for the general public. But a set of working-drawings, even if soiled and torn with handling and on the commonest manila-paper, say of one of our great buildings, would be worth double anything of the sort to members of the profession visiting the Fair. Not, of course, that these in themselves would be attractive and beautiful, but of course if such a great fair means anything, its educational feature is one of its strongest points.

COMPARATIVE MUNICIPAL BUILDING LAWS.—XXIV.

[*Note:*—In these tables bracketed letters invariably refer to preceding passages in the same column.]

Fire-Escapes and Stand-Pipes.

Boston:—*a. Every building hereafter built, and every building occupied by more than one family*, shall have, with reference to height, condition, construction, surroundings, character of occupation and number of occupants, one or more safe means of egress in case of fire.

b. School-houses more than one story high, churches, theatres, public buildings, halls, places of assembly and resort, buildings occupied above second story by two or more families, or as tenements, factory or workshop where ten or more persons are employed, shall have at least two independent ways of egress, each accessible from each apartment—one inclosed in brick walls with no interior openings other than doors of apartments for exit, and provided with ventilating skylight operated from lower hall.

c. Ways of egress kept in good repair, without obstruction. Stairway built to meet these requirements may project, by special permit, over public way.

d. Platform, landings and stairway steps of fire-escape strong enough to carry load of seventy pounds per square foot, besides weight of material.

e. Owner or lessee, tenant or person employed in building, or, for public school, any citizen, is entitled to possession on exhibition of certificate of safety issued by Inspector.

Baltimore:—*f. Dwelling-house more than two stories high, occupied or built to be occupied by more than one family on any floor above the first; building more than two stories high occupied or built to be occupied as hotel, boarding or lodging house, factory, mill, office, manufactory or workshop in which are operatives in any story above first*,

g. Shall be provided with such fire-escapes, alarms and doors as directed and approved by Inspector.

h. Fire-escapes kept in good repair, and painted, and without obstruction.

Brooklyn:—(*f*) and *i. Any dwelling more than two stories high, occupied or built to be occupied by three or more families above first story*, shall be provided with such fire-escapes and doors as shall be directed and approved by Commissioner. (*h*).

Charleston:—

Chicago:—*j. Buildings, except those used exclusively for private residences, more than three stories high*, shall be provided with one or more metallic ladders or metallic fire-escapes, extending from first story to upper stories and above roof, on outer walls, in location, number, material and construction determined from time to time by *k.* Commissioner and Fire Marshal.

Buildings over two stories high used for manufacture of combustible articles or material, wherein more than two hundred employés are employed, shall have at least two egress stairways at least 50′ apart.

l. Buildings more than two stories high used for manufacturing purposes shall have one metallic ladder for every twenty-five persons or less employed above second story. Every structure where one or more persons are employed for wages above first story shall be provided with a good fireproof stairway for each 25′ frontage of such structure.

Cincinnati:—*m. Buildings, except those used exclusively for private residences, more than two stories high*, shall be provided with one or more suitable fire-escapes extending from first story to upper stories, and above roof on outer walls, of location, number, material and construction determined by Inspector. (*n.* Or by "fire-escape and smoke inspector," if such is designated by Mayor.)

o. Buildings more than two stories high used for manufacturing purposes shall have one suitable fire-escape or fireproof stairway for every twenty-five persons or less employed above second story.

p. Any structure where one or more persons are employed as workmen or workwomen for wages in trade or occupation shall be provided with sufficient fire-escapes, doors and stairways for escape of employés in case of fire or accident.

Cleveland:—(*m*); (*o*); (*p*).

Denver:—*q. Buildings occupied above second floor above level of street, and*

r. Buildings more than two stories high, occupied in whole or part as tenement, boarding or lodging house, factory, mill, manufactory, offices or workshop in which persons are employed, or as school, shall be provided with one or more metallic ladders and fire-escapes extending from first story to upper stories and above roof, and with platforms in connection therewith at each story above first floor; fire-escape or ladder securely fastened to outer wall, and constructed of material and in manner from time to time determined by Board of Fire Commissioners.

Detroit:—

District of Columbia:—*Buildings constructed or used as hotel, factory, manufactory, theatre, tenement-house, seminary, college, academy, hospital, asylum, hall, place of amusement, more than 50′ high*, shall have affixed iron fire-escapes and combined stand-pipes and ladders, or either, as approved and adopted by Commissioners of District.

Kansas City:—(*q*) by more than one family, and *buildings occupied as tenements, boarding or lodging house, factory, mill or manufactory, offices, workshop, mercantile or other establishment, in which persons are employed above second floor, and schools more than two stories high*, shall be provided with suitable facilities for escape in case of fire, kept in good repair, sufficient for safe egress, in case of fire, of all persons usually employed in or frequenting building.

Fire-escapes authorized by Superintendent on outside of building must not be erected opposite or in front of windows, but

r. May project over highway, and shall have suitable connections with ground and with railed landings at each story above first, and connected with each story by doors or windows, and kept without obstruction.

Louisville:—(*m*), with advice of Fire Chief from time to time. Stairways in *factories, mills or warehouses more than three stories high, and more than 3,000 square feet area*, shall be fireproof.

Buildings more than two stories high used for manufacturing purposes shall have one metallic ladder for every twenty-five persons employed above second story.

Any structure where person or persons are employed shall be provided with sufficient doors, stairways, iron ladder escapes placed on outer walls; and *where persons are employed above first story*, there shall be a fireproof stairway to each 25′ frontage of building.

aa. Buildings over two stories high used for manufacture of combustible articles, and wherein more than one hundred employés are kept at a time, shall have at least two egress stairways, fireproof, and at least 50′ apart.

Memphis:—*Buildings more than two stories high, occupied or built to be occupied by more than two families above first floor, or as hotel, lodging or boarding house having more than fifteen rooms, and*

s. Every factory, mill, office-building, manufactory, workshop, hospital, asylum or institution for care or treatment of individuals, buildings used in whole or part as school or place of assembly, shall be provided with good and sufficient fire-escapes or other means of egress, in case of fire, as directed by (*h*).

t. Inspector.

Theatres, etc.: *u.* There shall be balconies not less than 4′ wide in open space (see "*Construction of Theatres*") or spaces at each level or tier above parquet on each side of auditorium of sufficient length to embrace two exits, and from balconies staircases extending to ground level; maximum riser, 8¼″, maximum tread, 9″.

v. Staircase from upper balcony to next below and from first balcony to ground not less than 4′ clear.

w. All balconies and stairs, including floors, of iron throughout and of ample strength.

x. Where one side of building borders on street there shall be balconies of like capacity, with stairways carried to ground, all constructed of fireproof material and approved by Inspector.

Milwaukee:—(*p*) *Buildings more than two stories high not exclusively used for private residences, designated by Inspector, Chief of Fire Department and Board of Public Works*, shall be provided with one or more metallic ladders or metallic fire-escapes extending from first story to upper story and above roof on outer wall, in location, number, material and construction as determined by Inspector, Chief of Fire Department and Board of Public Works; such ladders or fire-escapes to be convenient of access from interior building, with balcony or other safe and convenient resting-place on level with floor of each story.

Minneapolis:—*Places of amusement and instruction.* (*u*).

y. Staircase from upper balcony to next below width not less than 30″ clear, and from first balcony to ground not less than 4′ clear. (*w*); (*x*).

Nashville:—*Buildings where any story above second is used specially and distinctly as hotel, tavern, factory, tenement, school, academy, place of general meeting, or for theatrical or operatic representation*, shall have escapes attached.

Buildings in which persons sleep, work or live above second story not classed above, and houses of general meeting or for theatrical and operatic performances, even in second story only, when Commissioners shall determine, upon inspection, that means of egress are not reasonably sufficient for occupants to escape in case of fire, they shall order fire-escapes attached to building, all fire-escapes subject to approval of Commissioner as to number, location and construction.

Newark:—

New Orleans:—

New York:—*Dwelling-houses more than two stories high, occupied or built to be occupied by more than one family on any floor above first, and buildings more than four stories high, occupied or built to be occupied by more than two families above first floor, and buildings more than three stories high, used as hotel, lodging or boarding house, having more than fifteen rooms*, and (*s*) Superintendent of Buildings.

(*h*); (*u*); (*y*); (*w*); (*x*) (*i. e.*, Superintendent).

Omaha:—(*j*) by Superintendent and Chief of Fire Department. (*l*); (*h*).

Buildings occupied above second floor from level of street by more than one family, and boarding and lodging house, factory, mill, manufactory, offices, workshops in which persons are employed above second floor, school-buildings more than two stories high, and accommodating forty or more persons, shall be provided with facilities for escape approved by Superintendent and Fire Chief.

Fire-escapes on outside of building shall have suitable connection with ground. Stairs on outside of building when ordered by Superintendent. (*r*).

Buildings in which operatives are employed above second story shall be provided with fire-escapes approved by Superintendent and Fire Chief.

Women and children shall not be employed above second story unless two or more exits are provided.

Public halls (*u*), but length not limited (*y*). All to be constructed of fireproof material approved by Superintendent.

Public halls accommodating 1,000 or more shall have at least one fire-escape and stand-pipe in street or alley outside building from ground to roof, with hose attachments close to window or door at each floor or gallery.

Philadelphia:—

Pittsburgh:—

Providence:—*Buildings in which twenty-five or more operatives are employed in any stories above second* shall be provided with proper and sufficient, strong and durable, metallic fire-escape or stairways, constructed as required in this act, unless exempted by Inspector. (*h*), (*aa*), or, if that distance is not practicable, have stairway at each end.

St. Louis:—*Buildings used or intended to be used as hotel, factory, manufactory, theatre, tenement-house, seminary, college, academy, hospital, asylum, place of amusement, 40′ or more high*, shall have iron fire-escapes and combined stand-pipes and ladders, of pattern approved by Commissioner of Public Buildings, who may designate location and give certificate of approval.

Within sixty days after notice from Commissioner, *buildings used as place of public resort, factories more than two stories high employing thirty or more persons, office, store and business buildings wherein more than fourteen are employed above second floor, school, asylum and hospital buildings, tenement buildings more than two stories high occupied by more than ten families*, shall have built on exterior front and sides, when practicable, permanent and substantial iron balconies at each and every floor 10′ or more above sidewalk level, with iron stairs at each end leading from one balcony to the other.

Hotels, public boarding and lodging houses over three stories high shall be provided with permanent iron balconies with iron steps leading from one balcony to the other at ends of halls above first story, or at such other practical places, and of number, location and construction as Commissioner of Public Works may direct. He may dispense with balconies if he thinks other means of escape to be ample.

San Francisco:—*Buildings three or more stories high used as hotel, boarding or lodging house, any factory, mill, manufactory or workshop*, shall be provided with good and sufficient means of egress in case of fire.

Buildings in which operatives are employed above first story shall have metal fire-escapes.

Fire-escapes shall be kept unobstructed, and extend from first story to four feet above roof.

Women and children shall not be employed above second floor of any factory, shop or printing-office unless there is more than one means of exit.

Wilmington:—

Compiled by HENRY A. PHILLIPS.

MOREAU-VAUTHIER.

Lid of a XIV Century Casket.

WITHIN a few weeks France has lost three of her most distinguished artists — Gauvin, Galland, and now Moreau-Vauthier, the sculptor. Galland was one of the first, if not absolutely the first, of decorative painters; Vauthier was certainly as great at decorative sculpture. He began life in the workshop of an ivory-carver, his own father. Here he became familiar with that substance and perhaps instinctively drank in a desire which he carried out later on, that of reproducing the chryselephantine sculpture of the Greeks. But his first medal, gained when he was only twenty-four years of age, was for a coffer, and a richly decorated Gothic altar. Guided by Toussaint, Vauthier became an ornamental sculptor — an *ornemaniste* pure and simple. The churches of St. Bernard and St. Joseph, the Hôtel de Ville and the Tuileries were

the scenes of his early efforts; at the "Union Centrale" exhibitions multitudes of casts of his works have been on view from time to time, side by side with decorative panels by Galland; and a visit to the Musée des Arts Décoratifs will satisfy the most captious critic that both artists were the equals of the great masters of the Renaissance.

Moreau-Vauthier worked in marble and in bronze. His "Jeune Faune" and his "Pascal, enfant" must be remembered by all visitors to the 1889 Exhibition in the Champ de Mars for their grace and vigor. "La Peinture," "Junon," "Une Bacchante," and "La Florentine," are also among the *chefs d'œuvre* of the sculptor. But it was "La Minerve," made for the Duc de Luynes, in the 1855 Exhibition, which inspired Vauthier to emulate the great creations of Phidias, and to reproduce, not a modern Athena of the Parthenon, or a Zeus of Olympia, but little statuettes and life-size busts, in the same materials, ivory and gold, which should have all the characteristics of the national art. He tinted the ivory, he clothed it in gold and silver, and decorated it with jasper and onyx, with enamel and precious stones — all in the greatest taste, with sobriety and refinement. What might have been an atrocious vulgarity under some hand was, under his, an example of elegance and perfect taste. Simart and Duponchel had paved the way in the "Minerve"; Moreau-Vauthier and Lucien Falize perfected the revival of the art in their "Gallia." Although France is the land of modern sculpture of a high order, she cannot afford to lose any of her children. A visit to the Luxembourg Museum will show us how great this last loss is to the world of art.

S. Beale.

REYNOLDS'S INSTRUCTIONS FOR ERECTING AND TESTING LIGHTNING-CONDUCTORS.[1]

MAYOR'S CHAIR.
DEAL. ENG. des. by M. P. BURKE.

1. *Position of Conductors.*— The angles and prominent features of a building being the most liable to be struck, lightning-rods should be fixed on gable ends, chimneys, turrets, etc., and they should be connected together by continuous conductors along the ridges.

2. *Height and Spacing.*— Lightning-rods should be about four feet high, and spaced at intervals not exceeding fifty feet, so that no point of the building is more than twenty-five feet horizontally from a lightning-rod.

3. *Specification of Material.*— The metal to be exclusively employed for the construction of new lightning-conductors is copper tape. A conductivity of at least ninety-five per cent of that of pure copper should be specified; and the tape should be soft and flexible, so as to admit of its following closely the outlines of the building. Copper tape 1″ x ⅛″, weighing about half a pound per foot run, is the most suitable size for all ordinary conductors, and 1½″ x ⅛″ may be used for very high chimney-shafts. In order that copper tape of long lengths, without joints, may be obtained, all future supplies for the use of this department will be obtained through the India Store Department.

4. *Protection from Theft.*— In situations where copper tape is liable to be stolen, it may be let into the walls of the building and cemented over, or otherwise concealed where it is accessible. The practice of protecting the lower portion of copper conductors on buildings by enclosing them in iron pipes at the base of the building is questionable.

5. *Earth-connections.*— In order to guard against those accidental defects and disarrangements to which conductors are liable, buildings provided with lightning-conductors should have, as a rule, at least two earth-connections, the conductors leading to them being connected at the base of the building either above the ground-line, or by a conductor under ground forming a "surface" earth.

Each lightning-rod should be connected direct to earth by the shortest path outside the building, and, when practicable, it is well to carry the conductor down that face of the building which is most exposed to rain. In the case of gabled buildings, the conductor should be taken down the barge-courses in preference to the gable, so as to protect the angle of the building.

6. *Earth-coils.*— When the level of water or permanently wet soil lies within a few feet of the surface, the conductors should terminate in earths offering each about eighteen square feet of external surface. These may consist of copper plates about 3′ x 3′ x $\frac{1}{16}$″, rivetted to the ends of the conductors and buried in water or permanently wet soil from fifteen to twenty-five feet from the building. A better plan, however, is to coil the end of the conductor spirally on a wooden frame, the external diameter of the coil being four feet, with six-inch intervals between the turns. About thirty-three feet of tape is required for this earth-connection; it obviates the necessity of any underground joint, taps a larger surface of earth, and, the tape being twice the thickness of the plate, it is more durable, besides being a cheaper arrangement.

7. *Wells.*— When the permanent water-level is deep, it may be necessary to sink special wells for the earth-plates, which should be of the same size as those specified in the previous paragraph. The wells should be carried down several feet below water-level in the driest seasons, and the bottom part of the well should be built dry.

If coils of copper tape, however, be employed for earths, special wells are not necessary, because, there being no joints underground, the necessity for visual examination, periodically, no longer exists. In this case, the earth-coils may be buried at the bottom of a pit sunk below the level of permanently wet soil.

Where the depth is considerable, two or more conductors may be connected to the same earth-plate, and, in the case of a coil of tape, the inner as well as the outer end may be brought up to the surface of the ground so as to form two earth-connections. In both cases, the size of earths should be made proportionately larger.

8. *Surface-earths.*— In addition to these deep earths, it is necessary to provide surface-earths laid in trenches from one foot deep in clay soils to two feet deep in sand or shingle, through which the rain percolates more freely.

These surface-earths may consist of that portion of the conductor which leads from the base of the building to the well or deep earth, or they may be arranged as separate conductors led in trenches away from the building. In the latter case, the deep and surface earths should be connected together with a conductor carried round the base of the building.

The length of each surface-earth trench may be from twenty-five feet in ordinary soil to fifty feet in dry soil, and the width at bottom should be about nine inches. A few inches of powdered charcoal should be spread both above and below the conductor, and the trench filled-in with light soil. Any rain-water down-pipes may, with advantage, be led into these trenches.

9. *Sea-earths.*— In the case of buildings near the sea, good earths can be obtained by laying a length of tape so that at least five square feet of it shall always be under water; or a coil of tape may be buried in permanently wet sand.

When the distance to the sea is considerable, these earths should be supplemented by surface ones round the building, so as efficiently to tap any induced charge in its vicinity.

10. *Iron Pipes.*— Iron water-pipes, etc., form good earth-connections. Soft-metal pipes and gas-pipes should not be used, but, when they run close to the conductors from a building, they should be connected to the lightning conductor or system. There are many recorded instances in which both water and gas pipes have been damaged by lightning springing onto them from neighboring conductors, which would have been obviated if they had been connected thereto.

11. *Dry and Rocky Sites.*— In extremely dry or rocky situations it is almost impossible to obtain good earth-connections, except at a great distance. In such cases, the best plan to adopt is to bury several hundred-weight of old iron at the foot of the earth coil or plate in the mass of coke or charcoal, leading any rain-water pipes or drains so as to discharge into it.

12. *Coke, Charcoal, etc.*— Coke, charcoal or smith's ashes will be found very suitable for improving the earth-connections of lightning-conductors. A layer of about three inches should be spread both below and above the conductors in the trenches, and also round the earth plates or coils.

13. *Flag-staff Earths.*— The earth-connections of flag-staffs near magazines should be led in a direction away from the building. Should, however, the horizontal distance between the flag-staff and the nearest lightning-rod on the magazine be within fifty feet, or should any portion of the building be within the cone protected by the flag-staff-rod, then the magazine and flag-staff earths may be connected, or have an earth common to both. This rule is also applicable to shafts of powder-mills, etc.

14. *External Masses of Metal.*— Rain-water pipes and gutters should never be utilized as a portion of a system of lightning-conductors, to which, however, they should be connected. All external masses of metal, such as copper sheeting on magazine-doors and ventilators, etc., should also be connected to the nearest conductors by lengths of copper tape.

In the construction of magazines and other buildings in which the manipulation of explosives is carried on, the employment of external masses of the metal should be avoided as far as possible.

15. *Lines of Rail, etc.*— Lines of rail near buildings protected by lightning-rods should be connected to earth direct on both sides of the building, and when the line is carried inside the building it

[1] Reprinted from *Indian Engineering.*

should be connected also to the system of lightning-conductors. Iron railings round magazines should be connected direct to earth at intervals of about fifty feet.

16. *Internal Masses of Metal.* — All large and long masses of metal, such as beams, girders, pipes, water-systems, and large ventilators fixed in the interior of the buildings, should be electrically connected with the earth as well as with the conductor; but soft-metal gas-pipes should never be used as conductors, and the lightning-conductor should be kept as far as possible from them, and also from all internal gas-pipes.

17. *Fixing Conductors.* — Lightning-conductors should not be insulated from the buildings to which they are attached. The copper tape should be laid on the ridges and walls, and secured by suitable fastenings screwed or nailed to the building. The hold-fast should be of copper or gun-metal, fixed by nails or screws of hard copper; and they should allow for expansion and contraction, at the same time preventing all the weight falling on any one bearing.

18. *Metal Roofs.* — Buildings with zinc or galvanized roofs should be protected by copper conductors laid over them, but protected from actual contact by strips of wood, paint or tarred felt. The zinc roof itself should be treated like any other external mass of metal, and should be thoroughly well connected to the conductors in several places. The system, sometimes adopted, of having sheet-zinc lightning-rods and copper tapes from the eaves of the roofs to earth is very unreliable, because the lightning-rods are of ineffective section, the zinc sheets are insulated from one another by a layer of oxide, and the joint between the zinc and copper is liable to failure.

19. *Chimney-shafts.* — Chimney-shafts should be protected by a ring of copper tape $1\frac{1}{2}'' \times \frac{3}{16}''$, placed round the outside of the top of the cap and a few inches below it, having stout copper points projecting one foot above the top of the shaft at intervals of two or three feet all round. Copper tapes should be carried down on opposite sides of the shaft to earth from the ring; and these conductors should be connected at the base, a test-joint being added to enable the continuity of the conductors and the state of the earth-connections to be ascertained when necessary.

20. *Joints in Conductors.* — Metallic continuity should be insured at the joints of all conductors. The conductor should, therefore, if possible, be made up in one continuous piece, of the proper length, before it is sent out to be erected. The joints between copper tapes should be made by close rivetting, and should be carefully brazed and painted over. When brazing is impracticable, as when it is necessary to make a joint *in situ*, the joint should be rivetted as before and imbedded in a mass of solder. In rivetting copper plates, five rivets should be used, and the holes should be bored, not punched; the "arris" being removed and the surfaces brightened with emery, the joint should be brought together with a hollow punch before rivetting.

21. *Joint between Lightning-rod and Conductor.* — The connection between the lightning-rod and the conductor should be made by means of a slotted clamp similar in design to those employed for test and other joints. The lightning-rod should terminate at its lower extremity with a $\frac{3}{4}''$ bolt, screwed into the clamp, and thereby making firm contact with one or more tapes inside it. The conductor should also be brazed or soldered to the clamp as described in the preceding paragraph. The lightning-rod should, if possible, be sent out connected up with the conductor, ready for fixing.

22. *Repair of old Conductors.* — For the repair of old lightning-conductors, however, it may sometimes be necessary to use solder. For copper, the solder usually employed consists of equal parts of tin and lead, which has a resistance nearly ten times that of copper. The surface of the joint should, therefore, be not less than $1\frac{1}{4}$ square inches.

Molten zinc should be used for soldering iron conductors. Being nearly twice as conductive as iron, the surface of the joint need not necessarily exceed that of the cross-section of the conductor.

In both cases, the joint should be put together previously by screws or rivets, and the soldered joint, especially in underground work, should be carefully protected from galvanic action by tarred tape.

23. *Connecting Wire Rope to Copper Tape.* — Existing iron-wire rope-conductors may be connected to copper tapes in the following manner: Take a piece of sheet-copper $4\frac{1}{2}'' \times 3'' \times \frac{1}{8}''$, and have one side tinned; cut it down at one end to the size of the tape for a length of $1\frac{1}{2}''$, and rivet the tape to the sheet at this part; then bend the remainder of the sheet round the end of the rope, which should have been previously frapped with fine wire, thus forming a tube with the tinned side inwards. Sweat up the joint with zinc solder, and protect it by tarred tape bound tightly over it.

24. *Connection to Iron Water-pipes.* — Copper-tape conductors may be connected to iron water-pipes laid underground by filing about a foot of the top of the pipe bright, binding the tape onto it by wire, and soldering with zinc; or a short length of iron bar $2'' \times \frac{1}{2}''$ may be rivetted and soldered to the copper tape, and then bolted to the flange of the pipe by $\frac{1}{2}''$ screws passing through both the bar and the flange.

It is a good plan to coil several turns of the copper tape round the pipe (keeping it from actual contact by slips of wood) previous to fastening the end, so as to increase the earth-connection should the joint ultimately fail. The greatest care must in all cases be taken to protect the joint from galvanic action, by layers of tarred rope, or by imbedding the joint in cement.

25. *Expansion of Conductor.* — The variations of temperature produce an expansion and contraction in copper conductors which should be provided for by allowing the conductor free play through the hold-fasts employed to fix it to the building, and by leaving a small loop of the tape in some portion of its length. Conductors should never be screwed or nailed down. Vertical conductors on shafts, flag-staffs or high walls should have small loops above every second or third hold-fast, to take the weight off the conductor while still allowing for expansion and contraction. The hold-fasts in this case should be about four feet apart.

26. *Conductors not to be tampered with.* — In carrying out repairs to buildings, maistries and coolies must be specially warned never, under any circumstances, to disconnect, move or tamper with any portion of a lightning-conductor unless specially ordered to do so, and then only under the supervision of the officer in charge of the work.

27. *Records of Conductors.* — Records of all lightning-conductors should be kept in every divisional office, and should contain as many of the following particulars as possible:

(*a*) Date of erection or reconstruction.

(*b*) Character of soil or sub-strata, and depth of permanent water-level or wet soil.

(*c*) Full particulars of lightning-rods, conductors and earth-connections, nature of joints and connections, etc.

(*d*) Details of all external or internal masses of metal entering into the construction of the building, and how connected to conductors.

(*e*) Positions of test-joints, if any. Nearest earth available for testing, etc.

(*f*) In case of magazines, etc., quantity of powder, etc., usually kept in store.

(*g*) Date of last inspection, and *précis* of former tests, suggestions, etc., of inspecting officer.

(*h*) In case of buildings not under the immediate charge of the Public Works Department, name or title of person to whom notice of inspection should be sent.

28. *Periodical Inspection.* — Lightning-conductors should be inspected and tested once a year, and a report drawn up showing the result of such inspection.

29. *Electrical Tests.* — The object of electrical tests of lightning-conductors is to determine the resistance of the earth-connections and to localize the position of any defective joints or connections in the conductors. The resistance of a conductor itself is quite inappreciable (less than $\frac{1}{4}$ ohm per 1,000 yards for copper tapes $1'' \times \frac{1}{8}''$), and cannot be detected by the testing-apparatus usually employed. The resistance of the earth depends on the nature of the soil and its state of moisture at the time of test. As a rough guide, however, it may be mentioned that the joint resistance of two earths such as those described in paragraph 6, thirty yards apart in wet soil, will not exceed two ohms, and the greatest resistance offered by any earth must not exceed ten ohms.

30. *Defective Joints Localized.* — The resistance of the conductors from summit to ground-line, or to that part of the conductor from which the resistance of the earth-connections is ascertained, should, therefore, be practically *nil*. Any resistance in excess of that of the battery and leads must be due to defective joints, and the faults should be localized and marked for repair; and to enable this to be done test-joints should be added to all conductors.

31. *Conductors made in short Lengths.* — Conductors made in short lengths and connected by joints must have their metallic continuity insured by soldering or a good system of rivetting, and the joints, when tested electrically, must give no resistance. Underground joints and earths the nature of which is not known should be dug up and examined when practicable.

32. *Test-joints.* — Where the system of lightning-conductors has more than one earth-connection, it is necessary to introduce test-joints to enable the resistance of each earth-connection to be ascertained separately. These joints consist of a slotted clamp to which the two portions of the tape are attached by bolts.

Where the cross-connections between conductors or external masses of metal are few, these joints can be inserted in these cross-connections; but where the system of conductors is complicated, they must be placed on the conductors themselves, the object to be kept in view being that by means of the test-joints it shall be possible to isolate each earth separately for purposes of testing.

They must, therefore, be placed in convenient positions, so that the conductor can be disconnected without difficulty when required.

After the tests have been completed, the test-joints must be carefully re-made, the contact surfaces thoroughly cleaned with emery and brought into intimate contact with the bolts. The joint should then be covered with waterproof tape and painted over. When the joint has been completed it should be tested for metallic continuity. A space should be formed or left behind the joint to allow the tape to be passed round the conductor.

Single conductors without cross-connections to metal down-pipes or gas or water pipes do not need test-joints.

33. *Test-leads.* — In order to test the continuity of conductors fixed to inaccessible places, such as flag-staffs, chimneys or steeples, an insulated test-lead must be led up the flag-staffs or other erection, and at its upper extremity attached and soldered securely to the lightning-rod above its junction with the conductor. This lead should be of Hooper's core, metal (lead) covered, resistance not to exceed ten ohms per mile.

34. All lightning-conductors on public buildings should be brought, as far as possible, into conformity with these rules; but existing arrangements may generally be allowed to stand, provided care be taken to improve defective earth-connections and to make good all joints.

SOCIETIES

AMERICAN INSTITUTE OF ARCHITECTS.

THE unexpected and much-to-be-regretted resignation of Mr. Dankmar Adler from the office of Secretary of the American Institute of Architects made it incumbent upon the Board of Directors to assume a responsibility which has never before fallen upon them, and, as a result of their deliberations, I have been selected to fill the office for the current year, and have undertaken its duties with a full sense of the grave responsibilities which it involves.

As this year is to be marked by the opening of the Columbian Exposition, an event which will bring to these shores many foreigners, and will be marked by the holding of an International Congress of Architects in Chicago, it is hoped to make the next convention and this Congress one worthy of the occasion, and to devote it principally to the reading of short papers relating to the design, construction and decoration of the Columbian Exposition buildings and grounds, and to visits to the Exposition. I am therefore requested by the President to call your attention to the importance of a large increase in the membership of the Institute, in order that our society may be in reality the representative body which it should be and only can be by enrolling as members a large majority of the architects of the country, whose professional lives conform to the definition of an architect as contained in Sec. 3, Art. III of our Constitution, and whose conduct is in accordance with Sec. 4 of the same Article.[1]

In order to increase our membership, this appeal is made to you as an active professional member of the Institute, and as a member of a Chapter in the Institute, to ask you to do all in your power to further this object by individual effort and by adopting active measures within your Chapter.

Mr. Richard M. Hunt, in his most admirable annual address, delivered at Cincinnati in 1889, upon the eve of the consolidation of the American Institute of Architects and the Western Association of Architects, expressed his views of the importance of the Chapter as a factor in the life of the Institute, and forcibly asserted that "the Institute depends upon the Chapters for its very life-blood, and could not exist any more than the body without its members if the Chapters were not alive and active. Chapters should therefore be strong in membership and earnest in work, perfecting every suggestion for the advancement of the profession, considering and furthering all educational and helpful methods, and bringing to the conventions of the Institute all matters accomplished and under consideration that may be of interest to the profession at large.

"The practising architect, from the very diversity of his duties and requirements, gains largely by constant intercourse with his *confrères*. The interchange of ideas and personal experience is of inestimable benefit to him and to his clients; in fact, it should be the self-protective duty of every architect to belong to one of the Chapters. I would here suggest that too often young men, fresh from study, in the fire of ambitious enthusiasm, but yet untaught by stern lessons of experience, are eager to establish new leagues, associations, socities and clubs, rather than affiliate with established institutions and reap the profit of proved effort.

"A little reflection would teach them that the older institutions have formulated those rules and regulations, those principles of art and practice, which have elevated the profession in America to its present honorable standing; that through the insistent and *persistent* course of the Institute for the rights, for the dignity and for the position of architecture as a fine art, so long ignored in this country, they have, through precedents created for them, been spared some fierce contests.

"Let them, rather, profit by the paternal care of the Institute as their adviser and advocate, stretching forth with the strength and vigor of new inspirations to reach the ideals of its standards, taking for the underlying principle mutual assistance and coöperation in the more familiar intercourse of the Chapters."

Whatever doubts may have been entertained as to the wisdom of consolidation have long since been dispelled, and now we realize the need of a larger constituency; and as it is only by Chapter growth that the Institute can increase its membership,—as no person is eligible to membership in the Institute unless he is already a member of a Chapter,—it is recommended that the Chapters at once take active steps to bring into fellowship all who are eligible within their territory, making such changes in their by-laws, if any are required, by which those who live at so great a distance from their usual place of meeting as to prevent their attendance at Chapter meetings shall have their dues reduced or entirely abated.

It is also urged upon the Chapters that if, in their judgment, new Chapters could be advantageously formed in their own State or vicinage, that the officers of such Chapters constitute themselves a committee to urge the formation of new Chapters, and to call upon the Secretary of the Institute to aid them in their work.

While it is not deemed best that the Secretary make perfunctory tours through the country at the expense of the Institute, it is considered a part of his duty to go where his presence will aid in forming new Chapters or fostering the work in Chapters already formed, and when notified that his presence is desired he or a deputy will be sent to render the desired service.

It is now felt that the formative period of the Institute is passed, and it is hoped and expected that the large body of young men who have grown up since its formation, and who are unconsciously reaping the great advantage of the missionary and formative work which has already been done, will now come forward and swell its ranks, take a more active part in its management, infuse into it a new and higher life, and bring to it not only the work of the pencil but enrich it by discussions and the presentation of the new problems which afford constant opportunities for such papers, the lack of which has of late been frequently remarked.

It is also desired that some plan be formulated to put into practical form a scheme for mutual defence, which has been considered by many members of the profession one of the imperative duties of the Institute.

To bring about these and many other needed reforms, the first step is the increase of numbers, and the next and not less important is that every member "lend a hand" and assist by positive work to make himself felt as a factor in the upbuilding of the Institute, and as a necessary sequence secure a mighty increase in the influence and power of the profession of architecture in shaping the future of this country, which affords an unprecedented opportunity for architectural development and growth.

ALFRED STONE, *Secretary.*

[1] ART. III, SEC. 3. The status of an architect is hereby defined as follows: An architect is a professional person whose occupation consists in originating and supplying artistic and scientific data preliminary to and in connection with the construction of buildings, their appurtenances and decorations; in supervising the operations of contractors therefor, and in preparing contracts between the proprietors and contractors thereof.

SEC. 4. No member shall accept direct or indirect compensation for services rendered in the practice of his profession other than the fees received from his client.

ILLUSTRATIONS

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

THE CAPITOL AND STATE BUILDINGS, HARRISBURG, PA. ROBERT MILLS, ARCHITECT.

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

THIS State-house was erected between 1819 and 1822, under the supervision of Stephen Hill.

HALL IN THE HOUSE OF N. POULSON, ESQ., LONG ISLAND, N. Y.

SEE article "A New Fireproof Construction," elsewhere in this issue.

MODEL SHOWING METHOD OF FIREPROOF CONSTRUCTION DEVISED BY MR. N. POULSON.

SEE article elsewhere in this issue.

HOUSES FOR CHARLES E. PALMER, ESQ., ON JEFFERSON AVE., BROOKLYN, N. Y. MR. OTTO J. GETTE, ARCHITECT, NEW YORK, N. Y.

HOUSE ON LANARK ROAD, BOSTON, MASS. MR. EDWARD LITTLE ROGERS, ARCHITECT, BOSTON, MASS.

THIS house is on the southwest side of Lanark Road, quite near the Beacon Boulevard, and in the beautiful Aberdeen district. The lot has a frontage of 95 feet, and an area of 9,484 square feet. The house is built of stone, first story, and is shingled above, and is thoroughly well finished throughout. Large, light, sunny rooms, and an abundance of closets, fitted with all modern conveniences. The dining-room has panelled wainscot and panelled ceiling, and is finished in quartered oak. The hall has panelled wainscot and is finished in quartered oak. The library has bookcases and is finished in butternut. Careful attention has been given to the plumbing.

HOUSE OF A. SCHWARZMANN, ESQ., SHELTER ISLAND, N. Y. MESSRS. WAIT & CUTTER, ARCHITECTS, BOSTON, MASS.

BUILDING AT THE CORNER OF KINGSTON AND ESSEX STREETS, BOSTON, MASS. MESSRS. WINSLOW & WETHERELL, ARCHITECTS, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

TOWN-HOUSE, BOLSWARD, HOLLAND.

THIS plate is copied from *La Construction Moderne.*

COMPETITIVE DESIGN FOR ST. LUKE'S CHURCH, WINNINGTON, ENG. MESSRS. EDEN & WILLIAMS, ARCHITECTS.

THIS plate is reproduced from the pages of the *Builder.*

COURTS-OF-JUSTICE, FRANKFORT-ON-THE-MAIN, GERMANY.

THIS plate is copied from *Zeitschrift für Bauwesen.*

SCHLOSS PFLUGENSBERG, NEAR EISENACH, GERMANY. HERREN L. NEHER & A. VON KAUFFMANN, ARCHITECTS, FRANKFORT-ON-THE-MAIN, GERMANY.

THIS illustration is copied from *Architektonische Rundschau.*

UNIVERSITY COLLEGE, LIVERPOOL, ENG. MESSRS. ALFRED WATERHOUSE & SON, ARCHITECTS.

AMONGST the notable developments of recent years is to be counted the creation of the Victoria University. Few who, some years since, watched the beginnings of the Owens College, in Manchester, would have ventured to predict its association with the colleges of Liverpool and Leeds as one great modern university carrying on its educational functions in the three splendid groups of buildings which are known as the Yorkshire College at Leeds, the Owens College at Manchester and the University College at Liverpool. The Liverpool College will probably be largely extended by the erection of further buildings, which will complete one great central quadrangle; but for the present building operations are over, and the long frontage to Brownlow Hill will practically afford a complete exterior presentment of the college buildings for all time. By the courtesy of Principal Rendall we are enabled to give some realization of the picturesque aspect of the college from sketches made on the spot, just before the buildings were officially opened by Lord Spencer.

Practically the Liverpool University College buildings have been created by the munificence of her citizens in their private capacity, which was lately recognized by a great statesman as a striking characteristic of the city. The Queen has shown a special interest in this great educational development in the north by a contribution to the funds, as recently announced by Mr. Bryce, Chancellor of the Duchy of Lancaster, whose name will always be associated with the two colleges of Manchester and Liverpool.

The New Victoria Building of the University College is, in the words of the inscription engraved upon the south front, "Raised by men of Liverpool, in the year of our Lord 1892, for the advancement of learning and the ennoblement of life." The western wing of the building which adjoins the Engineering block, erected at the cost of Sir Andrew Walker, Bart., and is separated from it on the ground-floor by a wide carriage archway with a groined roof, leading into what will be eventually the inner quadrangle of University College, contains the Tate library, and is, to quote another inscription, "The Gift of Henry Tate." The most noticeable feature of the southern elevation is the Jubilee Tower, which rises over the central entrance and bears on its four sides the explanatory legend, "*Victoriæ Reginæ Dei Gratia L. Annos Feliciter Regnanti Cives Posuerunt.*" The clock and bells, which occupy the upper stage, are the gift of Mr. Hartley, and the face of the former, as well as the Latin inscription, is executed in glass mosaic, in which gold and blue tones predominate. The exterior generally is of ordinary selected local bricks with red terra-cotta dressings. This treatment is further relieved in the library wing by bands of red Ruabon brickwork. The east end of the building has a special individuality of character from the round or rather polygonal form suggested by the internal requirements, for this portion of the accommodation is occupied on the upper floor by a large semicircular theatre with raised seats, which can be adapted either to the purposes of an audience or the more special requirements of an examination, in which case isolated desks and chairs take the place of the rows of seats.

The central entrance leads into a vestibule which lies within the four walls of the tower and gives access to the great hall, a large chamber two stories in height with an apsidal termination at the east end, separated from the staircase by a range of arches which form a kind of aisle on the southern side. This hall, which is sixty-eight feet long and thirty feet wide, is lighted by tall mullioned and transomed windows on the north wall, and is lined with "Burmantoft's" faïence, a material which also forms the mural decoration of the principal staircase. The great hall extends upwards to the level of the first-floor ceiling, and it is a special feature of the first-floor corridor that it is formed into a balcony overlooking the hall, resembling the triforium of a church. East of the hall, in the portion of the building which is placed under the large theatre, lie the students' common-room and reading-room. On either side of the vestibule are the clerk's and the porter's respective rooms, while the long corridor (100 feet in length) which leads from the hall to the engineering block has classrooms on the north side and professors' private rooms upon the south.

The first floor, which may be reached either by the principal staircase or by two secondary flights, one near the western archway and the other in the northeast angle, contains more class-rooms (the largest of which is forty-three feet by twenty-two feet) and one or two professors' rooms. Over the archway comes a reading-room, connected with the senate-chamber, which latter is twenty-seven feet square and has a bay-window overlooking the street. These apartments are part of Mr. Tate's gift, for his liberality extends not to the library proper alone, but to the whole block of building in which it is placed. The senate-room has a dado, ceiling and floor of oak, and testifies to the donor by the H T monograms on the corbels of the ceiling-beams. As the east end of the ground-floor was given up to the comfort of the male students, so the first floor is dedicated to the ladies, who here have a common-room and a reading-room for their special use. In the former there is a range of faïence columns supporting the curved wall of the theatre above, and the room is further distinguished by having a walnut chimney-piece, the carving on which is executed by Miss Gordon.

The conspicuous turret at the southeast corner contains a circular staircase, which, though starting from the ground-floor, does not communicate with the first floor, but passes on to give access to the upper seats of the theatre — the intention being that when the public are admitted to any performances in this auditorium they should have a means of admission to their seats without passing through the college-rooms. This stair is a fine example of spiral concrete stepwork, and has a striking effect seen from below.

The second floor is not of less importance than the floors below, for it contains the lecture-theatre, which seats 500, and the library, which will hold 80,000 books. The theatre, which is a semicircle in form, has a radius of thirty-nine feet, and the floor-space of the library measures no less than 102 feet by 49 feet.

The entrance to the library is through a vestibule lying just off the principal staircase, in which is fitly placed a bust of Mr. Tate by Alfred Gilbert, R. A., and a tablet which commemorates the gift. There is another piece of sculpture in the building, viz, the statue of Mr. Christopher Bushell, the first vice-president, by Mr. Bruce Joy, which finds its place in the apsidal portion of the great hall. To return to the library: the book-shelves are arranged so as to project from the outside walls, that is, to stand transversely across the room, leaving a central passage (which in days to come, when books are multiplied, will be gradually encroached upon by an extension of the shelves), and dividing the sides of the library into bays some twelve feet wide. On the south side the recesses of the aisle alternately have sloped roofs and open mullioned lights connecting with the main nave, or run up into dormer chambers planned for the storage of books. All the visible joinery in this room is of oak, and there is an open-timber roof of wrought pitch-pine. Beyond the library is the librarian's room, and beyond that again a snug retreat for special readers, who will be provided, as will also the general readers, with every luxury of library furniture.

Again ascending, we find the third floor mostly occupied by the upper part of the library and the lecture-theatre, for the former has an extensive gallery lined with shelves, and three large gable recesses fitted up as book-stores. What remains of the story is given up to the requirements of art. There are also, it should be mentioned, some art-studies on the floor below, so that this department is not meanly housed.

The building is fireproof throughout, the floors being of concrete, on an iron framework. Messrs. A. Waterhouse & Son are the architects, the design having been prepared by Mr. A. Waterhouse, R. A., in 1888, from which year the contract dates. This description and the accompanying illustrations are copied from the *British Architect.*

SHOPS, MOUNT STREET, GROSVENOR SQUARE, W., LONDON, ENG. MR. T. E. COLLCUTT, ARCHITECT, LONDON, ENG.

ALTHOUGH Britons have for a long period formed a nation of shopkeepers, it must be admitted that the conditions of trade are not auspicious for any one who is eager to impart architectural qualities to a shop. It is easy to perceive in the illustration we publish where Mr. Collcutt was hampered, as well as what could be done if there was less faith in the virtues of immense sheets of plate-glass and prominent signboards or fascias among London shopkeepers.

MIDDLE-CLASS FLATS, GRAHAM ROAD, HACKNEY, E., LONDON, ENG. MESSRS. ESSEX, NICOL & GOODMAN, ARCHITECTS, LONDON, ENG.

THE illustration shows the block of flats now in course of erection. They occupy a site near the Hackney Station of the North London Railway. They comprise six separate buildings, each six stories high, with separate staircases to each, leading to suites of two, three and four rooms, the suites being so arranged that they can be converted into suites of five. Each has a kitchen with larder, sink and dust-shoot and water-closet; the wash-houses are in the roof with drying-flats adjoining. The material used in elevation is pressed red brick and stone-and-tile roof. The whole of the floors and staircases are of concrete, thus rendering the buildings completely fireproof. The open spaces between the various blocks will be laid-out as public gardens. There will be 414 rooms in the whole block when completed.

THE CATHEDRAL, OR DOM, FRANKFORT.

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 ROOF OF THE CASTLE OF CHILLON.

San Francisco, Cal., March 8, 1893.

To the Editors of the American Architect: —

Dear Sirs, — Please inform me of the material, and color of same, with which the roof of Chillon Castle is covered, and oblige

S. C. Benson,
418 California Street.

NOTES AND CLIPPINGS

Ventilated Roofs and Floors. — Mr. W. B. Gwyther, A. R. I. B. A., of the Indian Public Works Department, has devised a new form of ventilated roofing and floors suitable for tropical climates. The object of the invention is not only to prevent the penetration of heat through the roof or damp through the floors, but also to provide a means of carrying away heated and vitiated air from inside. The method consists in the use of hollow tubes of earthenware: in the case of flat-terraced roofs these are employed as a substitute for ordinary flat tiles which support the roof-concrete. The tubes are laid closely side by side, and, where they meet, end to end, a cross-flue to secure more perfect ventilation is formed by the use of half-pipes. The ends of these flues, when feasible, should be provided with iron gratings for the ingress and egress of air; the ends of the hollow tubes where they rest on the wall should open into a longitudinal flue made in the wall. Where lateral openings or gratings cannot be arranged, vertical openings through the roof, covered with bent pipes, may be resorted to as an alternative. To draw away the vitiated air from below, perforations in the under side of the tube have been devised. The efficacy of these openings in removing air from the upper part of rooms rests on the fact that heated air moves upward, and, after passing through the small apertures, will be carried off through the tubes and cross-flues, within which a movement of air will always be going on. In the case of floors the prevention of damp can be effected very thoroughly by the doubly-ventilated space. The sysem is being used in the New School of Art building, in Chowringhee, Calcutta, where, it is hoped, some records will be taken next hot weather to show the effect of this special construction. — *Invention.*

Heavy Artillery in the Past. — In view of the following statements, it is not strange that architectural havoc followed the footsteps of the Turks: In 1478 Mohammed II, in forming the siege of Scutari in Albania, employed fourteen heavy bombards, the lightest of which threw a stone-shot of 370 pounds weight, two sent shots of 500 pounds, two of 750 pounds, two of 850 pounds, one of 1,200 pounds, five of 1,500, and one of the enormous weight of 1,640 pounds, enormous even in these days, for the only guns whose shot exceed the heaviest of these are our 80-ton guns, throwing a 1,700-pound projectile, our 100-ton, throwing one of 2,000 pounds, and the 110-ton, throwing an 1,800-pound shot with a high velocity. The stone-shot of Mohammed's guns varied between twenty and thirty-two inches in diameter, about the same height as a dining-table; 2,534 of them were fired on this occasion, weighing, according to a calculation of General Lefroy's, about 1,000 tons, and were cut out of the solid rock on the spot. Assuming twenty-four inches as the average diameter of the shot fired at this siege, the total area of the surface dressed was nearly 32,000 square feet. At this siege the weight of the powder fired is estimated by General Lefroy to have been 250 tons. At the siege of Rhodes, in 1480, Mohammed caused sixteen basilisks, or double canon, to be cast on the spot, throwing balls two to three feet in diameter. — *Chambers's Journal.*

The Remains of St. Bridget. — During the repairs which have just been made in the Church of San Lorenzo in Panisperna, where Leo XIII was consecrated a bishop just fifty years ago, an important discovery took place. It consists of a marble sarcophagus, which, according to the inscriptions thereon, contains some of the remains of the celebrated St. Bridget. The relics consist of a part of her shoulder-blade and other smaller bones, and their identity is further confirmed by documents found in the archives of the church. It is stated in these records that other portions of her body have been removed to Sweden and placed in the celebrated monastery of Vaslena. The sarcophagus was found beneath the altar in the second chapel to the left of the chancel. There are so many people of the Anglo-Saxon and Celtic race who bear the popular name of Bridget that the news of the discovery of the remains of St. Bridget will doubtless prove of interest to many readers of the *Tribune.* — *New York Tribune.*

The Pohick Church Planned by Washington. — The old Pohick Episcopal Church in Fairfax County, Va., for the rebuilding of which George Washington drew plans in 1773, is still standing. "The exterior," says the rector, "presents the same appearance it did when Washington drove up to it regularly on Sundays in his famous coach. The interior suffered severely during the late war. All the woodwork was destroyed except the cornice, which is the only interior work still existing from Washington's time. The roof was left in a ruinous condition after the war, but the old timbers are still there well protected by a covering of good shingles. About eighteen years ago the church was put in good repair, though not restored to its original interior appearance, through the kindness of a gentleman then living in New York City. Much needs to be done to restore the church to its former antique interior, but it is comfortable and properly cared for." — *N. Y. Tribune.*

The Unit of Real-estate Value. — Cities have their own peculiar methods of buying and selling property, particularly real-estate. When an important sale is made in New York, for instance, the amount is at so much a front foot. Large values are better appreciated when reduced to the standard of front feet. Several of the leading cities of the United States, however, have never adopted the New York method. In Washington real estate is sold by the square foot. In Chicago both methods are in vogue. In Philadelphia the front foot is seldom heard of. Baltimore sells by the lot without regard to front feet or square feet. Atlanta sells by the front foot. The front-foot method seems to make the property appear more valuable than it really is, and growing towns generally adopt it to impress the new-comer with the idea that he is in the midst of a great "boom." — *Exchange.*

TRADE SURVEYS

Jobbing and mercantile interests throughout the East have made forecasts for the coming nine months. One of the results is to carry larger stocks, or, rather, to provide for a greater demand when the next distributing season sets in. In all lines of textile goods, distribution in both wholesale and retail lines has surpassed all former seasons, and word comes this week from the factories and warerooms that stocks are unusually low. Another outcome is that large purchases of cotton have just been made, and contracts for yarn are now being placed on a liberal scale, though this is not the usual time for such contracts. The reason assigned is that cotton is low, wool is low, and stocks need replenishing. In hosiery and knit-goods there has been great activity in all lines, despite enormous importations. In clothing, the distribution has been extraordinary, and manufacturers feel encouraged to enter upon a rehabilitation of stocks before the proper season. In boots and shoes, the published statistics of sales are very gratifying, and, as stocks are practically nothing, there will be greater mid-season activity than usual. The quick action of manufacturers to protect themselves against a tanners' trust has been quite a surprise, and it is a question whether, eventually, the two organizations will not become one. The paper-making industry has been passing through a severe struggle, due to extreme competition and an undue expansion of digester capacity. Straw, wrapping and other cheap paper is becoming a drug on the market. All kinds of pulp are in good supply, and prices show an improving tendency under wiser management in selling and seeking business. The paper-making industry has reached a point in its progress where nothing but prudence will enable it to avert harm. Commercial methods in supplying the markets of the country with staple products are changing in minor particulars. The need of more traders in a community is looked into when new credits are solicited. Substantial progress is being made in the matter of credits. More business is being done for cash, less bartering is done at cross-road stores, more frequent settlements are being made, and less risk is run: so say the commercial agencies. Another thing, worth passing notice, is the very general extension of small industrial plants. Fewer new concerns are being started, but it is, perhaps, quite safe to say that last year fully one-third of the industrial establishments of the country made material improvements, amounting, possibly, to from ten to ninety-five per cent of the value of the plant. This, in the aggregate, is an immense sum, of which no special notice is taken. From all that can be gathered, there will be a greater extension of capacity this year, a greater taking-out of old or half-worn machinery and equipments, and a putting-in of newer. This also, in the aggregate, represents an enormous sum. The statement can be made on the authority of some of the best-known manufacturers of steam and electrical machinery that the crop of probabilities in the way of orders and contracts was never as large or as promising as at present. This statement is strengthened by the evidence of machine-shop extension visible everywhere. Railroad earnings are only fair. Speculation in securities is restricted. Foreign buyers are very slow. American bankers believe that it is possible to restore all manner of American securities to European confidence, but there are too many million people among us who are not willing to pay the price of that confidence, and who believe we are better without it. Financial writers continue to sing their song to a harp with one string, but a broader policy than they indicate or comprehend will some day be developed. The conditions now influencing the markets of the world are temporary. Austria is about to call for another fifteen millions in gold; Germany is clamoring for more; Great Britain needs all her commercial policy can gather. All look to the United States for supply. The money per capita in circulation in the different countries of the world is as follows: United States, $25.62; United Kingdom, $17.90; France, $43.31; Germany, $16.40. The hostile forces in this country on the best financial policy will avoid an early conflict. There are no visible causes at work to lessen trade or to further depress prices, nor are the influences at work in the opposite direction very pronounced. The wage-workers of the nation are at work; prices were never lower, speculation never as harmless, and opportunities for enterprise and industry seldom more inviting. The exactions of middlemen are not hard to bear. An examination of condition of savings-banks and of building and loan associations shows a growth of funds, and, so far as can be known, a judicious investment of the same. House-buying on the part-payment plan has become quite general throughout the country, and this sort of investment is quite satisfactory in its return. The year 1893 will be a very active year in building. The reports from various large centres for the past month show that fully as many permits have been taken out as during same time last year. Iron and steel continue low in price. Planing-mill products can be contracted for summer and even autumn delivery at to-day's prices, so anxious are manufacturers for business. Lumber is under somewhat better control than a year ago. Everywhere is visible a conservatism of action which argues well for the future. If disaster comes, it will be from influences entirely disassociated from the management of the business men of the country.

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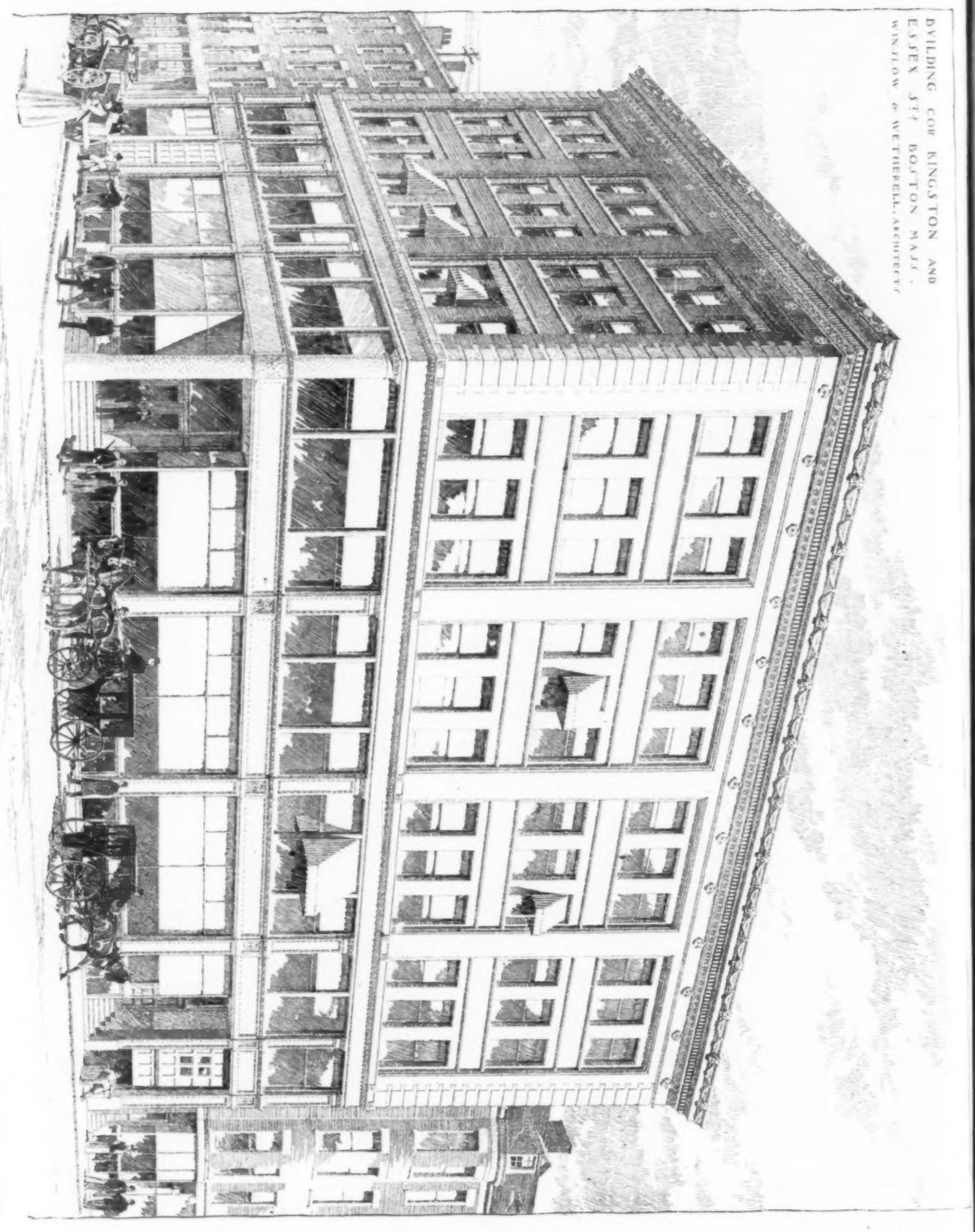

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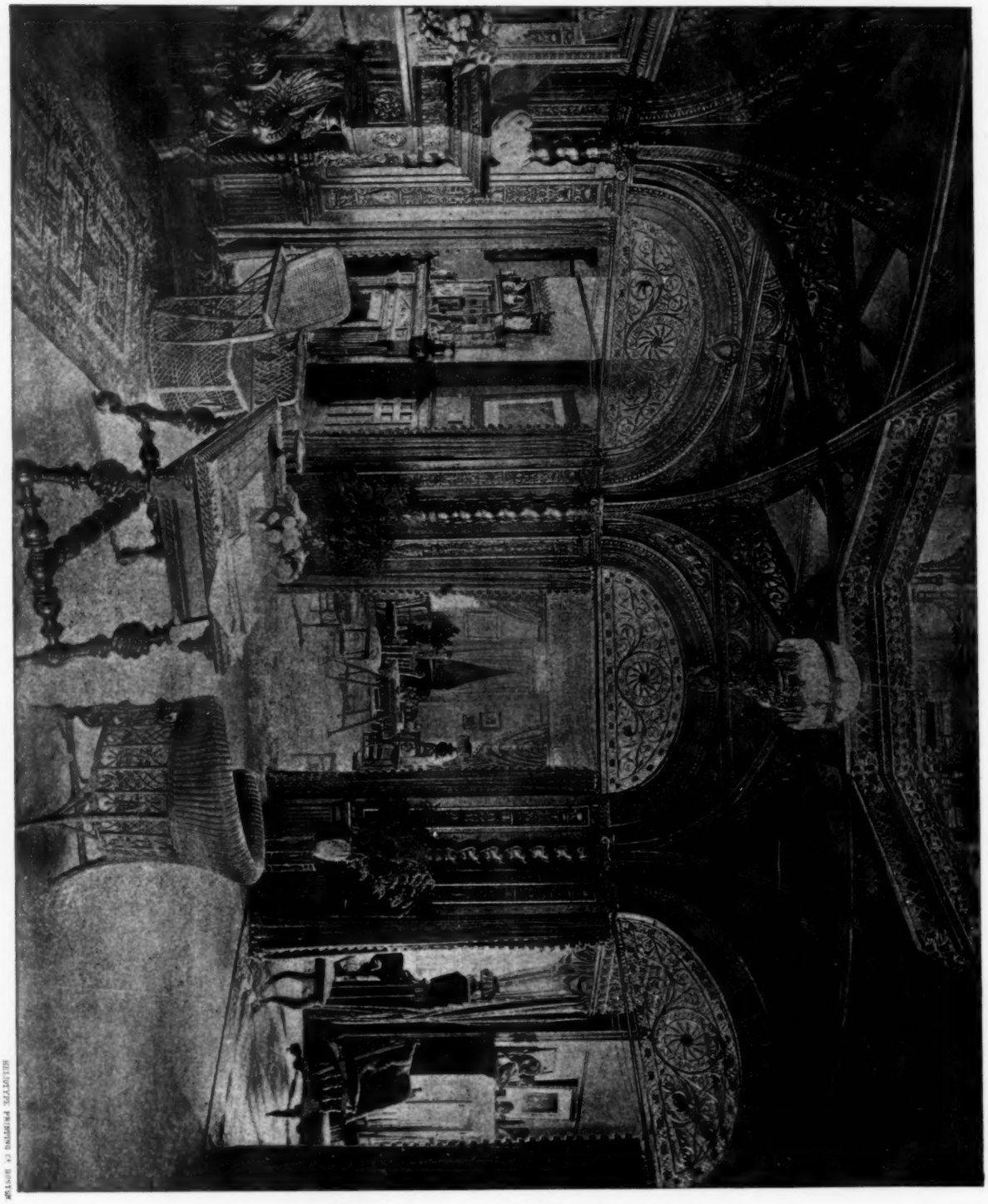

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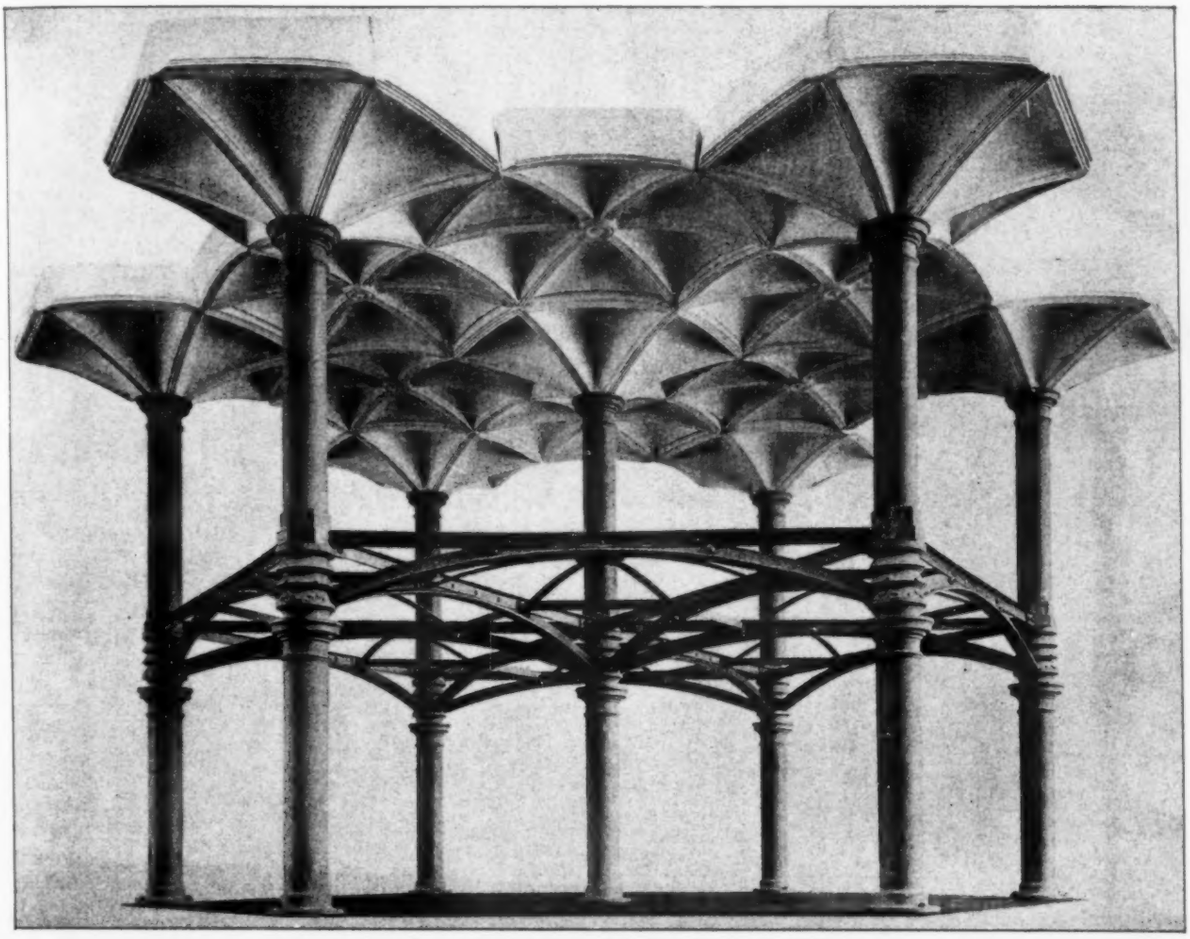

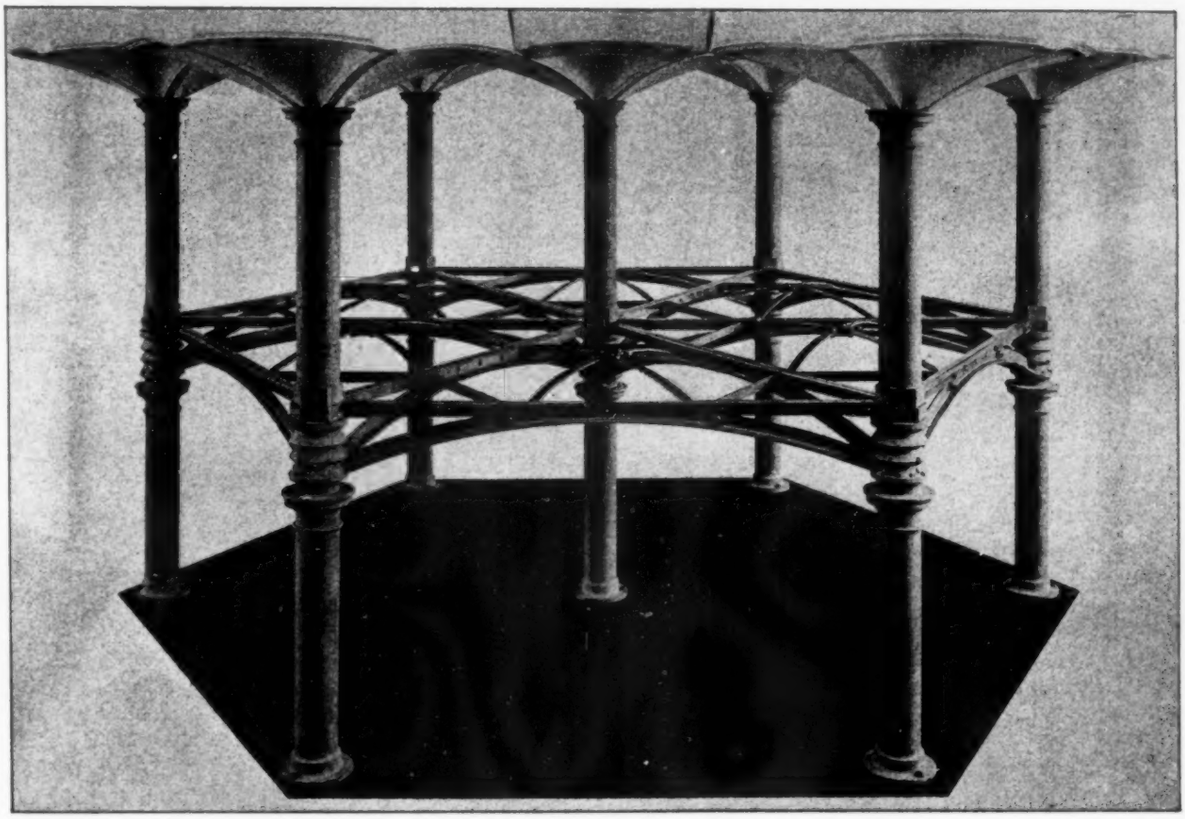

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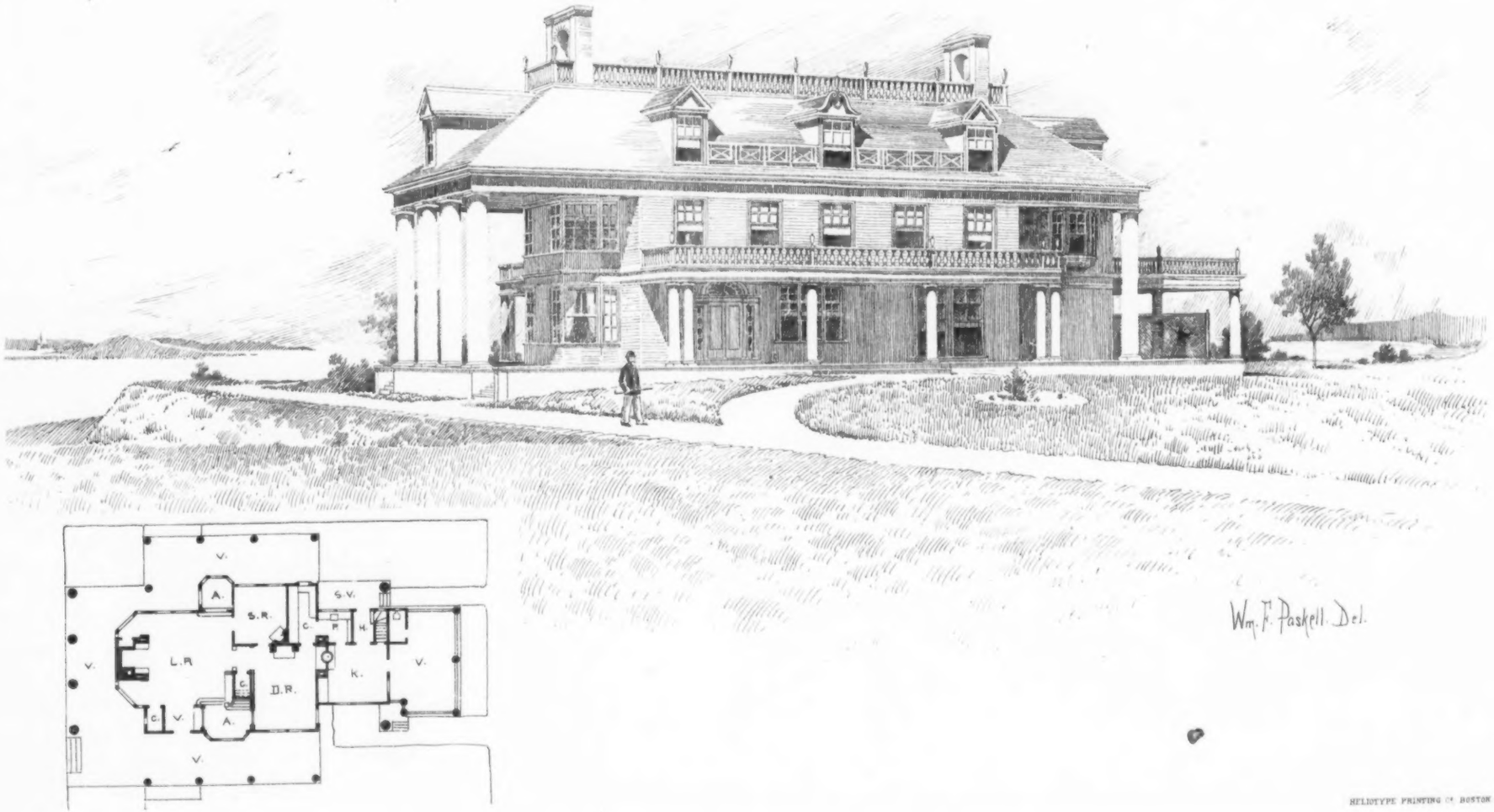

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