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SOME weeks ago, the Joint Committee of the United States Senate and House of Representatives gave a hearing to members of the American Institute of Architects, and other persons interested, on the subject of opening the design of public buildings to the architects of the country by competition or otherwise, as might be deemed best, in some such way as that proposed in the draft of a bill prepared by a committee of the Institute, in accordance with the suggestions of Mr. Windrim, lately Supervising Architect of the Treasury Department. The Joint Committee received the representatives of the Institute with great courtesy, and the real interest felt by Congress in the subject is shown by a bill, "authorizing the Secretary of the Treasury to obtain plans and specifications for public buildings to be erected under the supervision of the Treasury Department, and providing for local supervision of the construction of the same," which has just been presented to the House of Representatives by the Committee, accompanied by a report which sums up the deficiencies of the present system of designing the public buildings with singular effectiveness. Even architects, who are tolerably familiar with the defects of Government work, probably do not know that the cost of the buildings erected for the United States is nearly twice as great per cubic foot as that of buildings of the same class constructed for private citizens or municipalities, while the Committee do not hesitate to say that the unconscionable length of time always consumed in erecting buildings for the Government is due to the same system. As the Report says: "The Supervising Architect rarely ever sees one of these buildings while in course of erection. Its construction is generally under the supervision of some local carpenter or builder, who never made any pretence to architectural knowledge or study, and whose appointment was secured, not because of his skill or knowledge of the work, but because of the political influence he could marshal to secure him employment, and whose greatest solicitude is to prolong the tenure of his employment by delaying the completion of the work."

THIS is very frank talk from a Committee of Congress, but the Committee is evidently in earnest. To show that its assertions are justified, the Committee cites the example of the public building at Detroit, Mich. The construction of this building was authorized eleven years ago, and Congress has since appropriated thirteen hundred thousand dollars for it, yet the foundation walls are still incomplete. How much of the appropriation has gone in what the Committee calls "unnecessary salaries of superintendents and other agents," "the expense of watching and caring for the materials and structure," and "the loss, waste and deterioration of such material," it would be difficult to compute, but it must certainly be a very large portion. For these reasons, the Committee recommends the passage of the bill which the report accompanies. The bill, as presented, is very short. It authorizes the Secretary of the Treasury to procure plans and specifications and local supervision for the public buildings of the United States under such conditions as he may prescribe, but with the provision that not less than five architects shall be invited by the Secretary to compete for the work, and the further provision that the general supervision of the work shall continue in the office of the Supervising Architect of the Treasury Department, who is to receive proposals and award contracts as the representative of the Government. To this, of course, there can be no objection, and the bill will meet with the cordial approval of all friends of architecture, as well as of those who wish to see the public building work carried out on a more efficient and economical system.

THE death of such a builder as Marc Eidlitz deserves something more than a passing notice. For twenty-five years the architects and others interested in building operations in New York have turned to Marc Eidlitz as the head of his profession, and among the builders themselves he has always been, perhaps, the most conspicuous figure. The two Eidlitz brothers, Leopold, the well-known architect, and the builder, Marc, came to the United States from Bohemia many years ago, when very young. Marc was apprenticed for four years to a builder in New York, and, at the early age of twenty-six, started in business for himself. His work spoke for itself, and he soon had many contracts on his hands. Among many other private houses, he built those of Robert L. Stuart, J. Pierpont Morgan and Ogden Goelet; while the Astor Library, the Broadway Tabernacle, the German Hospital, the Church of the Incarnation, the Gallatin Bank, the Metropolitan Opera-House and Steinway Hall are only a part of the public buildings erected under his skilful hand. In matters outside the strict line of his busines, his characteristic energy made him very useful. He was from the first an active member of the National Association of Master-Builders, and was President of the Building Trades' Club and of the Germania Savings Bank.

THE Philadelphia Art Club has been moved by the eloquence of Mr. Armstrong Chanler to establish a Paris scholarship, similar to those already founded in New York and Boston. Like the others, the income of the Philadelphia Scholarship will be about nine hundred dollars a year. So far, the necessary money has only been assured for five years, but a committee of the Club has been appointed to raise a sum sufficient to make the foundation permanent, and the effort can hardly fail of success. Baltimore, Chicago and Cincinnati should come next, and, after, perhaps, a small interval, St. Louis and St. Paul-Minneapolis should have their Paris scholars. The annual sum required for representation abroad is so trifling that every city in the United States above the fourth rate ought to have its banner, so to speak, upheld in the French *ateliers* by some worthy son, and most of them, if Mr. Chanler retains his health and energy, probably will have it there before long.

THE decision of the French court in regard to the anarchist Ravachol will greatly delight the people who love to torture and kill their fellow-men, and do not like to be punished for it. This Dutch hyena, whose name was not Ravachol, but Gravestein, or something of the sort, confessed, or rather boasted, that he had murdered two women to get their money, because, as he said, he never begged, and would not work; and was known to have been guilty of other atrocious crimes, besides the blowing-up of a house full of innocent people; yet the court listened for nearly a day to his ridiculous bragging and rant, and, in the end, found him guilty, "with extenuating circumstances." What the "extenuating circumstances" were, it would be difficult to conceive, but it was

observed that Ravachol, who was almost beside himself with abject terror for some days after his capture, regained his accustomed impudence at the trial, and the public belief that the "extenuating circumstances" were illusions, produced in the minds of the jury by fear of being blown up by Ravachol's friends, was clearly shown by the murmur of "Cowards" which saluted the jurors after the trial was over. Whether the jurors were terrified into letting the assassin off with a mild sentence or not, there is no question that their action amounts to a cordial invitation to all the amateurs of wholesale homicide in Europe to come to France and pursue their favorite occupation, and it will not be long before the fruits of this amiable policy will manifest themselves. So far as this country is concerned, the migration of assassins to Paris will not be particularly noticeable. To anarchists, the prospect of death by strangulation at the end of a rope is an extremely repulsive one, and it is well settled here that attempts to blow up innocent persons with bombs, or even efforts to incite other people to use bombs for this purpose, will be promptly followed by fatal compression of the windpipe at the hands of Judge Lynch, if not of the regularly constituted authorities. There is something astonishing to Americans in such arguments as those used by Ravachol's counsel, in which he urged that the imposition of a light sentence on his client would tend to "reconcile" other gentlemen of similar tastes. In this country, people who murder others to get their money, or to prevent justice being done upon other murderers, or who try to get other people to commit such murders, are judged by what they have done, not by their explanations of their religious motives for their conduct, or of what it is the custom of their "party" to do, or by their eloquent expositions of their disappointment with the present arrangement of society — with reference to themselves — and the purity of the motives which led them to adopt, perhaps, mistaken means for setting it right. The fear of death will supply a loquacious criminal with endless arguments of this sort, but, fortunately for honest Americans, they produce very little impression on the clear and practical Yankee mind.

A NEW process for making aluminium has been devised, or, as the French say, "imagined," by M. Faure, the distinguished electrician, whose name is known throughout the civilized world through his connection with the invention of storage-batteries. M. Faure proposes to convert the ore of aluminium into chloride, and separate the aluminium from the chlorine by electrolysis. As compared with the ordinary electrolytic process, in which the fluoride is used, it is easily shown that the decomposition of the chloride takes a third less electric power, for the production of a given weight of aluminium, than the decomposition of the fluoride. Moreover, M. Faure proposes to separate the chlorine, which is disengaged in the form of gas, and convey it into chambers, where it is absorbed by lime, forming the commercial chloride of lime, which can be readily sold. Deducting the price which can be obtained for this from the cost of the entire process, he finds that the net cost of the aluminium obtained will be less than three cents a pound, or about that of an equal bulk of cast-iron.

SUCH a process as this, if carried out on a commercial scale, would change the metallic industry of the world, by the substitution of aluminium for copper, zinc, lead, tin-plate, and even iron; but M. Henry Thevel, in *Le Génie Civil*, shows that it is hardly practicable. At the high temperatures which must be used, chlorine gas is a very corrosive and unmanageable substance. No brick-lined oven will resist it, and its tendency to recombine with the substances from which it has been separated is very strong. Moreover, chloride of aluminium itself is volatile at a temperature only fifty contigrade degrees above its melting-point, and it is extremely difficult to keep the temperature so even as to allow the electrolysis of the fused mineral to go on evenly, without volatilizing it. At the same time, the idea appears to be an excellent one, and it is much to be hoped that later modifications may render the process commercially useful. Although aluminium at thirty or forty cents a pound, which is the cost at present at the French and German factories, is coming every day into more extensive use, a reduction to one-tenth of that would make it the most familiar of all metals, and it would undoubtedly replace, not only brass and tin-plate, but, to a certain extent, wood, in our households.

AN accident recently occurred in Paris, which resembles closely one or two which have occurred here, and should put the community on its guard. It is needless to say that in Paris all electric wires are put underground. Where they run under the streets, they are generally placed in earthenware pipes, buried in concrete, but at short intervals are arranged manholes, with covers, perforated for ventilation. The covers are cemented down with plaster-of-Paris, and when the ventilation openings become closed with mud, as they soon do, the man-holes are converted into air-tight receptacles in which gases can, and do, accumulate. When illuminating gas is escaping from a pipe near by, as is very frequently the case, it soon finds its way to the man-hole, and, when mixed with eight or nine parts of air, it forms an explosive compound, ready to be ignited by a stray spark from the electric wires. In the Paris case, which is described by an eye-witness in a letter to *Le Génie Civil*, the man-hole cover, weighing about a hundred pounds, was thrown into the air, to a height of twenty feet, with a report like that of a charge of blasting-powder, and fell on the pavement with such force as to break it. Fortunately, no one was struck by the iron, but the passers-by were seriously alarmed; and similar occurrences in future might have worse consequences. Of course, the proper mode of preventing them, since there seems to be no way of compelling gas companies to make tight joints to their pipes, is to have the manholes of the electric conduits so ventilated that gas cannot accumulate in them, which would be easily done if it were required.

THE *British Architect* tells a story about Mr. Ruskin which is new, although we believe that persons consulting the great critic have met with a similar response several times before. It seems that, about six years ago, it was proposed to restore Dunblane Cathedral, in Scotland. One of the gentlemen interested in the scheme wrote to Mr. Ruskin to tell him what was intended, no doubt expecting to be enthusiastically praised for the efforts he had made to preserve a specimen of what Mr. Ruskin professes to regard as the only true or beautiful architecture. Instead of that, he received the following letter:

"Brantwood, Coniston, Lancashire, 11th March, '87.

"*My Dear Sir*, — Restorations are always either architects' jobs or clergymen's vanities, and they are the worst sort of swindling and boasting. That of Dunblane Abbey, the loveliest ruin in Scotland (and, in its way, the loveliest in the world), would be the most vulgar brutality Scotland has committed since the Reformation. I would rather hear she had run a railroad through it and thrown the stones into the brook. Ever faithfully yours,

"John Ruskin."

The recipient of this epistle thought it prudent to keep it to himself until all the subscriptions had been collected for carrying out the work of restoration. The subscription-list was, therefore, passed around without mentioning Mr. Ruskin's opinion of the intended proceedings, and was duly filled and the work begun. It is now nearly finished, and, as Mr. Ruskin's letter can hardly interfere with the completion of the work, it has just been published.

A NEW manufacture, which promises to be of value, is that of "wired glass," or glass, in the shape either of sheets or hollow vessels, containing a network of fine wire, imbedded in the glass. Of what metal the wires are made, we are not informed, but it is probably some alloy, since the difference in coëfficient of expansion by heat between glass and ordinary metals is so great that the wires would draw loose. Platinum and glass have nearly the same coëfficient, so that a platinum wire can be "sealed" into glass permanently, but the cost of platinum is far too great to admit of using it in this way, and it is quite possible that a mixture of cheaper metal might give the proper rate of expansion. Whatever may be the nature of the wire, it appears that it strengthens the glass immensely. A sheet of flooring-glass, prepared in this way, may be heated to bright redness, and then flooded with cold water; and, although it will be cracked into innumerable pieces, the pieces will cling together so strongly that the glass may still be walked over. This property evidently adapts the new glass for use in skylights, and it has the additional advantage of being burglar-proof, as no diamond will cut it, and the operation of breaking a sheet of it is a long and troublesome one.

BYZANTINE ARCHITECTURE.[1]—I.

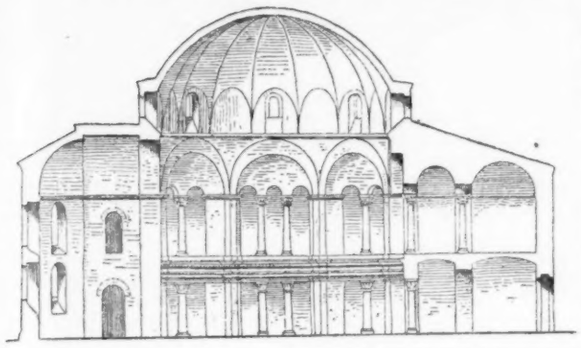


Fig. 1. Church of SS. Sergius and Bacchus, Constantinople: Longitudinal Section from the Apse to the Narthex.[2]

THE dome constitutes the characteristic feature of Byzantine architecture. It was not a new architectonic form. The Romans had been long familiar with it in the circular temple of the Pantheon and in the *calidarium* of the Baths of Caracalla at Rome, both finished examples of architecture, as admirable for their clever structural combinations as for their decorative magnificence. The ancient Romans, or the modern Byzantines, were equally acquainted with the Asiatic dome borne on pendentives through their constant intercourse with the peoples of the Orient and of Persia, then at the zenith of their prosperity and their civilization; but it had been applied only to small edifices. Attempts on a larger scale had, however, been made; the dome of Ezra in Central Syria, built in the early part of the sixth century, is nearly thirty-three feet in diameter. (See the *American Architect* for June 28, 1890.)

When the dome became the constructive principle itself, the difficulties increased in proportion as the dimensions of the edifices increased; one of these difficulties lay in the necessity of fitting the new forms to the rectangular forms required for the ceremonies of Christian worship. The first move was to do away with the colonnades of the Latin basilica; these were replaced by powerful pillars bearing large arches, whose broad openings formed the four sides of a cross, the centre of which was occupied by the dome. The latter thus rested directly on the top of the arches, which were constructed on a square plan and joined by spherical pendentives; that is, by means of the latter the change was effected from the square plan of the arches to the circular plan crowning their keys, and the weight of the hemispherical cupola was thus brought on the four pillars.

These great arches, acted upon by powerful vertical thrusts, were buttressed by semi-domes, or by barrel-vaults, and the main dome was in this way supported and sustained on every side. It became the centre around which were disposed the half-domes and the barrel-vaults requisite to insure stability; at the same time, this disposition secured broad spaces, which were utilized for the celebration of the rites prescribed by the Christian liturgy.

For technical reasons, this new constructional departure was of deep interest to architects; it roused their ambition and incited competition. Earnest study of the form which they could turn to such account, and especially of the architectural rules governing its application, was awakened. Under Justinian, a large number of domed churches, presenting a great variety of dispositions and built on different plans, were reared at Constantinople; celebrated among the structures of this period was the Church of the Holy Apostles, described by Procopius. It was in the form of a Greek cross, with two equal naves of three bays each crossing at right angles, and, consequently, forming five similar bays, each crowned by a hemispherical dome supported by four pendentives that filled in the angles of the square. From the beginning of the sixth century, Byzantine art thus freed itself from Latin traditions; it bears the marks of an original development, which found expression in a bold architecture. We present here its most characteristic manifestations.

The Church of SS. Sergius and Bacchus was erected at Constantinople early in the sixth century. The octagonal dome, which is of a most unique type, exhibits above the eight pendentives sixteen prominent arrises separating concave *fuseaux* forming penetrations, and in which are small windows that light up and decorate the base of the dome. (See the *American Architect* for June 21, 1890.) Notwithstanding the contour of the outer wall, this church may be considered as a rotunda, because all its parts are symmetrically grouped about a dome with an octagonal base. The problem of adapting the structure to the demands of Christian ceremonies was skilfully solved; as the niches occur only on the diagonal sides of the interior octagon, the central space approaches a square, and is enlarged by means of galleries encircling the central octagon. It offers a compromise between the rectangle of the Latin churches and the rotunda (Fig. 1). The elevation of the bays likewise recalls the Roman arrangement. The columns of the order forming the basement of the general disposition are connected by an entablature; the arches of the upper story constitute the sides of the octagon, the angles being filled by pendentives. They are each subdivided into three arches borne on colonnettes with no architrave.

The Church of San Vitale at Ravenna was founded in the year 526 of our era, by Saint Ecclesius on his return from a visit to Constantinople in company with Pope John I. It was apparently built after the plan of the octagonal church constructed at Antioch by Constantine. The work was continued in compliance with the orders of Justinian whose armies had just conquered a part of Italy, and the completed edifice, adorned with superb mosaics, was consecrated about 547 by Maximianus in the presence of Justinian and the empress Theodora. The plan is octagonal with an interior diameter of 111.5 feet and cantoned on the outside by several round towers; in accordance with the rules prescribed by the clergy in the fifth century the church is oriented and terminates in a large apse on the east. (See the *American Architect* for July 5, 1890). The perimeter of the interior space, 49 feet in diameter, is a reproduction of the outer perimeter, but on each side there is an exedra formed by two columns symmetrically disposed on an arc of a circle and communicating with the intermediate gallery (Fig. 2). Each side of the central octagon, which is supported by eight robust pillars bearing the great dome, is pierced by a large arch. On seven of the sides these arches form half-domical niches lighted through two rows of arches; the eighth and eastern side is open to allow a view of the apse and altar. The hemispherical dome rises above, its circular base joining the octagon by means of small pendentives. (See section, *American Architect* for July 5, 1890). The construction bears evidence of the persistency of Roman influence; the dome is built of tiles imbedded in a very strong mortar, after the example of the Temple of Minerva Medica and the Circus of Maxentius. The base of the dome must have been constructed of tiles shaped like the ancient amphoræ, fitting into one another and set vertically; the cap was made in the same way, but of smaller amphoræ with mortar between; these tiles formed a continuous spiral of great lightness and wonderful strength. The architectural and sculptured details are equally Roman; but the distinctive feature of San Vitale, among Byzantine churches, is its sumptuous decoration in mosaics dating from the time of Justinian; the apse especially is of remarkable richness.

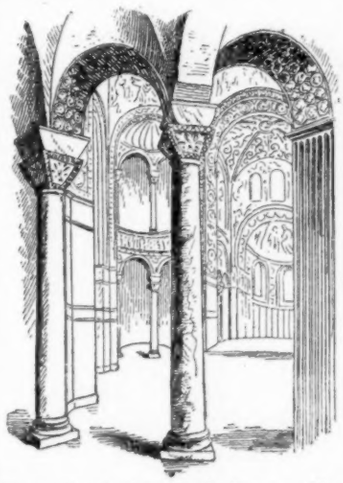


Fig. 2. Church of San Vitale, Ravenna: View of an Exedra of the Lower Gallery.

Saint Sophia of Constantinople must be taken as the type *par excellence* of Byzantine art; it marked the advent of a new style and at the same time attained proportions that have never been surpassed in the Orient or the Occident. (See the *American Architect* for June 21, 1890.) The first temple of the *Divine Wisdom of Saint Sophia* was reared at Constantinople in 325, by Constantine; Constantius, his son, enlarged

[1] From the French of Edouard Corroyer, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

[2] The illustrations of this article are from the work of M. Corroyer entitled *L'Architecture romaine.*

it in 338. It was burned down in 404, in the reign of Arcadius, but was reconstructed by Theodosius in 415; it was again destroyed by fire in 532. In the fifth year of his reign, Justinian undertook the reconstruction of Saint Sophia on a vaster scale and with infinitely greater magnificence; it was rebuilt seven years later after the plans of Anthemius of Thralles — who died in 534 before its completion — and of his co-worker or at least successor, Isodorus of Miletus: both were natives of Asiatic provinces in which architecture had developed with most originality in the fourth and fifth centuries. (See the *American Architect* for June 21, 1890.)

The plan of Saint Sophia seems to have been derived from the church of SS. Sergius and Bacchus, while its dimensions recall the immense proportions of the vaulted halls of the Roman thermæ: both these influences are clearly traceable, and it was evidently the intention to combine the elongated form of a basilica like that of Constantine (See the *American Architect* for June 14, 1890), which resembles perfectly the *tepidarium* of the Baths of Caracalla, with the concentric system of domed structures such as the church of SS. Sergius and Bacchus. The huge hemicycles transform the central square into an oval and their secondary niches convert the latter into a parallelogram with the angles rounded off. (See longitudinal section, in the *American Architect* for June 21, 1890.) The edifice is covered by vaulting of various kinds and a huge dome, 105 feet in diameter and borne on spherical pendentives which carry the weight to the pillars, rises at the centre. The central nave is elongated by two hemicycles cantoned by four large niches, the semi-domical vaults of which buttress the base of the dome on the east and west; on the north and south the supports consist of powerful buttresses with broad openings forming galleries in their thickness; the apse occupies the eastern hemicycle and the doors the western. Light is admitted through a multitude of openings in the walls of the large arches on the north and south, as well as through forty windows at the base of the dome. (See perspective view, *American Architect* for June 21, 1890.)

Saint Sophia is the masterpiece of Byzantine art; it furnished a model for the East as may be seen in the church of the Mother of God or the *Agia Theotokos.* Reared early in the ninth century, it was constructed in accordance with the ideas of the Greek Christians; the plan (see *American Architect* for June 21, 1890) is in the form of a Greek cross with a square nave crowned by a dome. This central space is flanked by four arms; that on the east, prolonged for the choir, terminates in a main apse accompanied by two smaller ones; the western arm is preceded by a narthex communicating with the side galleries. This disposition of a central dome with four small domes at the angles of the square is very common in Byzantine architecture. The influence of Saint Sophia is evident; Byzantine architects copied after this last edifice though they simplified the construction both in *ensemble* and details for necessary reasons, prominent among which the question of expense must have figured. Modifications were likewise made for the purpose of strengthening the arches forming the square and even of diminishing the importance of the dome, or at least insuring its stability. The distance from the large arches to the dome is much greater and the windows at the base of the latter — which seems already to suggest the Romanesque lantern towers — become more essential factors in the decoration and lighting of the central portion of the structure. The dome of the

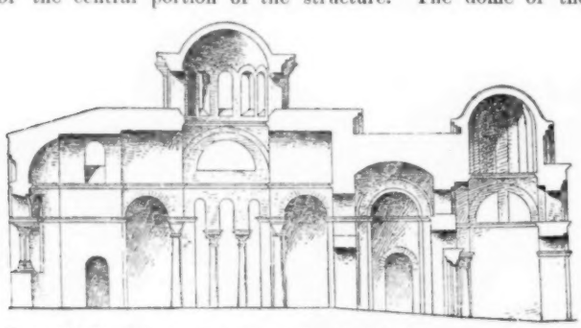


Fig. 3. The Theotokos, Constantinople: Longitudinal Section from the Apse to the Narthex.

Theotokos presents characteristics of especial interest. It rests on strongly accused pendentives above which is a row of windows covered by a hemispherical cap (Fig. 3). We find the construction already executed with greater care. The outer walls are built of brick, or more frequently still, in alternate courses of brick and cut stone; often even they are divided into broad variously-colored horizontal bands, which are utilized in framing the windows or enveloping the archivolts; on the interior the mosaics on a gold background are replaced either by marbles or much simpler mosaics, and frequently also by frescoes on carefully prepared coatings.

(To be continued.)

CONSTRUCTION.[1] — VI.

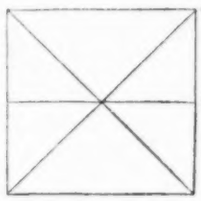


Fig. 27.

IT must be said to the credit of the architects of the twelfth century, that, having adopted a new and unprecedented system of building, they pursued its development with a rare tenacity and perseverance, without one backward glance, despite the obstacles and difficulties which arose at every attempt. Their tenacity is all the more honorable, since they could not foresee in adopting the system of construction of the Gothic vaults, the results which came naturally from this system. They acted like men moved by strong conviction; they opened for their successors a broad and sure path in which Western Europe walked without hindrance for three centuries.

Every human conception is tainted with some error, and the truly immutable, in everything, is still to be found; each discovery carries within it, at its birth, the cause of its downfall, and man has no sooner admitted a principle than he recognizes its imperfection, its flaws, and his efforts tend to combat the defects inherent in this principle.

Now, of all human conceptions, the construction of buildings is one of those which are confronted by the most serious difficulties, in that they are of opposite natures, the one, material, the other, moral. In fact, the constructor must not only seek to give to the materials used the most suitable form, according to their own nature, but he must group them in such a way as to resist diverse forces and foreign agencies. But in addition he is obliged to submit himself to the means at his disposal, to satisfy moral needs, to conform to the tastes and customs of those for whom he builds. There are the difficulties of conception, the efforts of the artist's intellect; there are also the means of execution from which the builder knows not how to free himself.

During all the Romanesque period the architects had made vain attempts to reconcile two principles seemingly irreconcilable; namely, the tenuity of vertical supports or the economy of material together with the use of the Roman vault with more or less alteration. Some provinces had, by reason of influences foreign to the Western spirit, adopted the pure Byzantine construction.

At Périgueux they built, at the end of the tenth century, the Church of Saint-Front, and from that isolated example rose a school. But it must be recognized that this kind of building was foreign to the new spirit of Western nations, and the constructors of Saint-Front of Périgueux erected that church as moulders might do, reproducing forms whose structure they did not comprehend. Thus, for example, the pendentives which support the cupolas of Saint-Front are faced by means of courses of stones set in corbels, whose beds are not normal to the curve, but horizontal; if these pendentives do not fall inwards, it is because they are held by the mortar, and adhere to the masonry which gives them their concave form.

In such buildings one sees only an attempt to reproduce forms whose geometrical reason the builders do not understand.

Moreover, we see complete ignorance, pitiable expedients applied as makeshifts at the moment when the difficulty presents itself, but no foresight.

A great number of Romanesque constructions indicate, upon the part of the architects, a complete want of foresight. One structure is begun in the vague idea of ending it in a certain fashion, and stops half-way, because the builder does not know how to solve the problems which he has set before himself; another can be finished only by the use of means clearly foreign to its first conception. We see that the early Romanesque constructors built from day to day, relying upon inspiration, upon chance, upon circumstances, perhaps they were even counting upon a miracle to perfect their work.

The legends attached to the building of great edifices (even if the structures were not there to show us the embarrassment of the architects), are full of dreams, during which the architects see some angel or some saint, taking the trouble to show them how they ought to build their vaults, or maintain their pillars; which did not always prevent these monuments from collapsing soon after their completion, for faith is not sufficient for building.

Without, perhaps, being less devout, the architects at the end of the twelfth century — chiefly, if not entirely, laymen — thought it prudent in the matter of building, not to wait for the intervention of an angel or a saint in order to erect an edifice. Moreover (a curious

[1] From the "*Dictionnaire raisonné de l'Architecture Française*," by M. Viollet-le-Duc, Government Architect, Inspector-General of Diocesan Edifices, translated by George Martin Huss, Architect. Continued from No. 849, page 14.

and noteworthy fact), the monkish chronicles, legends and histories which are so prodigal of praises of monuments raised during the Romanesque period, and which enlarge so complacently upon the beauty of their structure, their grandeur and their decorations, although many of these monuments are only wretched buildings of rough stones, badly designed and worse executed, become abruptly silent at the end of the twelfth century, when architecture passes from the cloisters into the hands of the laity. Perchance there is a word about the edifice — a phrase, dry and laconic; but as to the masters of the work, nothing.

Is it credible, for example, that, in the voluminous records of the church of Nôtre Dame at Paris which contains documents dating back to the twelfth century, not a single word is said about the construction of the present cathedral?

Laborious and intelligent artists, sprung from the people, you, who have been the first to free yourselves from worn-out traditions; who have entered freely into practical science; who have formed that army of skilful workmen soon to spread over the whole surface of the Western continent; who have opened the way for progress, for bold innovations; who in short, belong, by so many titles to modern civilization; who were the first to possess its spirit of research, its craving for knowledge; if your contemporaries have let your names be forgotten: if despising the efforts by which they profit, those who claim to direct the arts of our time attempt to disparage your works, then, at least, among so much injustice past and present, let our voice be raised to vindicate the place which belongs to you, and which your modesty has made you lose. If, less engrossed with your labors, you had, like your confrères in Italy, boasted of your knowledge and glorified your own genius, we should not to-day be forced to search your works in order to bring to light the profound experience that you had acquired, the practical means that you had so judiciously calculated, and above all to defend you against those who are incapable of understanding that genius can be developed in shadow, — that by its very nature it seeks silence and obscurity; — against the many who judge on the strength of sentences pronounced by passion, or self interest, and not after their own examination.

It must, however, be said that to-day, it is no longer permissible to decide questions of history touching the arts, politics, or letters, by simple affirmations or negations.

And the retrograde minds are those that wish to judge these questions, in relying upon the antique methods or upon their own partiality. No sensible artist dares to maintain that we ought to build our churches and houses as they did in the twelfth or thirteenth century, but no just mind would be unable to comprehend that the experience gained by the masters of that time can be more useful to us, according as they have made greater innovations. The most difficult obstacle for us to get rid of, the real, vital obstacle, is, we must admit, intellectual laziness; each man wishes to know without the trouble of learning, and each man pretends to judge without knowing the proofs of the case; and the truest, best written, and most useful principles will be set aside among obsolete relics, because some man of wit has derided them, and because the listening crowd is too happy to applaud a criticism which saves them the trouble of learning. A sad glory, after all, that of prolonging the duration of obscurity; it can bring no profit to its possessor in a century which boasts of casting light upon all things; whose activity is so great that, being unable to find in the present sufficient food for its intellectual needs, it wishes again to unfold the past before itself.

If our French architecture of the Renaissance is superior, in the eyes of persons who have carefully studied it and have brought into that study an enlightened criticism, to the Italian architecture of the fifteenth and sixteenth centuries, does not this come from the fact that our Gothic schools, despite the abuses of later times had long since trained skilful professionals and intelligent workmen, knowing how to submit form to reason; and from the fact that these schools were specially adapted to liberate the minds of the architects and workmen, and to familiarize them with the numerous difficulties which surround the builders?

We know that this language is unintelligible to those who judge the different forms of our art after their own sentiments or prejudices; and therefore, it is not to those people that we address ourselves, but to those architects who have long been familiar with the resources and difficulties presented in the practice of our art. Indeed, for artists, the study of an art where everything is foreseen and calculated, which even sins by an excess of research and of practical means, in which matter is both superior to form and submissive to principle, cannot fail to develop the mind and prepare it for the innovations that our time demands.

It would be a digression from our subject to explain how, at the end of the twelfth century, there was formed a powerful lay school of builders; how that school, protected by the Episcopate, which wished to lessen the importance of religious orders, and possessing the sympathies of the people whence it came and whose spirit of research and progress it reflected; and having been welcomed by secular feudalism, which did not find among the monks all the elements which it needed for building its dwellings: how that school, we repeat, profiting by these favorable circumstances, gained a strong foothold, and, consequently, great independence. It will suffice us to indicate that state of things, new in the history of the arts, to make its consequences appreciated.

We have previously seen where the builders had arrived about 1160, and how they had been led to modify successively the Romanesque vault, which was only a degraded condition of the Roman vault, and to invent the so-called pointed-arch vault. This great step taken, there still remained much to be done. The first result of that innovation was to force the builders to design their edifices, beginning at the vault, and hence to leave nothing to chance, as had happened only too often with their predecessors. This method, strange in appearance, which consisted in deriving the ground-plan from the design of the vault, is eminently rational. What do we wish when we build a vaulted edifice? To cover a surface. What is the end that we propose to attain? To fix vaults upon points of support. What is the principal object? The vault. The points of support are only means.

The Roman builders had already been led to derive the plan of their vaulted edifices from the form and extent of these same vaults; but this principle was only a general principle, and, from the examination of a ground-plan of the later Roman empire, one could not always conclude that such a part was vaulted in cradle-form, in groins or spherically, since each of these vaults might be in many cases, placed indifferently over these ground-plans.

It is no longer thus in the twelfth century; not only does the horizontal plan indicate the number and form of the vaults, but also their different members, transverse arches, wall-arches and pointed arches, and these members govern, in their turn, the arrangement of the vertical supports, their relative height and their diameter. Hence it should be concluded that, in order to draw definitely a ground-plan, and to proceed to its execution, it is necessary, first of all, to make the drawing of the vaults, of their slopes and of their abutments, and to ascertain exactly the dimensions and shapes of the stones of the various arches. The first Gothic builders acquainted themselves so promptly with that method of taking every construction at the top in order to arrive successively at the drawing of the bases, that they adopted it even in the edifices not vaulted, but having plank or timber ceilings, and they found themselves none the worse off, as we shall see later on.

The first condition in order to arrange the plan of an edifice, at the end of the twelfth century, was to know whether it was to be vaulted, and in what way. It is necessary, then, as soon as the number and directions of the arches of these vaults are known, to obtain the drawing of the abutments upon the capitals, for it will be the drawing of these abutments which will give the shape and dimensions of the abacus and capitals, as well as the number, size and position of the vertical supports.

Let us suppose, then (Fig. 27), a hall which is to be vaulted, having a length of twelve metres inside the building, and divided into compartments of six metres from axis to axis.

Let us adopt the system of pointed-arched vaults crossed by a transverse arch, after the method of the builders at the end of the twelfth century. We must trace the lower bed of the abutments of the arches falling on A and B, and find out the size of the voussoirs. We admit that these voussoirs, for a hall of such extent, must have 0.40 centimetres of width and height; we recognize that at that epoch the different arches of a vault are almost always formed of voussoirs alike in dimensions and form. We recognize again that, since the wall-arches begin much higher up than the transverse and the pointed arches, the slender columns serving to support them often rise above the level of the abutments of the pointed and transverse arches; that, in outlining the bed of the abutments of the transverse and pointed arches, we ought to take account of the elevation of the column supporting the wall-arch, just as we would take account of the wall-arch itself.

Let Figure 28 be the detail of the horizontal drawing of the terminus of the arches at B; from this point there rise only one transverse arch and two wall-arches. The latter are the commanding arches, for the transverse arch diverges from these wall-arches at their origin. Let $A\ B$ be the surface of the wall; the wall-arch has a projection, usually, half as thick as the pointed arch or the transverse arch, when these two arches have a similar section, and half as thick as the pointed arch when that and the transverse arch have different sections. In the present case, the wall-arch has then 0.20 centimetres of projection from the surface of the wall. Through C we draw a line parallel to $A\ B$. The axis of the transverse arch being $D\ E$, and the points F and G being taken at 0.20 centimetres each from that axis, we draw the two parallels $F\ I$ and $G\ K$, which gives us the thickness of the transverse arch. From F to I', measuring 0.40 centimetres, we have its height between the intrados and extrados; we can then in the square $F\ I'\ K'\ G$ trace the proper contour; it is the lower bed of the abutment.

Either the column supporting the wall-arch rises above the level of this bed, as indicated in L, or the wall-arch, as sometimes happens as in the Church of Nesle, Oise, takes its start upon the capital supporting the transverse arch; and then, from the axis $D\ E$, measuring off 0.40 centimetres on the line $A\ B$, which gives us the point M, we inscribe the contour of the wall-arch in the parallelogram $E\ O\ N\ M$. It is understood that this wall-arch should enter the wall for several centimetres. The lower bed of the abutment being thus found, the abacus of the capital must be drawn, and its contour must form a projection around the ends of the arches. If the wall-arch is resting upon a column rising to its abutment, as represented in L, the abacus $P\ R\ S$ turns squarely about and ceases at the column L of the wall-arch. If, on the contrary, the contour of the

wall-arch descends as far as the capital of the transverse arch the abacus takes upon the horizontal plan, the form *P T V X*.

In order to draw the column under the capital, in the first case, from the vertex of the right angle *R* of the abacus we draw a line at 45 degrees; that line meets the axis *D E* in a point 0, which is the centre of the column, to which we give a diameter such that the projection of the abacus over the surface of that column shall be greater than the radius of the column. There remains then, between the column and the surface *A B* of the wall, a vacant place that we fill with a pilaster hidden by that column and the pillar of the wall-arch.

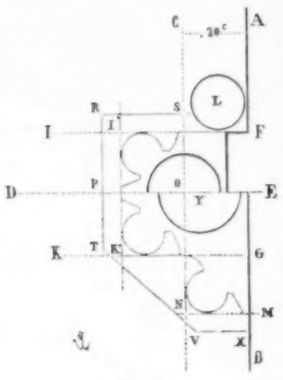


Fig. 28.

In order to outline the column under the capital, in the second case, we take a centre *Y* upon the axis *D E*, in such a way that the projection of the abacus over the surface of the column shall be greater than its radius; then the capital forms a corbel or bracket, and is found to be broader under the wall-arch than under the face of the transverse arch.

Let us take now, on Figure 27, the beginning *A* of two wall-arches, two pointed arches and one transverse arch. Let *A B* (Fig. 28*b*), be the surface of the wall, *C D* the directrix of the transverse arch, *D E* the directrix of the pointed arch; we outline the projection of the wall-arch as above. The pointed arches govern the transverse arch. From each side of the line *D E* we measure off 0.20 centimetres, and draw the two parallels *F G* and *H I* which give us the width of the pointed arch. From the point *H*, the meeting of the line *H I* with the axis *C D* upon that line *H I*, we take 0.45 centimetres, that is to say, a little more than the height of the voussoirs of the pointed arch, and we draw the perpendicular *I G*, which gives us the face of the pointed arch.

In the parallelogram *F G I H* we outline the appropriate contour.

From the two sides of the axis *C D*, measuring off in the same way 0.20 centimetres, we draw the two parallels *K L* and *M N*.

From the point *H*, measuring off 0.40 centimetres upon the axis *C D* from *H* to *C'*, we draw a perpendicular *L N* to that axis, which gives us the face of the transverse arch, and then we outline its contour.

At *P*, we imagine that the column bearing the wall-arch passes above the beginning of the pointed and transverse arches; at *R*, we suppose that the contour of the wall-arch has fallen vertically upon the abacus of the capital. In order to draw this wall-arch in this latter case, we take upon the line *A B*, from the point *M* to *Q*, 0.40 centimetres, and from this point *Q*, erecting a perpendicular upon the line *A B*, we have the parallelogram, including the contour of the wall-arch. The abaci of the capitals are drawn parallel to the faces of the arches, as our figure shows.

From the vertices *G* and *L*, drawing lines at an angle of 45°, we meet the axis *D E* at *O*, which is the centre of the pillar carrying the pointed arches, and the axis *C D* at *S*, which is the centre of the column of the transverse arch. We outline these columns conformably to the rule previously established.

Behind these detached columns, we suppose the location of the pilasters that reinforce the piers; then the wall-arch *R* falls upon a face of these pilasters carrying capitals like the columns.

Often the wall-arches did not descend to the abacus of the capitals of the great arches, and also had no pillar supporting them from the floor. They started upon a pillar placed on the lateral projection of the abacus, as Figure 29 indicates, both in horizontal section and in perspective elevation. Then the abaci of the lateral pillars *A* were cut in such a way that their oblique face *C D*, perpendicular to the directrix *B* of the pointed arches, was divided into two equal parts by that directrix.

Still, it must be recognized that the builders only little by little decided to indicate the form, direction and members of the vault upon the ground-plan. They kept for some time the monocylindrical piers on the ground-floor, while outlining the plan governed by the vaults only, upon the abaci of the capitals of these piers.

What occupied them after the end of the twelfth century was the rigid observance of a principle which had hitherto been universally admitted. This principle was that of the equilibrium of forces, substituted for the principle of inert stability, which was so well practiced by the Romans, and which the Romanesque builders had vainly tried to preserve in their large, vaulted edifices, composed of several naves.

Recognizing the impossibility of giving to the detached piers an impost sufficient to resist the thrust of the vaults, the builders of the twelfth century took a new course: they sought their means of resistance elsewhere. They were no longer willing to admit the detached pillars, except as supports maintained upright, not by their own base, but by the laws of equilibrium. It was of importance, then, only that they should have a force sufficient to resist a vertical pressure.

There are always, even when a principle is admitted for a certain time during its application, blind attempts; one never frees himself from traditions in one day.

In inventing the pointed-arch vaults on a square foundation and crossed by a transverse arch, the builders still sought points spaced off between each pair of compartments, more stable at the height of the principal pressures.

In fact, in Figure 27, the points *A* receive the weight and maintain the thrust of one transverse and two pointed arches, while the points *B* receive the weight and maintain the pressures only of one transverse arch. This system of vault-building, adopted during the second half of the twelfth century, induced the builders to erect under the points *A* piers stronger than those under the points *B*, and then to give to the voussoirs of the principal transverse arches falling on *A* a width and thickness greater than those given to the voussoirs of the pointed and secondary transverse arches; for in the early Gothic vaults, it is to be remarked, as we have already said, that the voussoirs of all the arches generally present the same section.

The arch in tierce-point was so well regulated by the necessity of diminishing the thrust, or resisting the weight, that we see in the early Gothic buildings, the broken arches uniformly adopted for the transverse arches and the lower archivolts, while the semicircular arch is kept for the bays of windows, for the arching of galleries, and even for the wall-arches, which carry only a slight weight or present only a small opening.

In the Cathedral of Noyon, whose primitive vaults must have been raised about 1160,[1] the wall-arches which belong to that period are semicircular. In the cathedral of Sens, built about this same time, the wall-arches were semicircular,[2] while the archivolts and transverse arches are in tierce-point.

It is the same with the choir of the abbey church of Vezelay, built at the end of the twelfth century; the wall-arches are semicircular.

In these edifices, particularly at Sens, the piers, under the combined pressure and weight of the pointed and transverse arches present a very considerable horizontal section, formed of clusters of engaged pillars; while under the weight of the transverse arches alone the piers are composed of monocylindrical twin columns, placed perpendicular to the axis of the nave.

At Noyon the intermediate transverse arches, before the rebuilding of the vaults, rested upon a single column. But the nave of the cathedral of Sens is much larger than that of the cathedral at Noyon; and the building is at all points stronger. That arrangement of vaults having two divisions and distributing the principal pressures and weights upon pairs of piers, had originally allowed the builders to place flying-buttresses only at the height of the principal piers.

It is probable that in the Cathedral of Sens, this was formerly the plan adopted; perhaps it was the same in the Cathedral at Noyon as in that of Paris; but these edifices having been more or less restored in the thirteenth century, it is impossible to affirm anything in that respect. What we may be certain of, is, that at the end of twelfth century, the builders had adopted the flying-buttress in despair, since they were seeking to avoid it as far as possible, and since they distrusted this means whose advantages and power they were not yet able to appreciate; and that they regarded it only as

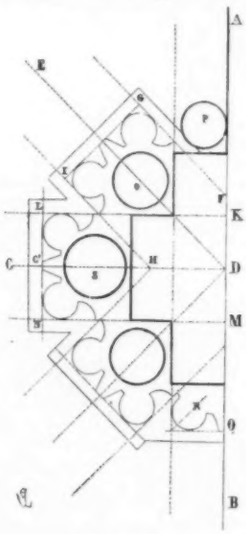


Fig. 28*b*.

Fig. 29.

an auxiliary, a last resort, often used too late, and when they had learned that they could not do without it. The best proof that we can give is that some years later the architects, having finally submitted, in the edifices with three naves, their system of vaults to the

[1] These vaults were rebuilt in the thirteenth century, over the great nave, only the original wall-arches being left in place.

[2] These wall-arches were raised at the end of the thirteenth century, as one can still see by the divisions of the apse.

law of equilibrium, opposed flying-buttresses to the thrust of vaults which had possessed them only partially or not at all, and did away with the flying-buttresses of the twelfth century, probably misplaced, or insufficient, in order to replace them by new and well arranged buttresses, as regards the resistance or the pressure.

(To be continued.)

GERMAN CASTLES.[1] — IV.

THE OUTER COURT, OR ZWINGER.

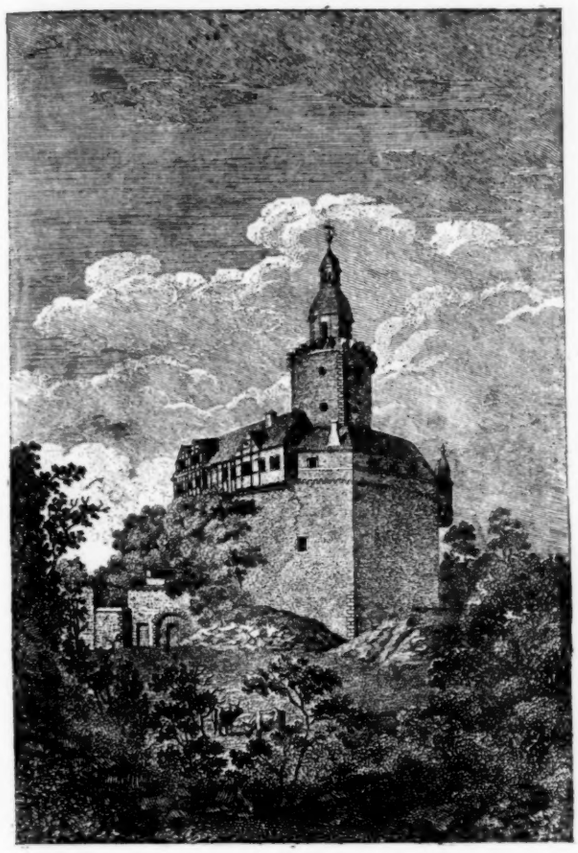


Fig. 29. Falkenstein on the Harz.

THE portion of German castles to be next considered is the outer court, or bailey. The specific German word for this court is "*zwinger*": a pure, feudal term, that would have gone out of use, probably, but for the Zwinger of the Dresden Castle, a court of so rare magnificence and extraordinary originality as to keep the old name alive on the pages of architecture and in the mouths of the German people.

I have observed, at least, that wherever else the word is employed, as in Lubeck and in Breslau, that it is a mere local property, and that it is applied moreover, to misleading objects. Thus in Breslau, for instance, every vestige of the court has been demolished, and the so-called *zwinger* is nothing but a fenced-in beer-garden, the sole distinction of which garden consists in the fact that it occupies ground that was once a portion of the town's outer bailey. In provincial out-of-the-way seats the term may, perhaps, be preserved traditionally, and a few noblemen, here and there where the term has fallen in disuse, have tried with patriotic enthusiasm to reintroduce it among the menials and tenants of their estates. But however successful these enthusiastic efforts may prove for the future, it is true of the present that the term "zwinger" is limited in use generally to architects; and in locality, to Dresden. The common people even in Dresden are at a loss often to explain why it should have got attached to their famous building. The clever ones among the town's folk tell American tourists that bears were *gezwungen* (*zwingen*) "baited" here. And they say this, I am sure, without any ironical insinuation: certainly Americans never see a figure of speech in it, for their part, nor guess that the only creatures baited and fleeced here are travelling foreigners! Outer courts have been demolished so generally that the people do not recognize one, when they see it, much less do they seem to remember that every old castle once had its outer court, and that this court had a special name. Where *zwingers* exist they are called in common parlance, simply "outer-courts."

In Berneck, Falkenstein (Fig. 29) and most western castles of small dimensions, the zwinger is a mere strip of ground behind the rampart. In the Wartburg its form is an irregular polygon. In Castle Eltz, in the Albrechtsburg, in Schönau Castle, in the Heldburg (see plan, Fig. 30) as indeed in most all mediæval seats, the are situated on hills, the plan of the zwinger depends upon the conformation of the castle's site, as to the zwinger's outer boundary, and on the conformation of surrounding buildings, as to the inner lines.

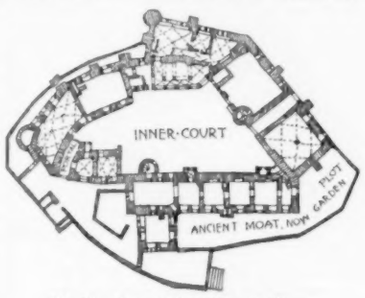


Fig. 30. Ground Plan of the Heldburg.

Extremely few courts are geometrically exact in design. The exceptions belong to dynastic strongholds, or to semi-military castles such as the Marienburg. Down to near the seventeenth century there was no stress laid upon having even the inside courts of castles faultlessly regular; not even in the periods when these courts were the very heart and centre of architectural display, as is proved conclusively by the way the famous inside court in the castle of Heidelburg was left by the castle's princely restorers and builders. How much less likely was it that accurate attention should be given to zwingers from an æsthetical point of view! to zwingers, that were out of the sight of my lord's family! It was, in truth, hardly likely; and we find, as a matter of fact, that zwingers never enjoyed a period of consideration and architectural elaboration. The mediæval ring-wall of castles evolved the balustrades and fences of the Renaissance; while the moat transformed itself during the course of time into the lakes and canals of modern castle parks. In the like manner has the conventional castle tower developed out of the feudal *burgfried* or donjon; and balconies, turrets and oriel windows are decorative transformations of the plain, practical *pech-nasen* and watch-towers of feudal times. But what has the mediæval zwinger in its turn evolved? Why, in France, the response may be, the *cour d'honneur* was evolved from outside courts; and plenty of German castles have courts of honor. Yes, we must answer, but a copy is not an evolution; and such castles with courts of honor as exist in Germany are direct imitations of French châteaus. We return to our first question again, therefore, and ask, what has developed out of the zwinger? I think we must say, nothing; nothing, so far as domestic architecture is concerned; nothing, it is meant, that is characteristic; that is national and normal; nothing that is a parallel to the *cours d'honneur* of French architecture.

Native German authors unfortunately do not dwell upon the topic, yet the subject has a certain interest, and I will not withhold the reflections that have occurred to me in pursuing it. And first, it is necessary to remember that the function of zwingers was two-fold. In times of war, such an outer-court was a capital defence, for it was like a trap. Generally the *burgfried* over-towered it, and it was enclosed on two or three sides by high buildings, and on the outer side by the rampart, so that persons within the court were exposed to missiles from above. A miniature copy of it was the "cage" of mediæval and sixteenth and seventeenth century town-gates, in which space was left between the outside portals that opened from the highway and the inside door that led into the town street, and travellers, when once admitted within, by either entrance, could not continue their way any farther before the next gate was opened. The second function of zwingers was, indeed, very nearly the same as this of town-gates, or of taking up and collecting visitors. Even when the identity of these visitors was unsuspected, when they were invited guests, a halt somewhere was inevitable after crossing the drawbridge. It was impracticable for all the members of a cavalcade to dismount at once; one guest had to wait for the one before him to pass with his crowd of retainers through the portal into the inside court. We know from old ballads also, that the strict separation of high-born attendants, freemen and serfs made some separate stopping-place in the rear necessary for these latter. The zwinger, as an outside court, afforded such a place. Menials therefore, remained in it, while the higher-born members of cavalcades passed forward into the inner court of the castle. Somewhere and in some way all comers were gathered into the precincts of the *schloss;* the carriages and attendants of guests were not left to stand in straggling lines in public view, as occurs in our own day. Long after the zwinger became useless as a means of defence, it was valued as a place in which to dismount; and the rich and courtly nation of the French, when they took up the inside court into the bosom of the palace, under the name of "vestibule," spread wings about this remaining outside court of hospitality, and enclosed it on three sides, dubbing it chivalrously with the new name of "court-of-honor." Germans, on the contrary, kept poor and made practical by rebellions and thirty years of continuous war, let the zwinger go out of use. They developed, instead, their inside courts, further transforming them into spacious *wirthschaft*, or barn-yard courts. The division of Germany into very many petty principalities may also have contributed to this striking difference between the arrangements made for the reception of guests in France and the Fatherland: for there being divers courts for the aristocracy of the land to

[1] Continued from No. 842, page 105.

resort to in Germany, no single one ever counted such a multitude of attendants as did the one supreme French court at Versailles.

I incline the more to speculate in this strain, perhaps, because I have found, while looking up the history of the origin of the Dresden Zwinger, that it was built when the Saxon court outnumbered the court of any other kingdom in Middle Europe, and was intended exclusively, moreover, for the *guests* of the king.

Its real creator was Augustus the Strong, for it was he whose tastes transfused society during more than a generation, making it pompous and elegantly gay, precisely that which this building represents. Poppelmann, the court architect, who designed it, was a Dresdener by birth, in touch with the peculiar life of the society to whose wants he administered, and in sympathy, from habit and constitution, with the ideas and plans of his magnificently licentious master. Never, perhaps, has a local society and period been embodied more adequately. Better societies and better periods have come short of immortality, while architecture has been destined to keep the times of Augustus alive in his unique "zwinger:" in the fine court that spreads itself over the earth like a kingly mantle, the fringe of which is composed of a low, broad, stone edifice, adorned with sculptured pots of exquisitely arranged fruits, garlands of flowers and troups of fauns. Yet but for a kiss — the kiss which Elector John George gave to his mistress, dying of the black pox — the Zwinger would not have been! What a fact for one's reflections when standing of an afternoon in the gay court, with a slanting sun in the western sky, and the smiling, insouciant company of fauns seeming alive, these bending to offer their backs as pedestals for flowers, and those clambered up onto the columns to proffer theirs to the arches, and to grin under their arms at the dames and gallants who came by! What a reflection, and what — a comfortable reflection! At any rate, I, for one, am thoroughly glad of that kiss and of the fatality that lay in it: one is so harassed in this world by one's demoniacal, social and æsthetic conscience, forcing one to ever seek the austerely beautiful, that it is a relaxation to find one's feet on a spot devoted to conscienceless gayety, and one's eyes resting on stones that laugh. Architecture is not any more degraded by the Zwinger than English literature is by Milton's poem, "*L'Allegro.*" And since Augustus built the Zwinger, and not Elector John George, who cares at this date that John George died, and that his younger brother came to the throne of their forefathers! John George's career would have been as shameless as his brother's was if it had continued, and might have been without the light veil of art and romance which Augustus, after all, did keep thrown over the doings of his reign.

This reign, which lasted nearly forty years, began in 1694, when Augustus was in the twenty-fifth year of his age. A year earlier, in 1693, he had been married to Eberhardine, a princess of the house of Brandenburg-Culmbach, a province that is known in our day for the excellence of its beer, but which was distinguished in the seventeenth century for its Lutheranism. Before his marriage, Augustus made the grand tour, and had seen a good deal of Versailles and the court of Louis XIV, which court had flattered him greatly: first, because of the rank of his family, which came next in power to that of the imperial family of Hapsburg, and, secondly, because of his personal endowments. His stature was of princely grandeur, and his strength prodigious. He broke the bronze vases of the *salons* of the Queen as easily as the courtiers cracked jokes, and, if the palfrey of a lady lost a shoe, he would pick the iron up and break off bits gallantly in order to preserve them as keepsakes. One can easily fancy how welcome a well-bred giant was to the bored court. Augustus, on his side, admired *Le Grand Monarque* sincerely, that which struck him most being the invariable stately decency of Louis's demeanor. When he began to keep favorites like the French king, he copied this demeanor, choosing his favorites from among ladies of rank, and observing in his public intercourse with them a pompous decorum — architecturally, a fact that is of considerable importance, since it aids in explaining the refinement of the works of every kind which Augustus constructed for this folk, his favorites, who occupied the field early in his career as king, and remained the mistresses of his court so long as he lived — poor Princess Eberhardine, his consort, having retired to a solitary castle (Pretch) in the country, resentful and implacable. No building is to be attributed to her influence, nor, indeed, can any of the numerous structures of the king in Dresden be attributed to the martial side of his career. He raised no columns of Victory and adorned no Pantheon with sculptured trophies. This interest as respects the things of war was limited, significantly enough, to such things as adorn the persons of warriors, or to armor and fine trappings. Of these, the products of industrial art, he made a fine collection, and showed them on his own fine person, when the opportunity allowed, to his guests and the court.

How much is architecture indebted, on the other hand, to the amatory side of the career of Augustus the Strong, to his loves and favorites! Aurora, Countess von Königsmarck, caused little, perhaps, to be built directly, for she demanded nothing for herself; but to Moritz, Field-marshal of France, her son, is due the decoration of the west gallery of the Dresden Castle and portions of the Château de Chambord. Moritzburg was first repaired under the *régime* of Countess Hierserle, the wife of Augustus the Strong's subservient court-marshal, and the regal palace in Warsaw under the *régimes* of Princess Lubomirska and the Princess of Teschen. Countess Cosel, who consented to replace the Teschen upon the condition that Augustus would give her a written and signed promise, first to divorce her from her husband (the king's Minister of Finance), and later, if the Electress Queen died, to marry her, built, as the king's mistress, continually and extravagantly. Thus to her instigation are owing the Renaissance repairs of Schloss Pillnitz (the regal country palace on the Elbe); secondly, the reconstruction of Schloss Cosel; and, thirdly, the erection of Palace Cosel, the present headquarters of the Dresden police.

Dresden artists and artisans must have received high, practical training under this favorite's sway. A sum equivalent to a million dollars went into the mason-work, carvings and cabinet-work of Palace Cosel alone; the chronicles of the time that mention the fact mention it with wonder and admiration, and giving details of the cabinet-work. We on our side must not forget to pass on, after once recording the building, in order to point to further favorites and to some of the circumstances that produced buildings and builders in luxuriant numbers, during this prince's reign, enabling him finally to erect an eminently successful architectural work. I think of the connections, namely, which Augustus sustained with the first officials of the crown: Count Fleming, Count Watsdorf, Count Vitzthum and others. Pretty nearly all of these dignitaries had sacrificed some female member of their families on the altar of the "King's Majesty," and had been allowed to amass great riches in consequence, which Augustus required them to spend in building. Count Hoymb, the minister of finance was tardy; but he had begun planning to build when his divorced wife, Countess Cosel, lost favor with the king. For this event occurred, as we read, in 1711, just when the first stones began to be laid for the Zwinger, all the plans for which the clever, stately dame had seen and judiciously approved. She was in Dresden and viewing the stones when she heard that a rollicking, curly-haired Polish countess was bewitching Augustus in Poland. Straightway she set out to Warsaw to confront the pair. But the king's chamberlain forced her to return to Palace Cosel; and when Augustus arrived in Dresden she was forced to retire from Palace Cosel to Schloss Pillnitz. In Pillnitz she was ordered to hand over the king's written promise of marriage, and, refusing with spirit, was destined by Augustus to be overfallen by royal guards. But Countess Cosel promptly sped her in disguise down the Elbe in a boat, past the lighted windows of the Dresden castle, and then in ahackney coach, over the Prussian boundary, to Berlin. Here she threw herself upon the mercy of Frederick Wm. I, who promised on his royal word of honor to protect her; and who did, in truth, shield her until the court of Dresden explained to him how advantageous it would be for him to have Augustus his friend, in regard to the matter of annexing Pomerania to Prussia. Then, naturally, the noble Frederick William, like his regal colleagues everywhere, saw fit to "think better" about the countess; and as a result of this better thinking she was seized in her house in Halle, by soldiers, and conducted forcibly back into Saxony. On the Saxon boundary, Saxon soldiers then took her and incarcerated her, at the order of Augustus, in the *burgfried* of Castle Stolpen, the *burgfried* — this last residence of "the grand favorite," being also restored from its ruined state to receive her.[1] In Dresden, meanwhile, the curly-haired Polish Countess Dönhoff was reigning over the court and purse of Augustus; and the Zwinger was being finished. Augustus contemplated erecting a castle, and his architects made plans for it whose contours embraced the streets and places that are now occupied by the Italienisches Dorfchen (Resturant Helbig), the Hôtel Belle Vue, the Royal Opera, the Gallery of Paintings, the Guard House and the Catholic Church. Nothing, absolutely nothing, was too extensive and costly for this inured spendthrift. But Architect Poppelmann must begin with the court first. His Majesty's subjects were getting very morose, and Countess Cosel (and after her Countess Dönhoff) would not bear seeing their long faces when the king held tournaments and gave fêtes in the town square (*Altmarkt*). Besides Prince Augustus, his son, was to be married to an Austrian princess, and hence the urgent need of a place for masquerades and bridal processions.

So much respecting the origin of the Dresden Zwinger and the purposes for which it was designed.

The court itself was entered, in former days, from a bridge over a wet moat, which is now filled-in and laid out to form a public garden (see Illustration), a portion of the water-wall of the old moat being visible still at the foot of the colonnade-like wings of the pavilions in front. The portal was on the ground-floor of a portal-tower, according to the approved custom of ages. According to custom, too, a second portal was planned vis-a-vis to the first, the space between being surrounded by buildings, so as to render it cage-like. All the regular, conventional parts of old-fashioned zwingers, in short, were retained faithfully. But to what arbitrary modifications were these parts gaily subjected! The sinister, massive portal-tower of feudal strategy breaks open its walls and rises like a decorative, slender tiara: the rampart on either side dissolves into a hundred-windowed colonnade; the barns and stables and retainer's houses into two-storied pavilions of lavish richness, without and within. The surface of the court also is taken in hand and levelled as smoothly as those marble floors in the palace the price of which the king's heir was later to write wrathful notes about — all was levelled for Augustus — and he could boast that the steeds of no other prince of his

[1] Castle Stolpen after being rebuilt, was used exclusively as a prison for the Cosel, whose confinement in it began in 1716, when she was thirty-six years of age, and ended with her death in 1765.

country pranced over more spacious, flatter ground; that no other courtly guests viewed the steeds' prancings from in-doors when the weather was cold and from out-doors with more ample convenience, and lunched and drank in pavilions more exquisite.

We are of the same mind, and we are glad to see that Professor Dohme in his new "*History of German Architecture*," pronounces the Zwinger also unique. The illustrations will show its fine peculiarities. There is only the date of its building to be subjoined, namely the four years between 1711–1715. L. v. KROCKOW.

THEATRE BUILDING REGULATIONS.[1]—II.

APPLICATION TO THE AUTHORITIES.

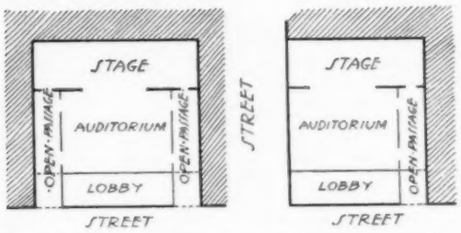


Diagram illustrating the location of the open passageways for Theatres, as required by the New York Building-Laws.

THE first regulation of the London County Council deals with the form of application to be made by persons about to build a theatre, and sets forth the drawings that are necessary to accompany the application.

Every person, who for the first time after the making of the regulations is desirous of obtaining authority of the Council to open any premises within the County of London, must first make an application in writing to the Clerk of the Council for a certificate under the Metropolis Management and Building Acts, Amendment Act, 1878.

The application must contain a statement as to the nature and extent of the interest of the applicant in the premises, and the character of the entertainment for which the premises are proposed to be used, and be accompanied by complete plans, elevations and sections, drawn on tracing-linen, to a scale of one-eighth of an inch to a foot; and by a block plan showing the position of the premises in relation to any adjacent premises, and to the public thoroughfares upon which the site of the premises abuts, drawn to a scale of not less than one-twentieth of an inch to a foot.

The drawings must be colored to distinguish the materials employed in the construction of the building; the width of all staircases, corridors, gangways and doorways, together with the heights of the tiers, and other parts of the building have to be figured on the drawings.

The thicknesses of the walls and scantlings of the various materials must be clearly shown by figured dimensions, and the cardinal points marked upon each plan.

The drawings have to be accompanied by a specification of the works to be executed, describing the materials to be employed and the mode of construction to be adopted, together with such other particulars as may be necessary to enable the Council to judge whether, when the premises have been completed, the requirements of the regulations will have been complied with.

The drawings must also show the respective numbers of persons to be accommodated in the various parts of such premises, and the area to be assigned to each person.

With regard to the preliminary formalities imposed by other countries they are principally of a formal character: in Paris it is necessary to send to the office of Public Instruction and Fine Arts a triplicate set of detail plans before beginning building operations. After these plans are passed, no modifications or alterations are permitted without complying with the necessary formalities. This, of course, is provided for in other countries.

It is worth mentioning that in Austria the manager is compelled to keep in his office an accurate set of plans, showing the pipes and wires laid down for lighting as well as a set of drawings showing the disposition of all seats and gangways. So also a plan of each tier or gallery must be hung conspicuously in that tier, with a copy of the rules, so as to afford the public an opportunity of understanding the various positions and situations of staircases, doors, etc. This is a very wise provision as is also the one, that pamphlets with plans at a reduced scale and copies of the rules should be kept on sale at the ticket-offices of the theatre.

In New York, plans of the tiers have to be exhibited in the building in a conspicuous place.

In Hamburg the plans deposited at the Police Building Office, must show the iron construction, the arrangement for heating, the water-supply, hydrants and gas-supply, the proposed use of every compartment and the number of persons for whom they are intended, so that in addition to the number of persons to be accommodated in the various seats, it is necessary to detail how many will occupy each dressing-room or workshop.

The plans of a theatre in Brussels have to pass the Public-Works Department, the Gas-Department, the Water-Department, the Sanitary-Department, the Chief of the Fire-Brigade, the official architect and the special commission upon theatres. One could easily imagine that it must take some time to obtain the official approval of a set of drawings of a theatre in Brussels, as the chief of each of the departments I have mentioned has to examine the application and draw up a report thereon. When an application has been granted the same officers have to make a fresh survey of the premises to ascertain if the conditions imposed by the Council have been fulfilled, and the building is not allowed to be opened until after such survey.

A somewhat similar course is adopted by the London County Council, but after the final survey if the superintending architect's report is favorable, a certificate as to the structural safety of the building is issued by the Council to the licensee. Armed with this, the applicant then applies for his dramatic, music or dancing license.

In all places of public amusement and instruction already erected in New York City the halls, doors, stairways, seats and aisles must, to facilitate egress in cases of fire or accident, be so arranged as the Superintendent of Buildings, with the concurrence of the Board of Fire Commissioners, may deem necessary for the public protection in such case, and all aisles and passageways in the building must be free from camp-stools, chairs, sofas, stoves or other obstructions, and no person is allowed to stand in the gangways during the performance. The Superintendent of Buildings and Board of Fire Commissioners have the power to make regulations binding on the owner, lessee or manager of any public building used for the assemblage of the public, and no building can be opened without the approval of these authorities.

SITE.

The next regulation of the London County Council is as to site, and on this point it is scarcely fair to compare the laws laid down in cities like London and New York with those enforced in Continental cities where State aid is procurable. The rule which I shall quote in full is new to London, no restriction as to site having been embraced in former regulations issued by the authorities:

"One-half at least of the total length of the boundaries of the site of any such premises which consist of an entire building, and in case of a room or other such premises not consisting of an entire building, one-half at least of the total length of the boundaries of the site of the building of which such room or other such premises form part, shall abut upon public thoroughfares, of which one thoroughfare at least shall be not less than forty feet wide, and of the remainder none shall be less than thirty feet wide if a carriageway, or twenty feet wide if a footway.

"If, in compliance with Regulation No. 10, an additional passage or way should be necessary, it may be provided by means of a private passage or way.

"Such passage or way shall not be less than ten feet in width, and under the complete control of the owner of such premises, and no doors, windows or other openings of the adjoining premises shall communicate therewith, or overlook any portion of such passage or way.

"No such premises shall be erected upon a site within twenty feet of any windows or other openings belonging to any other premises overlooking the site."

Regulation No. 10 referred to herein, reads:

"Two separate exits, not leading into the same thoroughfare or way, shall be provided to every tier or floor of such premises.

"If any tier or floor shall be divided into two parts, two separate exits, not leading into the same thoroughfare or way, shall be provided to each of such parts.

"Such exits shall be arranged so as to afford a ready means of egress from both sides of each tier or floor, and shall lead directly into a thoroughfare or way."

Perfect isolation is demanded in Austria for the larger theatres, but theatres holding less than six hundred spectators may have the wall at the back of the stage abutting on other houses. The other three sides must be free.

In St. Petersburg, Brussels and Italy, isolation is insisted on. When the open space is less than ten feet six inches wide there must be no windows belonging to adjoining premises overlooking a Brussels theatre.

The rule as to site enforced in New York City is a very good one indeed, and I must quote[2] it also in full on account of its excellent provisions and simplicity:

"Every theatre, opera-house or building hereafter erected for theatrical, operatic, or for any public amusement, or the remodelling of any building for the aforesaid purposes shall have at least one front on the public highway or street, and in front there shall be suitable means of entrance and exit for the audience. In addition to the aforesaid entrances and exits on the public highway there shall be reserved for service in case of emergency, in every such building, an open space equal to one-sixth of the width of the building, outside to outside measurement, and in no case less than eight feet in width in the clear, in its narrowest part, on the one side not bordering on the street. A separate and distinct corridor must be provided to continue from the open spaces to the street through such superstructure as may be built on the street side of the auditorium; these corridors must in no case be reduced in width more than required for the thickness of the outer wall forming the one side of

[1] Continued from No. 851, page 39.

[2] The extract was made before the recently amended law was promulgated.

the corridor, nor are they to be more than three feet narrower than the open spaces. The openings to these corridors must have doors or gates opening towards the street, the outer or street gates may not project beyond the street line when opened. Recesses not exceeding four inches in depth are to be left in the walls at the sides to receive the gates when open, so as not to diminish the width of the exit. During the performance the doors or gates must be kept open by strong locks.

"With regard to the compulsory open spaces at the sides of a New York theatre, they must at no time be used for storage purposes or for any other purpose but the legitimate use of exits. The level of the corridors from the open spaces must not be more than one step above the sidewalk.

"When a theatre is located on a corner lot, and on both sides of such building where there is but one frontage on the street or public highway the said open space to begin from the line of the proscenium wall and to extend the full length of the auditorium proper to the wall separating the same from the entrance lobby or vestibule."

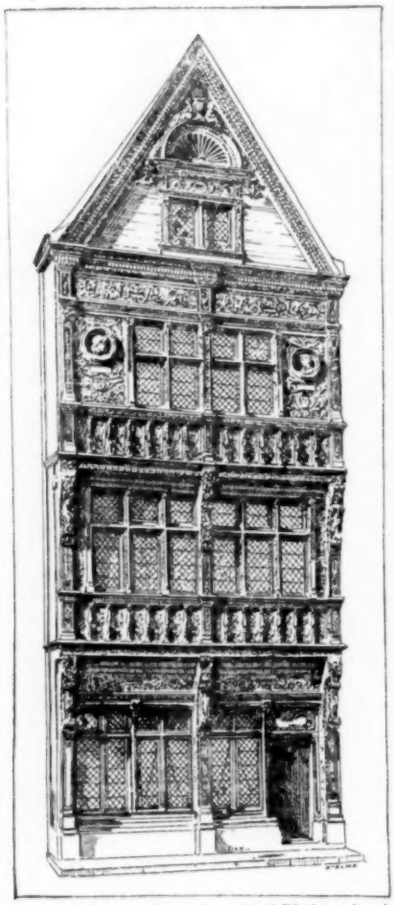
Theatres in Paris may be built either attached or detached. In cases of their being detached, there must be left on all sides, with the exception of those adjoining the public way, a clear space or passageway not less than nine feet ten inches wide, provided the neighboring houses have no openings upon the said passage. If such is not the case, the width must be increased in proportion to the size and general arrangement of the building.

No doorway may be formed between the passageway and the adjoining premises in case the theatre is detached, nor any communication formed between any portion whatever of the theatre and the adjoining premises, in case the theatre is attached.

E. A. E. Woodrow.

[To be continued.]

LITERATURE AND ARCHITECTURE.[1]



House at Rouen. From Havard's "*Dictionnaire de l'Ameublement.*"

But literature has another relation to architecture, or, perhaps, I should say to architects. It is nearly a score of years now since I first entered an architect's office. In my day it was the exception to find an architect's pupil or assistant who was also well read in his own literature. He worked at his office all day, and if he were earnest and industrious he spent a majority of his evenings over his drawing-board or his books of professional reference. Nowadays, perhaps, his leisure is even more fully occupied with studies having direct bearing upon his profession, for examinations appear to be the chief end of architectural man. Of all artists an architect is the better craftsman in direct ratio to the width and extent of his general knowledge. One can just barely conceive that a great painter may be ignorant of everything save of a technical knowledge of his craft and of an intuitive knowledge of human nature, but there is hardly a fragment of general information to be acquired which may not at one time or another be of inestimable service to the architect in the direct line of his profession. The great genius, perhaps, who appears in a decade of centuries is, of course, superior to all rules and regulations, and is, to a certain extent, complete within himself. I am, however, not speaking to a roomful of geniuses, but rather to a body of men of talent and artistic taste. To such I would say that it is at least necessary in my opinion for an architect to have an appreciation of the higher forms of literature as it is for him to be able to properly calculate the strain on an iron girder. Now, appreciation without familiar knowledge is a contradiction in terms, so that it is evident that a portion of the working day or night should be as sedulously set aside for the assimilation of general literature as for other more definitely and distinctly professional branches of study. Our contemporary architecture suffers, more than from any other cause, from want of imaginative faculty, and this want arises from widespread indifference to imaginative literature, characteristic not of the architect alone, but of the majority of our well-educated and refined upper classes. Imagination is, beyond a certain point, more or less of a habit of mind, and can be developed or retarded by circumstances and surroundings exterior to, and independent of, itself. We may starve it, or feed it, and to carry the analogue a little farther, we may stunt its development as effectually, by confining it to one species of food alone as by depriving it of sustenance altogether. Thus, though the benefit may not be objectively apparent, you may quicken your capacity for original designing quite as successfully by reading and enjoying an act of "Hamlet," or one of "The Idylls of the King," as by committing to memory a chapter of Fergusson or a page or two of Gwilt. Nor, again, should it be forgotten that the narrowness of mind which is the inevitable consequence of an indifference to literature is of all intellectual faults most to be avoided by the architect who, by the very nature of his art, is bidden to enlarge to the very widest extent the horizon of his sympathetic appreciation. Without culture you can hardly hope for refinement, a lack of which quality in your work is, as you all know, one of the most detestable of faults.

I have endeavored to make clear to what degree literature is the creditor of architecture. But is the balance all on one side? I hardly think so. If it had not been for the inherent poetry and mystic imagination, for instance, of Nôtre Dame de Paris, we should have never enjoyed what, from some points of view, is the masterpiece of Victor Hugo, and Quasimodo and Esmeralda would for us have never been. To the same cause, though in a somewhat more indirect manner, those wizardries of the North, the "*Waverley Novels*," owe their very existence, while how much of William Morris and of Rossetti, as we know them, is due to the influence of the late Gothic revival I leave you to judge for yourselves. I doubt, indeed, if much that is characteristic in Browning's later volumes is not due to the subtile influence of the sun-kissed, weather-stained marbles of the Italian Renaissance with which at various critical periods of his poet's life he was surrounded. Finally, there is no manner of doubt in my mind that literature has to thank architecture far more than architecture has to be grateful to literature for the gift of that master of melodious phrase, that great prose poet of the century, John Ruskin. It is architecture itself that the "*Stones of Venice*" and the "*Seven Lamps*" have to thank for their existence, and it grows with each year more clear to our eyes that, despite his marvellous rhetoric, despite his riotous wealth of eloquence, Ruskin has impressed the literature of his generation with a seal more enduring than that with which he has stamped its architecture. Ruskin apart, has any literature of an ennobling eloquence been devoted to the service of architecture? To my knowledge, at least, none. We have our Fergussons, our Parkers, our Gwilts, but how little else? Trustworthy educational treatises, encyclopædic in style, even if absolutely reliable in fact, are but a poor return for Literature to pay you for all she owes to your art. It is surely somewhat humiliating for us to consider that the majority of such architectural works as can claim to be really literature, and not mere samples of book-making, are, as the phrase goes, "made in France" or "in Germany," as the case may be, for we have, alas, no Viollet-le-Duc to adorn his subject with grace of manner and charm of diction, as well as to bring to it the treasured results of a lifetime of patient and laborious investigation. Even the books of that intermediary rank which act as a sort of link between the professional man and the layman, are much fewer and farther between than should be the case in a country the average level of whose literary culture is so high as that of England. Nor are the reasons for this difficult of recognition; the fault is not wholly upon one side or the other. It is only within the memory of the last generation that the great majority of architects have caused their own profession to be estimated by the outside world as worthy of that dignified position which is now universally accorded to it; while, on the other hand, outsiders have never felt, for they have never been taught to feel, an interest in architectural technique, comparable to that with which they have ever regarded the technical aspects of painting and sculpture. That something more than mere taste or general education is necessary to enable them to justly estimate an architectural creation is a somewhat novel idea to the vast majority of the public. This indifferent, well-nigh contemptuous, attitude towards the art itself has reacted naturally enough upon its professors, and is curiously reflected in the attitude towards architects assumed by the practitioners of the art of fiction. An essay upon the appearance of the architect in fiction would be almost as brief as the celebrated chapter on the Snakes of Ireland, and for the same reason. Dickens, however, whose portrait-gallery is hung with the counterfeit presentments of representatives of nearly every trade which is to be found within the covers of the London Directory, has not forgotten the architect, and painfully suggestive, too, is his method of treating our honored profession. Mr. Pecksniff, as you will remember, is perhaps the most offensive of the amazingly offensive personages by whom the action of "*Martin Chuzzlewit*" is carried on; so offensive

[1] Extract from a paper by Mr. Horace Townsend read before the Architectural Association, and printed in the *Architect*.

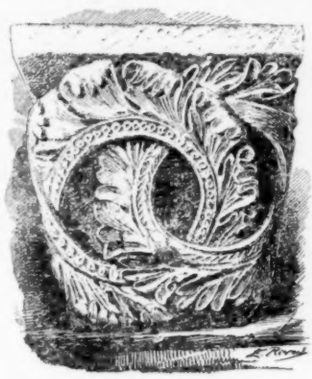
indeed is he, that he has been declared to be an altogether impossible personage. Certainly he is an absolutely impossible architect, and the ignorance displayed by the author of those details which would have helped to give *vraisemblance* and local color, as it were, to his creation, is little short of surprising. In introducing him to us the author remarks that "of his architectural doings nothing was clearly known, except that he had never designed or built anything, but it was generally understood that his knowledge of the science was almost awful in its profundity," and further that "Mr. Pecksniff's professional engagements, indeed, were almost, if not entirely, confined to the reception of pupils" — for the collection of rents, with which pursuit he occasionally varied and relieved his graver toils, can hardly be said to be a strictly architectural employment. And yet but a few pages farther on we find Mr. Pecksniff has evidently been invited to send in a set of competitive drawings for a new grammar-school. Not only does he do this, but he uses for that purpose a set of plans which had been drawn in the course of a very few days by young Martin Chuzzlewit, who, whatever his other valuable qualities may have been, was clearly as ignorant of the practice of architecture or of the principles of design as a new-born babe. And yet these plans are successful, and win the competition. More than this, Mr. Pecksniff, though bereft of the services of his only assistant, and himself engaged in non-professional affairs which take him here, there and everywhere, somehow manages to prepare the working-drawings, and to be present at the laying of the foundation-stone by "the member for the gentlemanly interest." After this, as far as the book is concerned, he ceases even to be nominally an architect. The one redeeming quality which I can find in the character of this libel on an honorable profession is that he recognized the importance of literature to architecture. "Various books," he is reported to have observed upon one occasion, waving his hand towards the wall, "connected with our pursuit I have scribbled myself, but I have not published."

That Thomas Hardy, the only other novelist of distinction who, to my knowledge, has made of an architect a seriously-considered character, should have displayed a more intimate knowledge of the subject is not so surprising, for, before he was a novelist, Mr. Hardy was himself an architect. Much as I admire these works of imagination with which the distinguished biographer of Wessex folk has presented us, I am at times tempted to regret that he did not remain longer in his original profession, and use, in a measure at least, his literary gifts in her service. We should have gained a work of the highest degree of literary merit with the name of a real live architect upon its title-page.

Finally, a word must be given to the periodical literature of architecture, and here, I suppose, I am treading upon somewhat delicate ground. I think, though, that I voice the sentiments of some of you at least, when I declare that ideal provision has not yet been made for us in that respect. Year by year the architectural profession is counting upon its rolls fewer who look upon it as a mere business, and more who regard it as a sacred art. The paths of the contractor and the architect daily diverge more and more, and though I have no words save of praise for those organs which at present represent so worthily the entire community which depends upon the art of building, I do not think that the ideal architectural paper is yet in existence. It will as I conceive it, when if ever it does arise, concern itself not with architecture alone, but with all those subsidiary arts which she has enlisted in her service, and with those artistic crafts which are subordinate only because they differ in degree and not in kind. It will be, from its inherent interest, the medium which shall bridge over the chasm which now seems to cut off so effectually the architect from the general community, a chasm the existence of which is due only to hereditary ignorance of the latter and the hesitation of the former to assume that position which, in the empire of art, is his inalienable right. It will be a model of all that the representative of artists should be in regard to its printing and its illustration, while in its pages will be found that perfection of literature which is only possible when the men who write concerning an art of whose principles they are thoroughly cognisant are also thoroughly informed with the principles of the literary art itself, and have recognized that the two are one and indivisible.

FOREST FIRES AND THE LUMBER INTEREST. — Director Powell, of the United States geological survey has had charge of the inspection and survey of the arid lands of the western mountain region. His effort has been directed to mapping the country into districts so as to include in each a water-supply, agricultural area and timber resource. In his report he states that his map shows 150 districts, each provided with the requisites named. In reference to the timber question, he says he has been charged with both advocating the preservation and destruction of timber, which would imply a direct contradiction. In reply he states that he has urged the necessity of preserving the forests in arid territory from destruction by fires, while he has advocated the permission to use timber by the inhabitants as good policy, since they will, in that case, have an interest in preserving what is useful to them. He holds that fires are the chief menace to the preservation of forests, not the use of the timber by the people living in contiguous territory. Mr. Powell recommends that each arid district be governed in respect to water-rights, timber, etc., by the people residing in it who will better provide for the local requirements in each case than could be secured by a general law governing all the districts as a whole. — *Northwestern Lumberman.*

WASHINGTON AND ITS PUBLIC BUILDINGS.



Romanesque Capital from the Cathedral at Autun. From *La Construction Moderne.*

FEW questions of Government legislation bear so seriously on the future interests of Washington as the style and location of the public buildings to be erected here by the Government. A most important bill is that one recently introduced by Congressman Tarsney, of Missouri, looking to a provision by which the plans for the design and construction of United States public buildings shall be open to competition among the architects of the country, instead of all being under the control of a single Supervising Architect of the Treasury. But, so far as Washington is concerned, side by side with the question of public buildings, must be considered that of their location, else the national capital will lose in the result half of the effect to be produced even by the most worthy and imposing design in the buildings themselves. Immediately before Congress are the projects for erecting the new District buildings and the new Government printing-house. What attention has been given or is likely to be given by the Government or any one to the thought of placing these buildings where they will tell most effectively for the dignity and beauty of our capital city? Is there any good reason, keeping always in mind that of public convenience, why the projected Government printing-office should not be erected on the avenue, and so designed as, with the District buildings, to form a harmonious and imposing line of fronts, which might, together with the new Post-office Building, go a good way toward redeeming our great national thoroughfare from its present architectural meanness. There are sites on the south side of the avenue conveniently near to the railroad, which certainly would be as appropriately occupied by a Government printing-office as by the present occupants, and the avenue would gain greatly in dignity and beauty if the right sort of building could be erected. This does not mean necessarily a showy and pretentious structure, but one of simple but pure design, and conceived in harmony with other buildings to be on the line. It might do much worse than follow the simple lines of that which is now by far the most satisfactory and worthy architectural front on the avenue — that of the Metropolitan Hotel. What the avenue needs is not a succession of patches or narrow sections taken from as many different architectural schemes, but long spaces quietly and harmoniously treated and designed to impress by their extent alone. Why should not whole squares be occupied by Government office-buildings, the lower stories being devoted to shops for public convenience, and protected from the sun by graceful arcades, like those of the Rue de Rivoli in Paris? This would be much better provision for shade than the few irregular and scraggy trees, which at present only serve to keep up a kind of village cross-roads aspect on our much-boasted national avenue. Or why should Congress locate extensive Government buildings in remote and scattered positions, and leave our most conspicuous and, so far as space is concerned, our grandest thoroughfare to be occupied by rows of very ordinary and, here and there, unsightly structures? Is it not evident that the time has come for the Government to seriously consider some wise and broad plan for the architectural growth of the city, and especially of the chief avenue? What the city of Washington might now have become without the magnificent street-plan adopted by the first President of the Republic and strictly adhered to by the Government ever since, such it is now in danger of becoming in its general architectural aspect unless Congress, with timely forethought, shall adopt some measures for the control of public building in the District according to some broad and comprehensive plan worthy of the dignity and grandeur of the national capital. Without any hasty expenditure, but by the exercise of a wise precaution and direction, it remains for Congress to effect such a transformation of the great avenue of the capital architecturally as was made of it as a roadway by Governor Alexander Shepherd.

The bill introduced by Mr. Tarsney is in the right direction. The movement for the new District building and a new Government printing-office are hopeful in their way, but what is really needed to enable all these movements to reach the best result is some provision which the Government should now make for a bureau of public building or a commission of architecture, which shall take a comprehensive survey of the whole field, both of the design and the location of our public buildings and monuments, and see that the vast expenditures of the people's money, which sooner or later will have to be made for these purposes, are turned to the best results in enhancing the beauty and the dignity of the national capital. This can only be effected by following a well-conceived plan, like that of L'Enfant, in laying out the city. If left to haphazard selection, the opportunity that comes but once to a capital and government like ours will be lost for an indefinite time, if not forever. — *Frank Sewall in the Washington Evening Star.*

COMPARATIVE MUNICIPAL BUILDING LAWS. — VIII.

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

Masonry Walls.

Boston: — *a.* All walls of brick, stone or other similar material,
b. Shall be thoroughly and practically bonded and tied, and solidly put together,
c. Shall be built to a line, plumb and straight,
d. Laid with mortar or cement,
e. All supports of the same shall be of iron, brick or stone, and of sufficient strength to safely support the superstructure.

Baltimore: —

Brooklyn: — *f.* All stone walls less than 24″ thick shall have at least one header extending through wall, in every 3′ 0″ in height and 4′ 0″ in length of wall; and if over 24″ thick shall have a header extending 2′ 0″ into wall, for every 6 superficial feet on both sides of wall.
g. All headers to have, least width 18″, least thickness 8″.
h. All headers to be good flat stones dressed on all sides.

Charleston: —

Chicago: — *i.* Cellar and foundation walls must when possible be rendered impervious to dampness.
Asphaltum or coal tar pitch is recommended in addition to hydraulic cement.

Cincinnati: — *j.* Every wall constructed of brick, stone or other incombustible substance, solidly put together with lime or cement mortar, and properly bonded.
k. Cut stonework, properly cramped and anchored to backing.

Cleveland: — (*j*); (*k*).

Denver: — (*a*); (*b*); (*c*); (*d*); (*e*); (*f*); (*g*); (*h*).
l. All stones shall be laid with level beds, top and bottom.

Detroit: —

District of Columbia: — (*a*); (*b*); (*d*).
m. Cellar or basement walls, Dwelling-houses, below surface of ground fully protected from dampness by exterior covering of hydraulic cement or slate.

Kansas City: — (*a*); (*b*); (*c*); (*d*); (*e*).

Louisville: —

Memphis: — (*f*); (*g*).
n. All headers laid on natural bed.
o. Walls, piers or parts thereof shall not be laid in freezing weather, nor built upon if frozen.

Milwaukee: — Water lime cement in all masonry foundations exposed to dampness.

Minneapolis: —

Nashville: — Walls shall be built, (*e*), with all close joints. All joints well slushed or grouted.
Twenty per cent of a stone wall shall consist of headers which run entirely through the wall.
Hoisting machines braced so as not to shake or rock building during construction.

Newark: — All walls below curb level shall be laid in cement.

New Orleans: —

New York: — (*a*); (*b*), with close joints, (*c*); (*f*); (*g*); (*j*); (*n*), and all other stones likewise, (*o*).
Walls of all buildings below surface of ground, shall be built of stone or brick laid in cement mortar.
p. Joints of all walls well filled with mortar.

Omaha: — (*a*); (*b*), with close joints, (*c*); (*d*); (*p*).

Philadelphia: —

Pittsburgh: —

Providence: — Every wall other than foundation walls, constructed of stone, brick or similar substance, shall be properly bonded and solidly built with mortar or cement.
(*f*).

St. Louis: —

San Francisco: — All walls shall be erected straight and plumb.
Stone walls less than 24″ thick, one header through wall every 6 superficial feet; *over 24″ thick*, one header every 6 superficial feet on both sides of wall and extending 2′ 0″ into wall or more.
(*p*).
All walls below curb level laid in cement mortar, one (1) part cement to two (2) parts mortar.

Wilmington: — (*f*). Stone to be laid flat, hammered down in wall, properly bonded and solidly built with lime or cement mortar.

Brick Walls.

Boston: — *a.* Brick walls and buttresses shall be of merchantable well shaped bricks,
b. Well laid and bedded,
c. With well filled joints in lime or cement mortar,
d. Well flushed up every course with mortar,
e. All brick used during warm months well wet at time laid,
f. And dry at time laid in winter months,
g. Every ninth course at least headers or bonding course, except where walls are faced with face-brick, where every ninth course shall be bonded with Flemish headers or by cutting the course of the face-brick and putting in diagonal headers behind same.

Baltimore: —

Brooklyn: — *h.* No swelled or refuse brick in any wall or pier.
i. All brick used, good, hard, well burnt brick.
j. If used during months April to November inclusive, well wet when laid.
k. Every sixth course a heading course, except where wall is faced with brick,
l. And then every fifth course,
m. Bonded into the backing by cutting the course of the face-brick and putting in diagonal headers behind same, or by splitting brick in half and backing same by continuous course of headers.

Charleston: —

Chicago: — *n.* Every seventh course headers.

Cincinnati: — *o.* Press brick work to be properly bonded to backing.

Cleveland: — (*o*).

Denver: — (*a*); (*b*); (*c*); (*d*); (*e*); (*k*); (*l*); (*m*),
p. Or by iron ties as approved by Inspector.
q. All heading courses in brick shall be good hard perfect brick.

Detroit: —

District of Columbia: — *r.* Every fifth course of brick facing securely bonded by headers.
s. All brick used during months April to October inclusive, shall be wet at the time they are laid.

Kansas City: — *t.* All brick walls and buttresses to be of well burned brick, (*b*); (*c*); (*d*); (*r*), and dry if laid in freezing weather.
u. Every seventh course at least a heading or bonding course, except where walls are faced with brick, in which case every seventh course shall be a Flemish bond, or by cutting the course of the face-brick and putting in diagonal headers behind the same.

Louisville: —

Memphis: — (*h*). Nor soft bricks, (*i*).
v. Every fifth course shall be a heading course, except when walls are faced with brick in running bond, (*l*); (*m*).
w. The preceding applies only to business and manufacturing establishments. Good salmon brick may be used in the upper story of dwellings.
All bricks laid with broken joints, with joints well filled with mortar.
x. All brick laid in non-freezing weather shall be well wet immediately before being laid.

Milwaukee: — (*u*).

Minneapolis: — (*a*); (*b*); (*e*); (*d*); (*e*); (*q*).
Every seventh course a heading course, except in walls built with some bond in which as much as every ninth course is a heading course, except where walls are faced with face-brick. In which case, every seventh course bonded with Flemish headers, or by cutting the course of the face brick and putting in diagonal headers behind the same, or by splitting the brick in half and backing the same with a continuous row of headers.

Nashville: — The brick of outside walls shall be hard and well burned.
Every seventh course a heading course, except in front walls with pressed brick, then any fifth course shall be bonded in the backing by cutting the course of facing brick and putting in diagonal headers behind the same.

Newark: — Headers every sixth course.

New Orleans: —

New York: — (*h*). Nor soft bricks, (*i*); (*k*), except where walls are faced with brick in running bond, in which case every sixth course, (*m*).
(*x*).

Omaha: — (*h*). Nor soft, nor salmon brick, (*i*).
Section 32. (*k*). In running bond, in which case every sixth course shall (*m*).
Section 45. Every seventh course a heading or bonding course, except where the walls are faced with face-brick, in which case, every seventh course shall be bonded with Flemish headers or by cutting the course of face-brick and putting in diagonal headers behind same.
(*x*).
Pressed brick shall be laid in full bed, no buttering allowed.

Philadelphia: —

Pittsburgh: —

Providence: — Every ninth course shall be a heading course, except where some bond is used in which at least every ninth course is a heading course, or (*g*), or by splitting the face-brick in half and backing the same by a continuous row of headers.
Metal ties built in as often as every ninth course and not over 12″ apart, may be used instead of brick headers.

St. Louis: — Every fifth course laid with headers.

San Francisco: — (*h*); (*i*).
Every fifth course a heading course, except when walls are faced with pressed brick, (*l*); (*m*).

Wilmington: — All brick walls built plumb and straight and to a line, properly bonded, with close joints.
Outside walls, at least every ninth course laid with headers; header joints laid flush from end to end, with mortar. Fronts to be faced with brick every seventh course, (*m*).

Mortar.

Boston: — *a.* All mortar and cement of the best quality for the purpose to which applied, and properly mixed.

Baltimore: —

Brooklyn: — All mortar made of clean sand and lime or cement in proper proportions; in no case shall loam or earthy matter be put into mortar to be used in erection of stone, brick or foundation walls of any building.

Charleston: —

Chicago: —

Cincinnati: —

Cleveland: —

Denver: —

Detroit: —

District of Columbia: —

Kansas City: — (*a*).

Louisville: —

Memphis: — *Lime mortar*, thoroughly mixed in the proportions of one (1) part of fresh unslaked lime and three (3) parts of clean sharp sand,
b. Free from loam.
c. Sand must not be finer than approved samples kept at the office of the Chief of the Fire Department.
d. All lime mortar shall be at least two days old before using.
Louisville cement mortar, mixed in proportion of one (1) part of fresh Louisville cement and two (2) parts of clean sharp sand, (*b*); (*c*).
All Louisville cement mortar must be used within twenty minutes after mixing.
Portland cement mortar, mixed in the proportion of one (1) part of fresh Portland cement to four (4) parts of clear sharp sand, (*b*); (*c*).
All Portland cement must be such as will stand tensile test of 300 pounds in seven days and 400 pounds in thirty days, and shall not be mixed more than thirty minutes before using.

Nashville: — *c.* All mortar shall be made of good lime or cement and sharp grit sand free from loam.

Newark: — Mortar used for the construction of buildings shall be composed of three (3) parts of sand, to one (1) part of lime; or of two (2) parts of sand to one (1) part of cement.
f. No inferior lime or cement shall be used.
g. All sand shall be clean, sharp grit free from loam.

New Orleans: —

New York: — *h. Lime mortar* shall be made of not more than three (3) parts of sand to one (1) part of lime and shall not be used until thoroughly slacked.
i. Cement mortar shall be made of not more than three (3) parts of sand to one (1) part of cement, and shall be used immediately after being mixed.
j. Cement and lime mortar, shall be made of one (1) part of lime, one (1) part of cement and five (5) parts of sand.
(*f*).
k. The sand used for mortar in all buildings shall be clean, sharp and not finer than the standard sample kept in the office of the Superintendent of Buildings,
l. Which samples be approved by the Board of Examiners,
m. And kept in suitable glass jars for the guidance of officers and inspection of the public.
n. Concrete foundations shall be one (1) part cement, two (2) parts sand and three (3) parts small broken stone, all carefully mixed.

Omaha: — (*a*); (*f*); (*h*); (*i*); (*j*); (*k*); (*m*); (*n*).

Philadelphia: —

Pittsburgh: —

Providence: — All mortar shall be of the best quality for the purpose to which it is applied.

St. Louis: —

San Francisco: — All mortar used in any building shall be made in the following proportions:
Lime mortar, three (3) parts sand and one (1) part lime and shall not be used within twenty-four hours after being mixed.
Cement mortar, two (2) parts sand and one (1) part cement.
(*f*); (*g*).

Wilmington: — Lime mortar to be made of clean sharp sand free from loam, in the proportion of one (1) part of lime to five (5) parts of sand.
(*f*).

Compiled by H. A. Phillips.

BOOKS AND PAPERS.

THE technical literature of the architectural profession in the United States is still much inferior to that found in Germany, France or England in both quantity and quality. It is also excelled by the writings of practitioners in the various branches of engineering. This unfortunate and somewhat discreditable position is the result of several causes, the most potent of which is, perhaps, the oft-repeated assertion that beauty of details and a striking treatment of the external mass of the building must be the chief aim of the architect in modern America. This is the lesson always inculcated by the light criticisms current in the magazines, which are usually written by men without professional training, and who assume to authoritatively decide the merits of a given building without appreciating in the slightest degree the nature of the real problems in the work, which demanded the attention and loving toil of its architect. Valuable and enduring criticisms can only be the work of one who thoroughly understands and sympathizes with the creator of the art-work criticised. Young and barely-fledged architects are much addicted to this style of writing, which they drop when they become wiser.

A second reason for this deficiency is to be found among imperfectly trained or purely æsthetical architects, ignorant of construction, who very frequently deny the necessity of a thorough knowledge of the engineering and structural side of the profession, airily saying that design is the function of the architect, and that the engineer and the contractor must attend to the construction of the building. The interesting series of papers on the management of an architect's office recently published in this journal very plainly pointed out the necessity of a full knowledge of construction. A visit to a large office will also show that the engineer is certainly as essential in the office as the designer. It is, perhaps, a little singular that most of these positions in architectural offices are now filled by civil or mechanical engineers, showing that most young architects are still deficient in an essential proportion of their professional education. Indeed, a very considerable danger actually exists that the civil engineer may decide to reverse the present arrangement, employ architectural designers, and then himself compete for the prizes of the profession, the great fireproof structures for mercantile purposes.

It is also undeniable that the professional papers read at the various conventions of architects are very decidedly inferior in value to those presented at the meetings of the various engineering societies. Government patronage and licenses for architects appear to monopolize the attention of the architects present, rather than professional topics. Many American architects certainly equal the best engineers in the successful solving of exceedingly difficult problems in building, in boldness and decision, and in the invention and adoption of novel methods, but they rarely publish anything more than fetching perspectives of their works, either being too busy to write out their processes and methods, or preferring to retain their professional information for their exclusive use.

The issue of this work[1] by a New York architect, therefore, causes great satisfaction, for it gives reason to hope that the series in which it appears may be extended by other publications likewise devoted to the practical side of the profession, and which may bear comparison with the numerous excellent manuals on engineering topics now in print. The two volumes are well made, copiously indexed, have a very valuable series of graphical and numerical tables for saving time and labor, and the pages have broad margins for manuscript notes and the insertion of additional data in their proper places. The notation employed by the author is somewhat eccentric, differing from that in common use in some respects. If our current notation is to be changed, it would probably simplify computations most to take lengths in feet and loads in tons, changing coefficients to correspond.

Chapter 1 is devoted to the Strength of Materials, with preliminary definitions, a full table of forms of cross-sections of beams and columns, and the corresponding values required for use in subsequent formulas. An acquaintance with algebra sufficient for the application of formulas expressed in algebraic terms is necessary, though a full understanding of this chapter would be greatly facilitated by a knowledge of mechanics and of resistance of materials, since the derivation of the formulas given can hardly be briefly and clearly explained without the use of the higher mathematics.

Rankine's formulas for columns is preferred in accordance with the best American practice. A very full table of coefficients for resistance to the different forms of strain by the materials in common use is also given, though numerous vacant spaces remain to be filled by the results of future experiments.

The mode of computing the end reactions, shears and bending-moments for beams loaded in various ways is very convenient and easily applied. For ordinary arrangements of loading, this data is compactly printed in Table 7. The strength and stiffness of beams are then illustrated by several examples.

The graphical method of finding the strains in roof-trusses is briefly explained, and the same method is then applied to the arch, both topics being more fully treated in Volume 2.

The second chapter discusses Foundations, describing the materials and their mode of use, stepped footings, inverted arches, pile foundations, etc. The author takes the load producing an appreciable settlement to be the ultimate resistance of the soil, allowing but one-tenth of this for a working-load. This method would, indeed, be safe, but would also certainly be impossible in case of a soft clay soil, like that of Chicago, where buildings often settle several inches without injury. Inverted arches are commended for shallow foundations, but they cause the outer piers and footings to slide apart, and this must usually be resisted by tension bars. Other methods then become more economical, and are to be preferred. The treatment of foundations should be extended in a future edition to include the designing of base plates, steel rail and concrete footings, steel beam and concrete foundation rafts, etc., which appear to be unknown to Eastern architects, but which are often essential in soft soils.

Chapter 3 treats of Cellar and Retaining Walls, their stability being determined analytically and graphically by methods that are convenient and probably as accurate as possible. But young architects should bear in mind that the best engineers do not have implicit faith in the absolute accuracy of any mode of treating these tough problems, because the actual and the assumed conditions rarely coincide. But the subject is very clearly and fully examined, and the graphical method will usually be found most convenient.

Chapter 4 is devoted to Walls and Piers. Masonry must frequently be executed in freezing weather, though it probably never becomes as strong in that case. This may be partly obviated by the addition of salt to the mortar. The strongest hydraulic cements rarely set quickly. Slip joints are recommended for the junctions of stone with brick walls, though they are not common in ordinary work. Successive bond-stones set above each other in a brick wall are justly condemned as tending to crack the wall. Solid walls with porous furrings are properly preferred to hollow walls. A convenient formula for the strength of walls is based on Rankine's formula for columns, but gives a considerably smaller safe load per square foot than is in frequent use, and this formula is applied to several examples. Rondelet's rule for thickness of walls is practically useless. The thrust of piled barrels against a wall is subjected to an original investigation, and the chapter closes with a consideration of the stability of walls against wind-pressure and of the strength of corbels.

Chapter 5 resumes the Arch, and graphical methods are applied to segmental and semicircular arches, to curved and flat arches between I-beams, to the stability of abutments, to inverted arches and to a hemispherical dome. The diagrams and explanations are very clear and full, and will be very useful to the young architect, since the subject will not be found as attractively and simply presented elsewhere.

It is quite possible, as suggested by Gen. Sooy Smith, that the Spanish-tile arches and vaults used in the Boston Public Library will supplant the current method of constructing fireproof floors with I-beams and horizontal tubular arch-blocks. These arches are composed of three overlapping layers of thin tiles laid in the best cement, so that they have a very considerable transverse strength in addition to the resistance due to their arched form. The mode of determining their strength is fully explained here for the first time.

Chapter 6 treats of Floor Beams and Girders, first explaining the manner in which they support loads, then considering the structure of timber, effects of seasoning, dry-rot, etc. The tusk is, no doubt, preferable to any other form of tenon for ends of joists supported by a girder of equal depth, but a notched joist spiked to side of girder is better for ordinary work, and stirrups are preferable for heavy structures. Formulas for stirrups are given, yet it is usually necessary to materially increase their minimum dimensions in order to make them appear safe to the eye, as well as to make the hooks sufficiently stiff.

Formulas for resistance of beams to transverse bending are next given, the loads being arranged in various ways. As the practical application of such formulas is very frequent and rather tedious, a very ingenious table (12) is arranged for floor-joists of the woods most commonly employed, and a mere inspection of the table determines the most economical joist to be used for ordinary floors, as well as the proper distance between centres. A similar graphical table (13) as readily gives the sectional dimensions of wooden girders when stayed sidewise. Table 14 is in the same way applied to I-beams, and Table 15 gives the proper dimensions of I-beam girders, also stayed sidewise. Very full directions are given for the use of these tables, and they will be found to save much valuable time and to lessen errors, but care should always be taken to see that the beam will not deflect sufficiently to become unsightly or to crack plastered ceilings. The author is very conservative in regard to steel beams, considering them to be still defective in manufacture and of doubtful economy in comparison with wrought-iron, though believing that they will probably supplant iron beams.

Formulas are given for flitch-plate girders (still used in St. Louis) for the keyed and bolted girders, and for notched or indented girders, together with a table of reactions, moments, etc., for continuous girders, and a table of stresses, etc., for beams trussed in various ways.

The deflection of beams, girders, trussed beams and trusses, is then fully examined, and the process of designing a trussed beam

[1] "*Safe Building.*" A treatise giving in the simplest forms possible the practical and theoretical rules and formulas used in the construction of buildings. By Louis De Coppet Berg, F. A. I. A., Assoc. A. S. C. E. Vol. 1, 1890. Vol. 2, 1892. Boston: Ticknor & Co. $10.

is explained. Tables of dimensions and properties of iron and steel I-beams, channels, angles, tees, etc., are then given, being compiled from the pocket-books issued by the leading mills.

Chapter 7 treats of the application of graphical methods to the determination of the Bending-moments, Shears and Deflections, caused by loads arranged in various ways on beams. This mode of analysis can easily be mastered by young architects unacquainted with the higher mathematics, and it will be found of great value, since it is perfectly general and is applicable to the most complex distribution of the loads.

The centre of gravity, neutral axis and moment of inertia of almost any regularly formed section of a beam may be found by means of the formulas in Table 1. But the necessary computations are often very tedious and liable to error, as in case of a Hodgkinson section (No. 23), and forms of section are also frequently used for which no formulas are given. General graphical methods, applicable to any form, are to be found on page 267, and will be preferred by most architects. The required areas may be quickly and accurately measured by a planimeter, then multiplying the area thus found by a proper factor, unless the section be drawn full size. The centre of gravity and position of neutral axis are correctly obtained, but to find the moment of inertia of the form in Figure 158, the pole x must be taken on a straight line parallel to $a\ e$, and distant $\frac{1}{2}\ a\ e$ from area line $a\ e$. The error in the text is doubtless inadvertent, and should be corrected in subsequent editions. A convenient method for this purpose is to draw $a\ x$ and $e\ x$ making angles of 45 degrees with $a\ e$. Useful notes and formulas for use in designing iron girders bring us to the end of Vol. I.

Volume II is almost entirely devoted to a full treatment of iron and steel construction, to which is added a series of valuable tables for economizing labor and for reference.

Chapter 8 describes the composition, derivation, preparation and structural uses of iron and steel. Smaller factors-of-safety being permitted by the more homogeneous nature of the material, greater care is necessary to see that each part is duly proportioned to the strain it is required to resist, and that proper inspection is made. Defects in cast-iron construction generally result from bad materials, careless moulding, square-angled patterns, crooked cores and different thicknesses in the same piece. As flaws are not easily detected, cast-iron is now rarely used, excepting for columns, wrought-iron or steel being preferred wherever possible. The processes of moulding and casting are fully described, as well as the proper mode of inspection. Puddling, wrought-iron, rolling and re-rolling are also explained, with the process of refining wrought-iron. Double refining is said to not benefit good muck bars, contrary to the received opinion, and it considerably increases the cost of iron.

Steel is produced in various ways, but for structural purposes it is now either made by the open hearth or the Bessemer process, though it is still impossible to produce successive lots with identical composition and similar qualities. Hence the author does not consider the use of steel advisable at present, except after very careful and frequent tests, though it may become the metal of the future.

Cast-iron, wrought-iron and steel differ greatly in their properties, but it is very difficult to definitely fix the limits between them. Hardening steel increases its strength materially, but it is then very liable to yield to sudden strains or shocks, and is accordingly not used in construction. Both steel and iron are greatly injured by rust and require protection by painting, tarring, galvanizing, or an application of the Bower-Barff process. In each case, care is to be taken that the metal is first clean and free from rust, or the protection will be useless.

Formulas and tables for extension and contraction of iron under strain are given, and the effects of intermittent or reversed strains described. The factor-of-safety should be doubled for rolling loads or shocks.

The minimum thickness of cast-iron columns varies with their diameters or lengths, but is never to be less than $\frac{3}{4}$ inch. Standard sizes of columns are usually most economical, since new patterns are then not always required.

It appears that wrought-iron plates may now be obtained up to eight feet wide and to weights of two tons each. They should be from one-fourth to one inch thick. Stock sizes of rounds, squares and flats are to be used, to avoid extras for odd sizes. Upset ends on rods are recommended, except for short rods. Close examination will sometimes show that these upset ends are merely welded on. The form of eye-end given is safe, though there is a great diversity of opinion concerning the best form.

Chapter 9 treats of Rivets and Pins, one of the most complex and tedious topics in construction. Machine riveting is preferred, as in the best practice. Drilled holes are preferable, but much more expensive, though required in steel plates. Steel rivets are said to be inferior to those of iron. Butt joints with two cover-plates are recommended, but these cover-plates should be lozenge shaped and not rectangular. Formulas are given for resistance of rivets to shear, crushing and bending, and several numerical examples illustrate the process of designing a riveted joint. A series of graphical tables greatly lessen the work.

Pins are subject to similar strains, but are single, and each pin is acted upon by transverse forces in equilibrium, though usually having different directions. These forces are reduced to their components normal and coincident with a plane of reference until the plane of maximum components is found, when the eye-bars are next subdivided or rearranged on the pin until its diameter becomes a reasonable one. An examination of a dozen pages devoted to the study of a single pin joint will show that the designing of pin joints properly is in many cases a very tedious problem. It should also have been stated that pins and eye-bars should fit each other closely to avoid a considerable loss of strength.

Chapter 10 discusses the Designing of Plate and Box Girders. The author prefers single-web to box girders, because more economical, easily accessible for painting, etc. Cambering is unusual, as great difficulties would occur in construction. The best rule for girders is to put in plenty of rivets as they are cheap, but formula and full directions are given for determining the number of rivets connecting the different members, as well as for the maximum length of flange-plates, the location and strength of stiffeners, etc. Table 41 gives graphically the strength of web-plates, Table 42 that of angle bars and Table 43 that of the flange-plates, of plate-girders, which very much lessen the labor and time required. Fifteen pages are then occupied with the process of designing a girder supporting several concentrated loads, a numerical example taken from the author's practice. Due attention is here paid to economy as well as strength.

Chapter 11 resumes the Graphical Analysis of Strains in trusses of the various types. The loads on the truss are assumed to be concentrated on the principals, which is not in accordance with the actual conditions, as one-third to one-half the weight of the truss is concentrated on the lower chord, with a considerable addition in case of a truss supporting a ceiling. The loads on the truss should be computed with greater accuracy, as they vary materially according to weight of sheathing, mode of covering, etc. The weight of the truss itself appears to be neglected, though forming a considerable additional load for wide span roofs. The notation used is more convenient than that of Bow. Various types of trusses are studied, ending with the hammer-beam truss. Valuable formulas for curved struts and ties are then given, as they must sometimes be used instead of straight members. The wind-strains on trusses are next found by separate diagrams, the reactions being determined by computation, after finding intersection of axis of wind-pressure and horizontal span line of truss. The method by equilibrium polygon is more general and is certainly more convenient for curved roofs. Expansion-rollers are advised for roof-trusses of more than eighty feet span, and two wind diagrams must then be drawn. The stability of pyramidal roofs and spires against wind-pressure is then examined, with the study of two examples.

Chapter 12 explains the methods of Designing the Joint Connections of a combination and of an iron truss, for given cases. The loads are computed, the strain diagrams drawn and sectional dimensions of members are found. The joint connections of the combination truss, Figure 258, appear clumsy, owing to the large factor-of-safety (10) against crushing wood across the grain employed by the author, and which makes the permissible pressure per square inch unnecessarily small, only one-sixth to one-third the pressure considered perfectly safe by Hatfield ("*Transverse Strains*," p. 121). This causes the use of abutting blocks at strut ends and under washers, which are not usually found in wooden trusses, and are really very seldom required. The purlins may also be supported by Z-shaped hangers and tied together by straight straps spiked on top. As the panel points of the principal are its strongest points, the washers can generally be boxed-in to a square bearing on the wood without unduly weakening the timber. It is also more economical to construct the lower chord of planks set on edge and spiked and bolted together, breaking end joints properly. This dispenses with the expensive splice, straps and bolts shown, and makes a stronger and smaller tie-beam. The washers and straps are also larger than necessary, for reasons previously given. This truss is, therefore, more than sufficiently safe, and would look better with less material, and would still be perfectly stable.

An iron roof truss is next worked out in a similar manner after the members are decided upon. The safe tensile resistance of 12,000 pounds per square inch is rather large for iron rods, and the New York Building Law just enacted would permit only 8,333 pounds per square inch. Details of joints are shown in Figure 268 and are well arranged. The pressure of the shoe-plate on the masonry wall is about $7\frac{1}{4}$ tons per square foot, requiring the masonry of the wall to be well built. Pressure on expansion-rollers is 50 per cent greater than permitted by Du Bois's formula.

The final chapter of the work treats of columns of cast or wrought iron with the usual forms of cross-section. End connections are shown, as well as the various methods used for building up columns from rolled bars. All cast-iron columns, except those of square or circular section, are deservedly condemned, and several exceedingly convenient graphical tables are arranged for finding diameter and thickness of a cast-iron column for a given length and load, avoiding much tedious labor. Divided base-plates, Figure 279, are often quite dangerous. The Z-bar column is approved, and is now much used in the best practice, made of either iron or steel.

In order to make the work more complete and convenient, there have been added tables of trigonometrical functions, a table of four-place logarithms, which will be found very handy for computations after the habit of using it is once formed, tables of powers and roots, of areas of rectangular bar sections, of circles, of decimals of the inch and the foot, metallic conversion tables, and one of weights and measures.

All the points appearing to require reconsideration have been mentioned in this review, and no statements or formulas have been found which would make the work an unsafe guide in construction. Every builder, draughtsman, student or architect who desires to erect good buildings that will outlast himself, should immediately procure a copy of this work, the best American book on the topics treated known to the writer, and should not fail to master it thoroughly. The author has certainly earned the sincere gratitude of the profession.

THREE more well-printed, copiously illustrated and remarkably low-priced volumes have lately been added to that excellent series, "*Les Artistes Célibres*," published by the Librairie de L'Art.

Of these, the largest and most important is "*Antoine Watteau*,"[1] by M. G. Dargenty, which, in addition to the numerous cuts in its text, is enriched by seven fac-simile plates from drawings by the master, printed *en sanguine*. The illustrations afford a most complete exposition of the painter's powers, ranging from a masterpiece like the "Embarkation for Cythera," of the Louvre, "*ce chef-d'œuvre de chefs-d'œuvre français*," to a little pencil sketch. In them we see all the doings of the fine-weather world which Watteau created, a world of lovers and of comedians, where comes no pain or grief or care, but where on grassy lawns beneath the shade of stately trees, youths and maidens dance and sing and whisper soft nothings to each other, undisturbed in their perpetual picnicking.

A complete contrast to these is furnished by M. Émile Michel's work treating of "*Les Brueghel*,"[2] the noted family of Flemish painters, which has many reproductions of the grotesque and somewhat coarse allegories painted by Peter Brueghel the elder, wherein nondescript and misshapen monsters, typifying Avarice, Lust, Envy, Idleness and other vices, disport themselves in many impish ways. His pictures of homely peasant life are more pleasing — he was called "Peasant" Brueghel from his fondness for depicting such subjects — and much information as to life and its environment in sixteenth-century Flanders may be gleaned from his paintings of a "Kermesse," of "Justice," "The Alchemist" and others. The landscapes and flower-pieces of Jan Brueghel (dubbed "Velvet" Brueghel, because of his partiality for wearing garments of that material) who often worked in conjunction with Rubens, were of much merit and numerous specimens of them are given by M. Michel.

M. Antony Valabrègue writes the third volume, "*Abraham Bosse*,"[3] which is devoted to an account of the life and labors of a French engraver of the seventeenth century, who worked in the manner of Callot and left some fifteen hundred plates behind him at the end of his long life. Bosse also practised painting and architecture and wrote several books on those arts and on perspective, of which he was professor in the Academy of Painting, at Paris. His engravings are especially valuable as records of the costumes, trades, popular types, ceremonies, amusements and interiors of his time, and representative pieces from his series of "The Senses," "The Ages of Man," and "The Seasons," with others, add interest and value to the pages of M. Valabrègue's study.

The useful catalogue of works and the bibliography appended to each volume in this series, deserve a word of special commendation.

ILLUSTRATIONS

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

THE CATHOLIC CLUB-HOUSE, NO. 120 WEST 59TH STREET, NEW YORK, N. Y. MESSRS. WM. SCHICKEL & CO., ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

GROUND was broken for this building in February, 1890. The construction of the building consumed about a year and a half and its cost was $180,000. It has a frontage of 75 feet, and covers, with an extension containing the ball-room in the centre, the full depth of the lot, which is 110 feet. The basement and first story are faced with rustic work, and the upper stories with Roman brick and terra-cotta. In the interior of the building the style of the Italian Renaissance prevails with the exception of the drawing-room and the ball-room. On the first floor are the hall, the reception-room, the reading-room, the billiard-room and wardrobes. The entrance-hall is imposing. Opposite the entrance a large doorway leads to the billiard-room; this is hung with an antique tapestry, framed in Velours de Flandres. Two doorways opening into the reading-room on the right are screened with portières of Vatican tapestry toned to harmonize with the wall treatment. The walls of the reading-room are hung in Japanese leather, the background being of copper bronze, showing a bold design in old brass. The bookcases and reading-tables are of antique oak. In the billiard-room adjoining, the walls and ceiling are panelled with oaken pilasters and beams, enriched with heavy relief, the motive being a conventionalized treatment of oak leaves. The wall-hanging is a dull bronze, overlaid with a free drawing in metallic green, while the ceiling is treated with lacquered aluminium, carrying a broad ornamentation suggested by the wall design, in half-tones of the key colors. A raised platform around the room is set with chairs and tables in the Viennese style. On the second story is the board-room, ball-room, the ladies'-room and the drawing-room. The ball-room is in the style of Louis XVI period, profusely ornamented in relief by Klee. The color-scheme is ivory and gold. The wall columns are of marble with richly gilded capitals. This ball-room is also to be used as an assembly-room and a lecture-room. The third story is entirely devoted to the library of the club, for which extensive provisions have been made, as at present it contains over 20,000 volumes. The library is in English oak and is walled by its thousands of volumes and gives space for only an occasional Morris chair with cushions of dull terra-cotta corduroy, an antique sofa in Henri IV tapestry, and a few curtains of a deep olive stuff hung below carved oaken transoms screening the lofty windows. The fourth and fifth floors are laid out as bachelors' apartments. In the front of the fifth floor are the private dining-rooms with loggia in front affording a splendid view of the park. The dining-rooms are furnished in antique mahogany. In the basement are the engine-room, wine-cellar, store-room, kitchen and two fine and well-appointed bowling alleys.

THE ROSTRUM OF THE COMMENCEMENT-HALL OF PRINCETON COLLEGE, PRINCETON, N. J. MR. W. A. POTTER, ARCHITECT, NEW YORK, N. Y.

THE PINGREE BUILDING, DETROIT, MICH. MESSRS. JOHN SCOTT & CO., ARCHITECTS, DETROIT, MICH.

THE ZWINGER, DRESDEN, SAXONY.

SEE article on "German Castles" elsewhere in this issue.

A PAVILION OF THE ZWINGER, DRESDEN, SAXONY.

[Additional Illustrations in the International Edition.]

METAL GRILLE BEFORE A FOUNTAIN OPENING.

[Steel Engraving.]

PORTAL OF NOTRE DAME DU SABLON, BRUSSELS, BELGIUM.

[Gelatine Print.]

ENTRANCE TO A HOUSE ON THE VOSS STRASSE, BERLIN, PRUSSIA.

[Gelatine Print.]

PIAZZETTA SAN MARCO, VENICE. S. PROUT.

CHURCH OF ST. SALVI, ALBI. J. A. SLATER.

CHURCH OF ST. AUSTREMOINE, ISSOIRE. J. A. SLATER.

DESIGN FOR MUNICIPAL BUILDINGS, OXFORD, ENG. MESSRS. DAWES & HOYLAND, ARCHITECTS, LONDON, ENG.

OUR illustration shows the principal elevation and two sections of the proposed Municipal Buildings submitted in the late competition. The transverse section is taken through the council-chamber, public hall, assembly-room and library. The longitudinal section is taken through the principal entrance, public hall and law courts. The public hall is 100 feet long and 54 feet wide, the law court is 52 feet long and 36 feet wide, the council-chamber is 62 feet long and 32 feet wide, the assembly-room is 68 feet long by 34 feet wide. The plans throughout were prepared with great care and completeness, and as competition drawings they were unusually full of carefully thought-out detail. The estimated cost of the whole of the buildings was £50,000.

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 MISHAP TO THE CHICAGO SOCIETY OF ARTISTS.

CHICAGO, ILL., April 29, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Information has already been published that the current exhibition of the Chicago Society of Artists was destroyed by fire on the evening of Tuesday, April 26. This collection was exhibited in the top floor of a seven-story building, called "The

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[1] "*Antoni Watteau*," par G. Dargenty. Librairie de L'Art, publishers, Paris. Price, 6 francs.

[2] "*Les Brueghel*," par Emile Michel. Librairie de L'Art, publishers, Paris. Price, 5 francs.

[3] "*Abraham Bosse*," par Antony Valabrègue. Librairie de L'Art, publishers, Paris. Price 4 francs.

Chicago Athenæum," which had no pretensions to being a fireproof building. For the crèdit of Chicago it should be clearly understood that the exhibition had nothing to do with the Art Institute of Chicago, and that the fire was not in the Museum building.

Yours very truly, W. M. R. French, *Director.*

NOTES & CLIPPINGS

The Wellington Monument in St. Paul's. — There seems some hope that the monument to the Duke of Wellington by Stevens may at last be dragged out from the obscure corner in St. Paul's Cathedral where it can *not* be seen, and placed where the artist always hoped and expected it was to go, in a central position in the nave. We do not know what special circumstance may have prompted Sir F. Leighton's letter to the *Times* on the subject at the present moment, but it seems that he has ascertained that we now at least have the support of the Dean and Chapter of the Cathedral, which is the most important point to be gained, and in that case it is only a question of funds. It is hoped that there are a sufficient number of persons in England who feel interest in a great work of art to subscribe the sum required for moving the monument, which is estimated at about 1,000*l*.;[1] though of course, we are aware that to the majority of Englishmen the subject is of no consequence at all. They have got a monument to Wellington they can go and look at or take their friends to see; as to who the sculptor was or what his merits they mostly know and care as little as they do about the unsatisfactory position of the monument. No great monument could be treated worse than this has been. On the only side on which it is lighted you must stand close under it to see it; on the only side on which you get a comprehensive view the lower portion is barred off by a screen, and the sculptures of the upper portion are reduced to dark masses seen in outline against the light. In the nave the monument would make a grand central object, quite in keeping with the style of the cathedral. Then would follow the question of completing the monument by the equestrian figure at the top. The monument certainly requires that both in regard to design and sentiment; the idea was that the figure of the dead warrior below was to be contrasted with his living presentment above. A portrait-figure of the man only will not suit the proportions of the monument; it is designed for an equestrian group. Some persons, we believe, think it incongruous to have a horse in the church, though they would never be troubled by the incongruity of grotesque carvings in a Mediæval church. The horse is one of God's creatures (as Kingsley would have said), and a very noble one, and very architecturesque in his lines and design. And as to precedent, have we not the De Brézé monument in Rouen Cathedral, with its equestrian statue which has stood there for many generations without scandalizing any one? — *The Builder.*

Remains of Prehistoric Man. — Twenty years ago M. Emile Rivière, recognizing the value of the grottoes under Les Rochers Rouges, to the east of Mentone, for antiquarian researches, bought them, but neglected to work them. Later the former proprietor resold them to a quarrymaster, Abbo, who unearthed the prehistoric skeletons which have excited so much interest in the scientific world. M. Rivière at once applied for an injunction, and obtained it; but, unfortunately, the supposed proprietor was found to have had no right to sell to anybody. The case is further complicated by the fact that the spot where the bones were found is just over the Italian frontier, so that the question of ultimate ownership threatens to be difficult to settle. The skeletons in dispute are three — a man whose estimated height, the head being missing, is about seven feet nine inches; a woman, complete, six feet three inches; and a youth. These make seven skeletons of prehistoric man unearthed up to the present time in these caves, over which the Italian Government so far has not attempted to exercise any rights. Up to 1875, M. Rivière had discovered the skeletons of one man and two children, twenty-nine feet below the surface of the cave, and surrounded by palæolithic implements. These skeletons are now in the Jardin des Plantes, Paris. About 1883, an antiquary named Jullien unearthed in the same cave the skeleton of a man of six feet five inches, and M. Rivière established a legal claim to the possession of it. The Prince of Monaco has undertaken to pay the costs of M. Rivière's present action, and will become possessor of the skeletons if it should be successful. — *N. Y. Evening Post.*

Parisian Customs. — Very many quaint old customs still prevail in Paris that have long survived the original reason for their existence. For instance, no sooner do born Parisians turn into a side street than they instinctively (and to infinite peril of their lives and limbs from the ubiquitous cab) walk in the very middle of the roadway leaving the sidewalks deserted. In the "good old times" this custom had a reason which has ceased to exist. In the first place at the beginning of the century there were no sidewalks, which of course prevented promenaders from getting used to them, and in the second place householders were wont to indulge in the habit of throwing all refuse of every description out of their front windows, so the long suffering pedestrian was obliged to walk in the very middle of the road or else run the risk of being deluged with dish-water or stunned by cabbage-stumps. Now all that is changed; one is not allowed even to shake a rug out of the front window after ten o'clock in the morning, and the infringement of that rule brings an irate policeman, and to hardened offenders a fine. In fact so stringent are the laws on that subject that some years ago a man brought a curious suit against the city, and won it too. He was walking past the Column of the Bastille when a man jumped from its summit. The suicide's shoe was forced off by the fall and struck the passer-by, inflicting severe injuries. He recovered damages on the ground that the city had not kept its monuments in proper order, and that it was the duty of the municipal authorities to see that no projectiles were hurled from them. The city thought so too, so rather discouraged would-be suicides by closing the doors of the various Parisian columns against all visitors. — *Home Journal.*

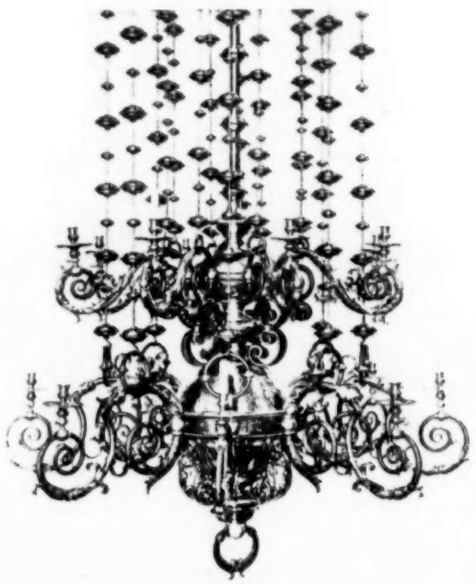
[1] Sir F. Leighton and the Dean and Chapter of St. Paul's have already set an example by subscribing 50*l* each.

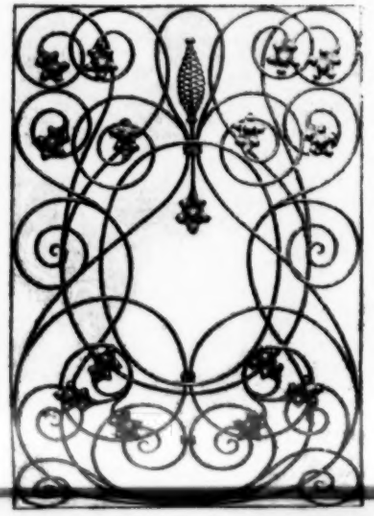
The Age of Good Oak Wood. — Professor Marshall tells us that the oak, in a general way, requires to grow from 120 to 200 years before it is fit to cut for large timber. Left alone it may live for 1,000 years, but the proportion of good timber in trees after a certain age rapidly diminishes. There are many trees still standing in this country which are from 800 to 1,000 years of age, perhaps the best specimens being those in various parts of what was once Sherwood Forest. The oak rarely bears fruit at all before it is 50 to 60 years old, and 70 to 80 years is a more general age. — *Invention.*

TRADE SURVEYS

The abundance of money in the markets of the world has been commented upon very much within the past few days by financiers on both sides of the water. Another matter spoken of favorably is that a demand is once more setting in for American securities upon a large scale. It has been known that for nearly two years European holders have been unloading American securities, and it is believed that the necessity for this policy has now ceased. It is said that the ground has been prepared for a general improvement in demand for securities in which Americans will profit first. The fact that American buyers of securities have already begun to purchase, therein showing their confidence, will have a decided influence upon stimulating foreign demand. If these anticipations should prove to be correct, there will, no doubt, set in a very general demand for American securities. The unsettled conditions in foreign countries are helping in this direction. American correspondents of German financial houses have been receiving information relative to the best kind of securities to buy here, and representatives of European houses state that there is also a strong move among British capitalists to increase their holdings at an early day. Large shipments of gold are taking place without apparent detriment. The estimated outflow for the coming two months is placed between twenty and thirty million dollars. This is probably more than will be wanted. Our financial system will be threatened as long as the struggle for gold in Europe continues. The financiers are racking their brains to meet the issue which they see coming. A multitude of suggestions have been made, but none practicable. The two hundred and twenty millions of American gold now within sight are not available, excepting as metallic reserve, and writers on this side are advocating the adoption of a policy which will enable us to protect a sufficient reserve against foreign demands. Among the most interesting features developed in the past few days is a general increase in railroad traffic and a continued decrease in producing-capacity in the heavier industries, continued low prices for all kinds of products, and a heavy export trade amounting to $130,000,000 for the fiscal year in excess of the previous fiscal year. There is a healthy distribution of goods throughout the country, but it is marked everywhere by a determination upon the part of the small retailers to restrict purchases within very safe limits. There is scarcely any speculative movement in the country. Nearly all movements of that character have been destructive to their originators. Producing-capacity is being increased, and this fact shows that manufacturing interests generally have confidence in an ultimate expansion of demand. The low range of prices is not being taken advantage of by buyers, because of the conviction that they are permanent. Cotton-growers have restricted acreage, but the farmers of the Northwest have extended acreage, though, to what limit is not known. The bankers report an abundance of money, and loans show that the demand for funds is increasing. Lower rates of interest are promised throughout the West, and will probably be established very soon as a result of the increasing ability of the farming community to meet obligations. Throughout the New England States a more healthy industrial condition is developing, due to increasing orders. Textile manufacturers are enjoying a good trade. Paper-makers are, as a rule, quite busy, though complaining of low prices. Boot and shoe makers have sold more goods this year than last. Machinery manufacturers and the makers of tools are doing fully as much business as last year. In the Middle States, a slight revival of demand has set-in in some industries, while others are dragging. The iron trade has not shown any decided improvement, although an improvement is thought to be near at hand. The ship-yard, car-works, locomotive-works and bridge-works are quite crowded, while all others are not running to full capacity, excepting the makers of pipes, who have recently been set to work to turn out supplies for two or three long pipe-lines. The lumber trade has once more reached normal activity, due to the very general resumption of building operations. The possibility of labor strikes by the middle of the month causes some unrest. The mining interests are in good shape, although prices are extremely low. The anthracite interests have effected such changes as will enable them to better control production and distribution in the future. There is a growth of small industries throughout the South and West, and a falling off in the booming of towns which threatened to work so much injury last year and year before. An investment of money in new enterprises is going on, but with greater care. Railroad companies throughout these new sections are preparing to build a large number of short lines to develop manufacturing, agricultural and mining interests. It seems to be the general impression that a permanent improvement is near at hand, and, while there are many reasons to be assigned for this belief, it is best to wait a little longer before asserting positively that the agencies at work in that direction will not encounter some unforeseen obstacles. The abundance of money is, of course, one strong factor; the probable heavy demand for American securities is, of course, another; the low range of prices is a third; the general expansion of demand going on in the country is a fourth. But, after all, it is impossible to foresee events or tendencies, because all the great controlling forces are so deep down. When we look back, it is as clear as day that the Baring failures and all failures following them would occur when they did, and financiers can now express surprise at the financial policy which led up, and down, to them. Since their occurrence the world has been waiting for a reaction, hoping that it would bring a flood-tide of high prices and extraordinary activity. Sound reasons can be given both for and against such anticipations and probabilities.

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





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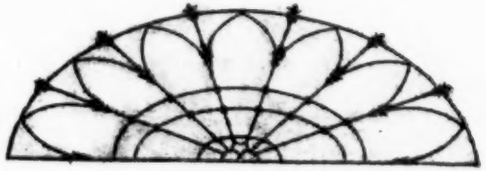

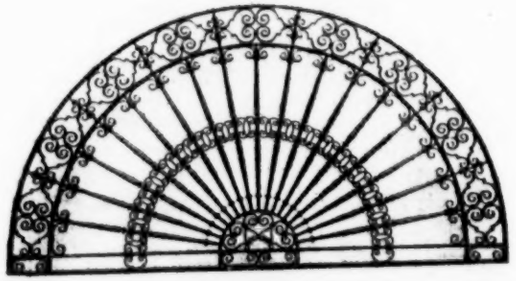

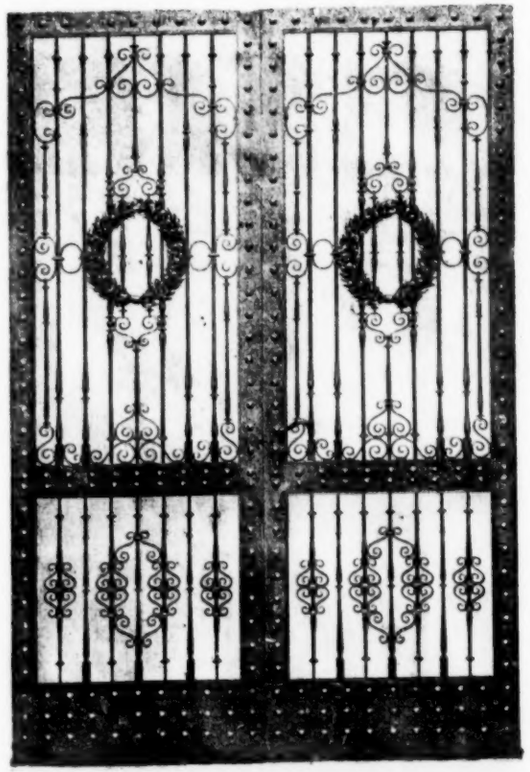

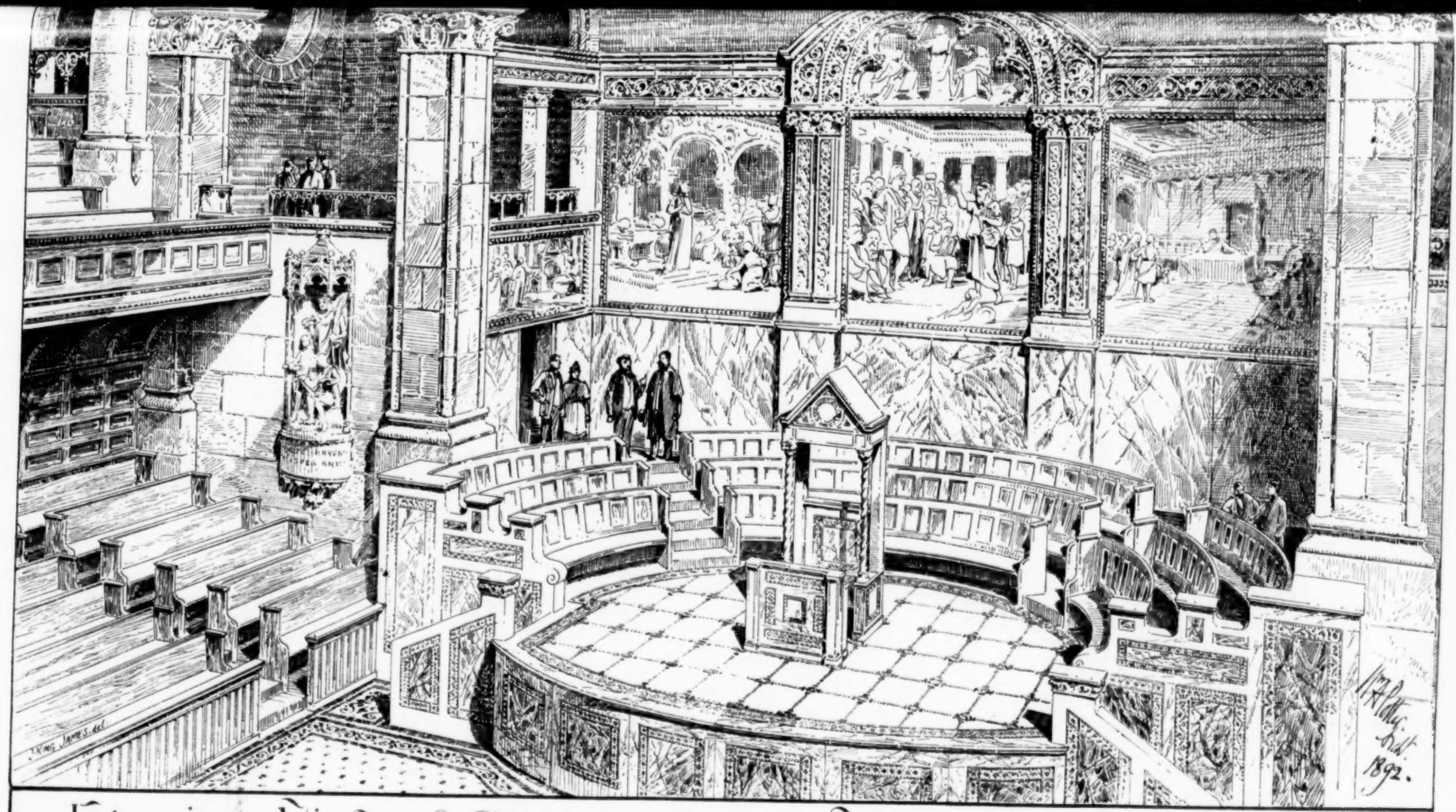

Interior View of Commencement Hall showing the Rostrum. Princeton College.

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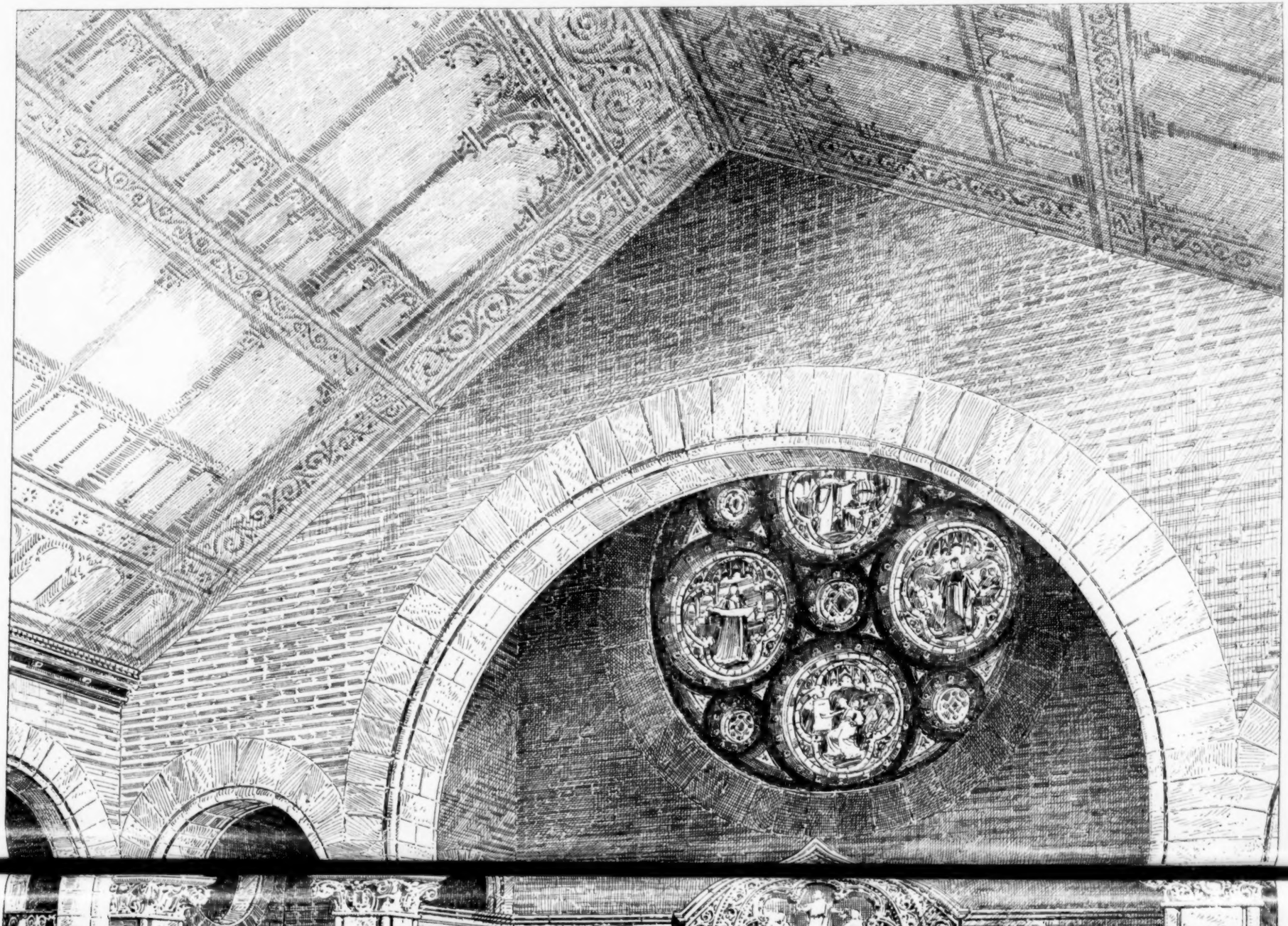
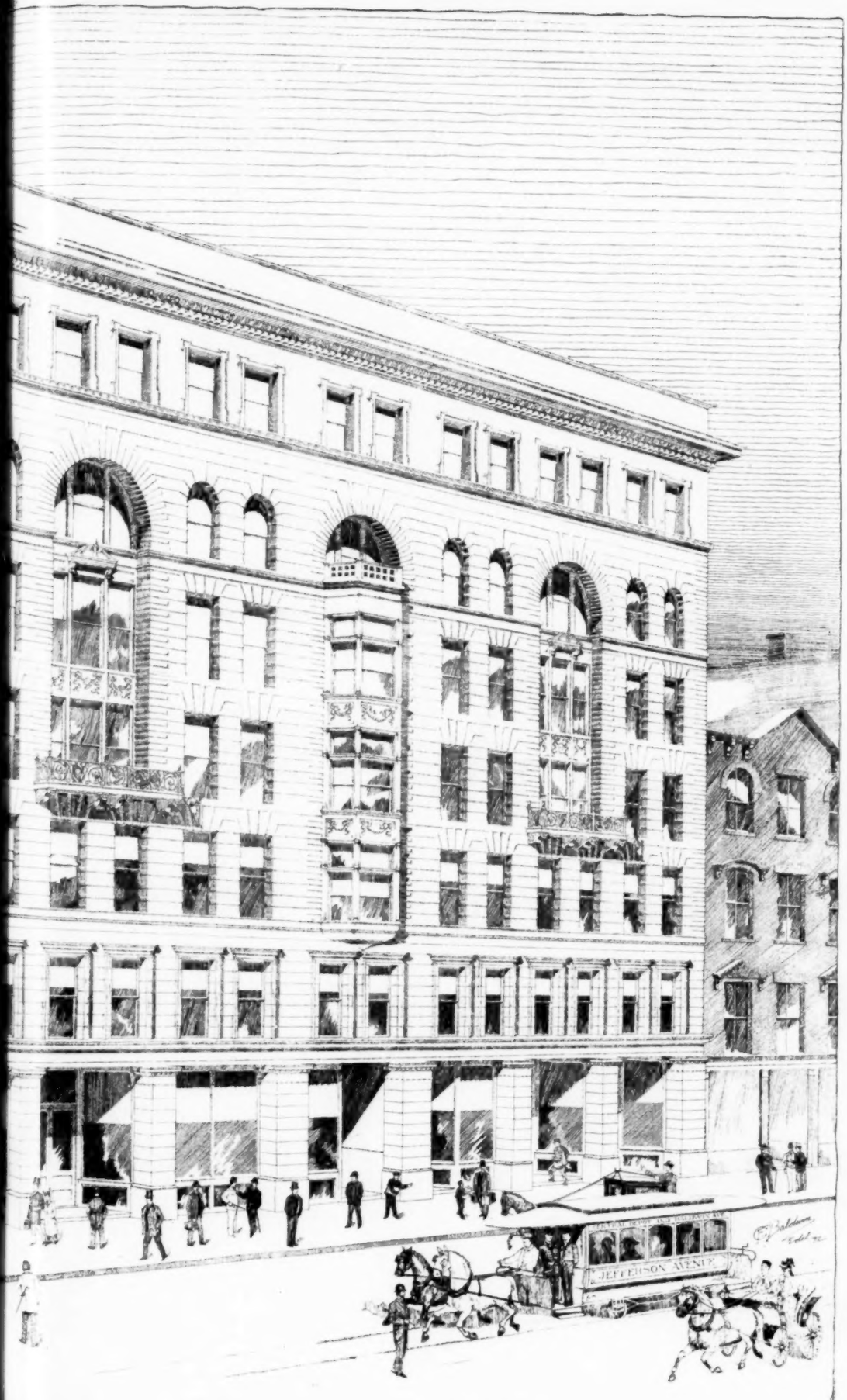
121 East 23rd St. N.Y.

Heliotype Printing Co. Boston.

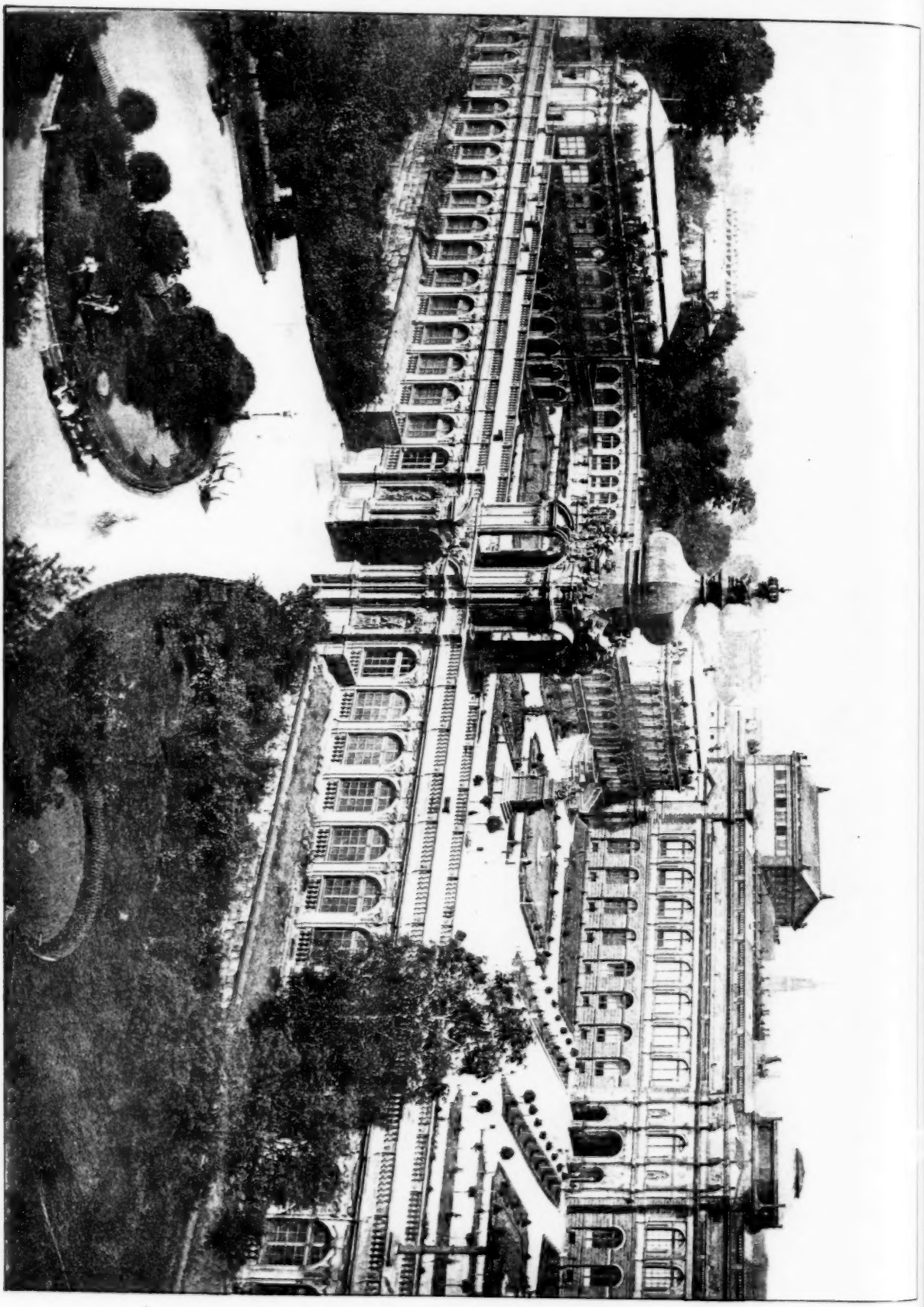




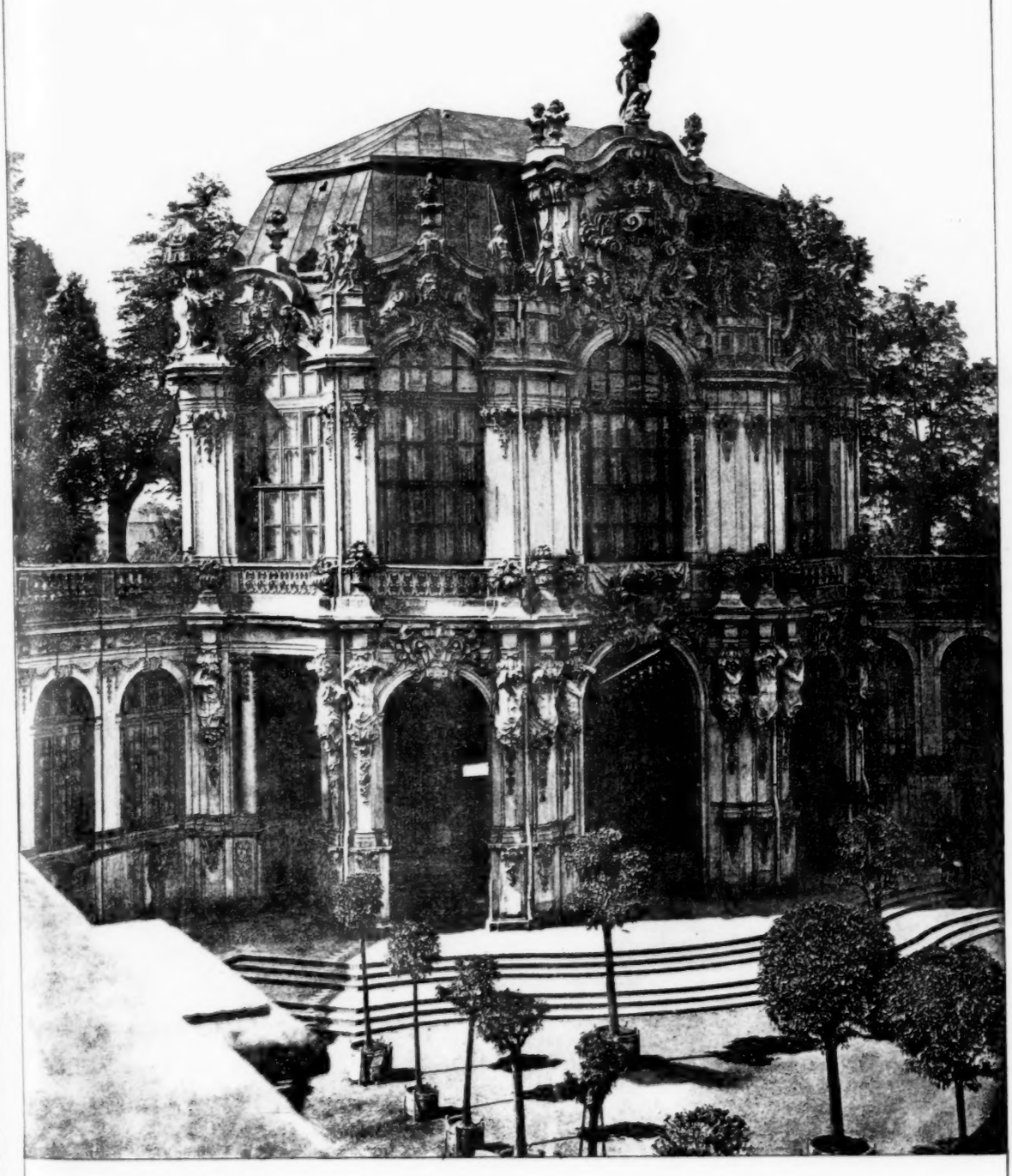
BUILDING"
AND JEFFERSON AVE.

JOHN SCOTT & CO.
ARCHITECTS.

HELIOTYPE PRINTING CO. BOSTON.



THE · ZWINGER · DRESDEN · SAXONY



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