THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXXVIII. Copyright, 1892, by TICKNOR & COMPANY, Boston, Mass. No. 877.

Entered at the Post-Office at Boston as second-class matter.

OCTOBER 15, 1892.

CONTENTS.

A CASE, which seems likely to establish several very important precedents, was decided by the English Court of Appeal a few weeks ago. It seems that the town of Hull made a contract for the construction of certain sewerage works. The contractors engaged fully to execute and complete and maintain all the works mentioned in the specification or shown on the drawings, under the superintendence of the town engineer, upon whose certificate payments were to be made; and a certain part of the contract price was to be retained until six months after the completion of the work. The contractors furnished sureties, who agreed that their principals should perform their contract; and, in the bond of the sureties, it was stipulated that they should not be released from liability until after the expiration of six months from the date of the certificate of completion, and not then unless all the conditions of the contract should have been fulfilled to the satisfaction of the engineer. The works were completed April 18, 1889, and the engineer gave his certificate of completion. Eleven months later, in February, 1890, he gave his final certificate, and the balance of the contract price was paid.

NOT long afterward, defects began to appear in the work. The sewers leaked, and, on investigation, it was discovered that much of the brickwork was laid dry, in the roughest manner, and hundreds of yards of the sewers were unfit for use, so that they had to be built over again. The town authorities sued the contractors and their sureties for reimbursement for the losses thus sustained. It was claimed, on the part of the defence, that the engineer's superintendence was very inefficient, or rather, that the engineer had not looked after the work at all, but had trusted wholly to the reports of an incapable clerk-of-works, who had seen nothing of the robbery being practised under his eyes. So far as the contractors were concerned, neither the judges nor the jury thought that the failure of the engineer to catch them was any excuse for stealing, and a verdict was brought in against them, the amount of damages to be determined by a referee. The sureties, however, contended that, as they were innocent of the fraud, they were entitled to set up the final certificates and acceptance of the work by the town officials against any subsequent claim for damages; and they argued also that, as the engineer had neglected to carry out properly his duty of inspection, they had been prejudiced, and were entitled to a counter-claim. Both these claims were unanimously rejected by the judges of the Court of Appeal, and the judgment of the court below, against the sureties, was confirmed. The three Lords Justices concurred in saying that neither the delivery of the final certificate, the payment of the balance of the contract price, nor the alleged neglect on the part of the engineer affected the sureties' liability. "The sureties," said Lord Esher, "had covenanted that the work should be well and "truly done, and it had been badly done. *Primâ facie*, there- "fore, the sureties were liable. But the money was to be paid "on the certificate of the engineer, and that had been given, "in fact, but obtained by fraud. The question was whether "the sureties were to be relieved by such a certificate. It "could not be that the certificate, however obtained, was to "release the sureties, but only such a certificate as released "the contractors. The certificate, then, though in fact given "to the contractors, did not release them. It was obtained "from the engineer by the fraud of the contractors — their "personal fraud. The certificate, therefore, did not release "them, and consequently it did not release the sureties, and "they had no defence under the contract." As to the alleged neglect of the engineer, as agent of the town, to superintend the work properly, Lord Esher said that the contract gave to the town the right and power to superintend, but did not impose upon it the duty of doing so; and the fact of its not having been properly done was no defence to the sureties. The mere fact that the town had not exercised its right of superintendence was no breach of any duty to the sureties, and did not release them. Lord Justice Bowen extended this by saying that there was no contract between the town and the sureties that the town should superintend the work, and the non-superintending, therefore, was no defence to the sureties. There was no right on the part of the sureties to superintendence by the corporation. A mere omission on the part of the employer, or a mere passive acquiescence in improper acts of the contractors, did not release the sureties.

THIS view of superintendence is a very different one from that which used to prevail here, even in courts, and still prevails outside of the courts — that, if a contractor can deceive an architect into giving a certificate for work, the defects of which are concealed, thenceforth the contractor's sin is pardoned, and he is entitled to keep the price of good work for his dishonest botching, while it is the architect who must pay the owner the difference in value between the two. According to the English law lords, neither inefficient supervision, nor certificates too confidingly given, exempt in the slightest degree the contractor or his sureties from carrying out exactly what they have agreed to do; and, however inconvenient for cheating contractors such a doctrine may be, there is no doubt that it is the only logical and reasonable one.

A RATHER unusual question in regard to architects' fees is asked, and answered in *La Semaine des Constructeurs*. It seems that an architect was employed to render the usual professional services in connection with the erection of a dwelling-house. In some way it came to pass that he bought some of the material for the building, including the hardware. In adjusting accounts between himself and the owner, he charged for the articles which he had procured the regular retail price, although it was known that he purchased them at the trade price. The owner conceived the idea that the difference between the wholesale and retail price belonged to him, and deducted it from the architect's commission. The architect, on the other hand, claimed that it was not a part of his regular service to buy materials, and that he had been put to trouble and expense to do so, and ought to have some compensation; and that the price which he had charged was only that which the contractors themselves would have charged for the same things, so that the owner lost nothing. The controversy was referred to the Jurisprudence Committee of *La Semaine*, which holds unhesitatingly that the architect is entitled to the retailer's profit on goods which he buys for the owner, and that nothing is to be deducted on account of it from his regular fee for ordinary professional service.

ALTHOUGH the position of *La Semaine* is reasonable enough, the profession in this country looks with disfavor on the practice of converting architects into dealers in materials, as, to a certain extent, injuring the confidential relation which should exist between the architect and his client. One reason for this is probably to be found in the underhand practices which prevail almost universally in the building-material trade, by which the list price affords no indication of the real price, and the discount-sheet, which often

shows an enormous discrepancy between the actual and the ostensible price, is carefully guarded from the eyes of architects and owners. We have often before spoken of the trouble and inconvenience which architects have to submit to, in order to ascertain the true value of materials charged on the bills which they have to certify as correct and reasonable, and it is not surprising that most of them are unwilling to take any share in such traffic. At the same time, it is very common, and often necessary, for the architect to purchase materials on behalf of the owner, and, with us, the usual understanding is that he shall do so at as low a price as he can, and charge the owner a commission of ten per cent on the actual cost as compensation for his time and trouble. Although this arrangement is not favored by the dealers, who have an extreme aversion to letting any one outside the trade know the wholesale prices of their goods, and is, on this account, rather troublesome to the architects, it has the advantage, in the eyes of the latter, of being perfectly open and above-board, and is, of course, very favorable to the owner, who gets his goods through the architect in this way for less than he could buy them for himself, and has the benefit of the architect's educated taste, and knowledge of the market, thrown in. Moreover, so far as this country is concerned, such an arrangement is much fairer to the owner than that of having the architect charge him the retail price, and keep the dealer's discount himself. Although the contractors would be glad enough to put down all materials in their estimates at the list price, and keep the difference between that and the net cost for their profit, they do not, where there is any competition among them, attempt such a thing. We have known a case where the list price of a material commonly used was four times the actual wholesale selling price, and there are many articles where one is double the other. It is obvious that a contractor who bids against others for a job does not count on such preposterous profits on his materials, but contents himself with twenty, twenty-five or thirty per cent advance on the net cost, according to the sharpness of the competition which he has to meet. Where, therefore, the architect buys materials for the owner, although he might fairly claim to be entitled to charge as much for them as they would cost the owner if they were included in one of the contracts, or as much as he would allow for them in a builder's bill for day-work or extras, it is not the list price that he consults in such cases to ascertain the true retail value, but the wholesale price, to which he adds a percentage determined by his judgment.

GENERAL ANNENKOFF, the renowned builder of the Trans-Caspian military railway, whose ingenuity and energy entitle him to rank among the greatest engineers of any age, was commissioned by the Russian Government to plan and direct such public works as it might be advisable to undertake in the districts recently visited by famine, and, as a preliminary step, has prepared and published a report on the subject which is of extraordinary interest. It is well known that the cause of the failure of the crops in the afflicted provinces has been the dryness of the spring and summer season. This dryness has been, in general, increasing for the last ten or fifteen years, and it has been reported within a few days that, owing to the same cause, the harvest of the present season has failed, and another season of famine is imminent throughout provinces which have thirty-five million inhabitants. In the western portion of the afflicted district, which, under the name of Little Russia, has been for centuries famous for its fertility, the more noticeable feature of what appears to be a permanent change of climate consists in the transformation of the west winds, which once always brought rain, but are now dry winds. The farmers of the district attribute this change to the draining of the Pinsk marshes, which lie to the west and southwest of Little Russia, and their explanation appears to be, in the main, correct. In the eastern part of the famine district, however, the easterly winds, which were once moist, have become dry. These winds blow, in that region, almost constantly during the months of May, June and July, and the effect of the change is to make agriculture almost impossible, particularly as they have gained in force at the same time that they have lost in moisture. Observing this, the local farmers reason that the cause of the alteration is to be found in the destruction of the great forests which once covered the territory drained by the Volga. This destruction began many years ago, but it has been prosecuted recently with greatly increased energy, so that a passage has been opened for the unobstructed sweep of air from the dry eastern plains over the regions hitherto fertile.

NOTWITHSTANDING the fatal alteration of the climate of the southern part of the country, it does not appear that the total rainfall over Russia has materially diminished, and the problem presented for solution is not that of increasing the rainfall, but of modifying its distribution. For this purpose, General Annenkoff thinks that a radical change must be made in the manner of dealing with rivers. According to an adage which, he says, is current in Central Asia, a river is a thing "to be guarded and cared for like a young girl," not to be treated as a troublesome encumbrance, to be disposed of in the shortest and quickest way. In the United States, he tells us, this principle has been recognized, and at the same time that the course of the great rivers has been straightened and their banks consolidated, for protection against floods, provision has been made for reservoirs along their upper course, in which their flood waters may be stored to refresh and fertilize the lower valleys during the dry months of summer. In Europe, on the contrary, the principle hitherto followed in the "canalization" or other regulation of rivers has been to convert them as far as possible into mere gutters, by means of which the rain which falls upon the territory drained by them is gathered up and hurried into the sea as rapidly as possible. The consequence is that, while the excess of water brought into them during the spring rains is carried off with great rapidity, it is often drawn expeditiously and completely from the upper valleys only to be poured with disastrous suddenness upon the country about their lower courses; and the loss of the storage afforded under natural conditions by the saturation of the ground in the upper valleys, through the slight periodical overflows, results in a diminution of the average volume of water conveyed, such as has been observed in nearly all the Continental rivers. In the mountainous countries of Spain, Hungary and Southern France, it is found that the overflows due to the spring freshets, which formerly lasted several weeks, now disappear in three or four days, through the effect of the straightening and dredging which the channels have undergone; but, although this result is satisfactory to the people who live in the upper valleys, it, nevertheless, follows that sixty per cent of the moisture which was formerly available for the nourishment of vegetation is now lost. The clearing of the forests, and the consequent loss of the powerful influence which they exert through their property of absorption, and the shade which they cast upon the soil under them, has contributed much to the waste of natural moisture, for want of which, it must be remembered, many thousands of persons have been deprived of food, and many more will die of starvation, unless General Annenkoff and his associates should soon devise means of relief. What those means should be we shall probably know later, but, for the present, General Annenkoff simply explains the cause of the trouble, without specifying in detail the measures by which it may be remedied.

A NEW sort of condenser has come into use for steam-engines in France. Where steam-power is used on an extensive scale, it often becomes a matter of considerable importance to cool the water condensed from the steam as rapidly as possible. The more quickly the exhaust steam can be condensed into water, the greater will be the difference of pressure between the two sides of the piston, and, consequently, the greater the power developed with a given consumption of coal. For cooling the condensed water, it has been common to run it through clusters of pipes, so as to expose as large a surface as possible to the air, or to allow it to drip through bundles of laths or brushwood into a tank. Under the new system, the condensed water from the exhaust is pumped into a sort of gridiron of large pipes, which are pierced with a great number of small holes, but have no other outlet. The water, forced into these pipes under a considerable pressure, spouts in innumerable tiny jets from the holes, and then falls into a tank beneath. Being brought in a state of fine division into direct contact with the air, it loses its heat very rapidly, and, on reaching the tank, is already cool enough to be pumped back for use in condensing the steam from the cylinders. Of course, the jets of hot-water give off clouds of vapor, so that about ten per cent of the water is lost in this way, but the economy and effectiveness of the apparatus more than make good the loss.

LOMBARD ARCHITECTURE.[1] — V.

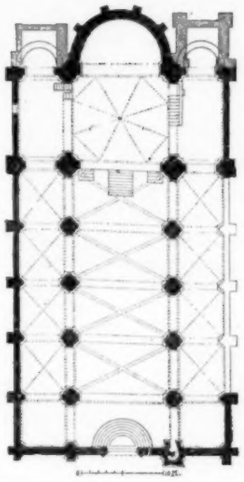


Fig. 29. Plan of San Pietro in Cielo d'Oro.

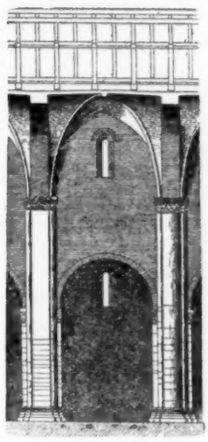


Fig. 30. Bay of the Nave of San Pietro in Cielo d'Oro.

LET us now return to the consideration of the progress of architecture in the essential parts of the edifice. We have seen that the groined vaults on a square plan originally constructed over the nave of San Michele could not be maintained. It was then impossible to support such vaults solidly where they were made high enough, so that the central section could be lighted directly. San Pietro, in Cielo d'Oro, which is later than San Michele, judging from the quality of the bricks, and whose construction dates, to all appearances, from the first half of the twelfth century, offers a new and more advanced solution of the problem of covering the great nave of a church with groined vaulting.

In this edifice (see plan, Fig. 29) the bays of the principal nave are not square, but are divided lengthwise, so as to form an oblong corresponding to the subdivision of the side-aisles. The pillars and buttresses are thus all equal, and the supports of the great vaults being double in number, at the same time that the vaults themselves are only half as large, the result is that the conditions of stability are much improved. It is the structural system adopted in the French ogival churches. However, this organism, which it was proposed to establish in the great nave of San Pietro in Cielo d'Oro, as shown by the original construction of the transverse arches and formerets,

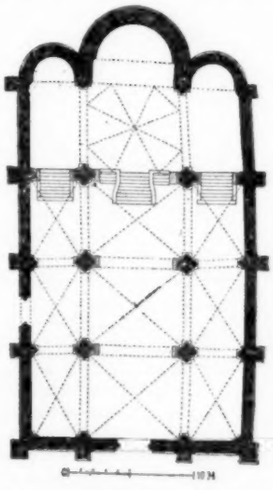


Fig. 31. Plan of San Teodoro, Pavia.

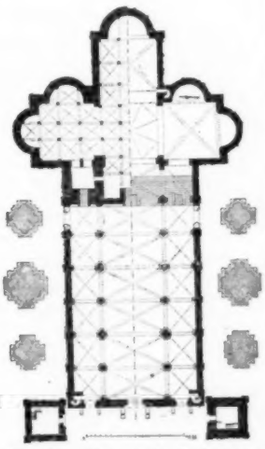


Fig. 34. Plan of the Cathedral of Parma.

was not wholly realized at once; the vaults were not built until later. It must, however, be conceded, considering the absence of rampant walls and buttresses capable of supporting the transverse arches of the great vaults, that iron ties were employed from the start to withstand the thrust of these arches. The use of these ties, which is universal in the later mediæval edifices of Italy, must have, then, come down from the preceding period; San Pietro in Cielo d'Oro is one of the monuments offering the most convincing proof of this. The division of the bays lengthwise was, nevertheless, very advantageous, because it reduced the effect of the lateral thrust on the outer walls, in the spaces between the pillars, and because it doubled the number of the tie-beams.

The Church of San Teodoro, at Pavia, displays the same identity in the division of the nave and of the side-aisles; but at San Pietro in Cielo d'Oro it is the lateral bays that are square and the central ones that are oblong, while the reverse is the case at San Teodoro, where those in the side-aisles are elongated in the direction of the length of the edifice. This modest construction of the twelfth century, therefore, presents a rough draft of the type of churches with regularly-spaced pillars and ample bays, the finished forms of which are exhibited in the Cathedral of Florence and other great Italian houses of worship of the later Middle Ages. San Teodoro is remarkable in other respects also. The spacious crypt occupies the entire width of the church; all the work, except the capitals of the pillars and the door-frames, is in large-sized bricks of good quality, of which those forming the bases of

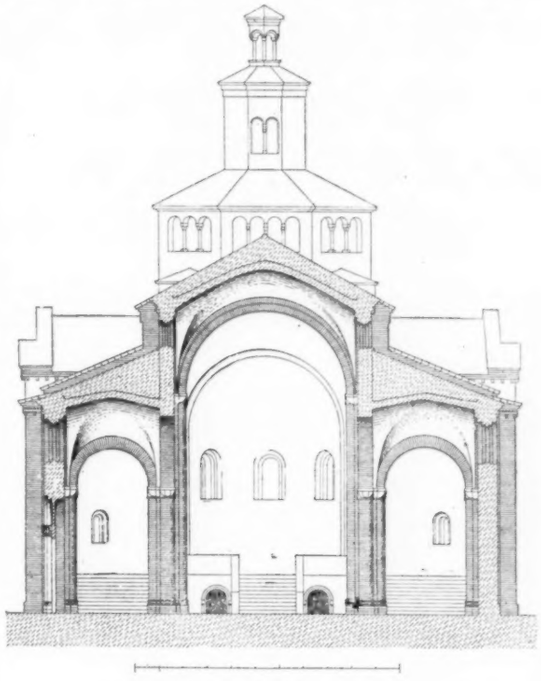


Fig. 32. Section of San Teodoro, Pavia.

the pillars and the small consoles of the cornices are moulded; these last were cut before being baked, after having been dried in the sun. The almost smooth capitals are cubical; the dome, surmounted by a lantern with smaller lanterns above, was built afterward, and makes an elegant central pinnacle, which was taken advantage of in later mediæval times and in the Renaissance.

We have just referred to the good quality of the brick at San Teodoro. The manufacture and mode of using this material shows a corresponding improvement at San Pietro in Cielo d'Oro, where the masonry is in itself superior to that of San Michele. This gives an important criterion for the classification of these monuments chronologically, and which is all the more useful because, as brick improved in quality, it was more widely employed, until it was substituted wholly for stone. As long as brick was coarsely made, as long as it was badly dressed, rough and blunt-edged, architects avoided using it for facings in parts which they cared especially about, and such walls were then revetted with stone. So that at San Michele, which is a sumptuous structure for the time, all the essential members of the interior organism — pillars, arches, engaged colonnettes, bandeaux and the framework of the bays — are in stone, and almost all the exterior walls are faced with the

[1] From the French of F. Dedartein, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 876, page 20.

same material. Then, at San Pietro in Cielo d'Oro, the use of stone is limited to the isolated pillars of the interior; and finally, at San Teodoro, it is restricted to a few decorative pieces or is almost wholly excluded.

But the Pavian Lombard edifice in which brick appears in its highest perfection and greatest predominance is the little Church of San Lazaro, just out of the city; it was built in the middle of the twelfth century. The bricks, both ordinary and moulded, are remarkably fine in quality and regular in shape. The elegant arcades of the crowning (see Fig. 33) are entirely in terra-cotta, including the supports. The edifice evidently belongs to the latest of the series of purely Lombard constructions. We see in it the starting-point of that superior manufacture and splendid ornamentation which gave such lustre to the terra-cotta structures reared in Lombardy during the following centuries.

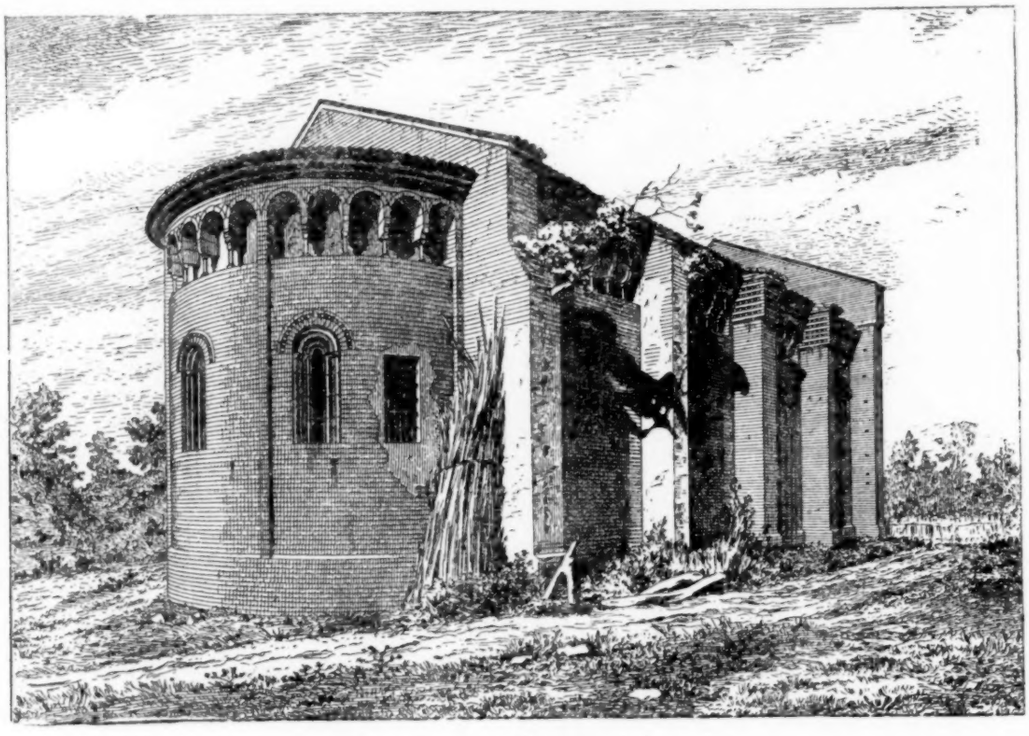


Fig. 33. View of San Lazaro, near Pavia.

In addition to the churches just spoken of, the city of Pavia possesses quite a large number of others, more or less perfectly preserved, which go back to the eleventh and twelfth centuries. Nowhere else did the Lombard style manifest itself with so much fruitfulness and vigor; while, at Milan, it was subjected to the partially depressing influence of a grand and noble past, it could develop in perfect freedom and in all originality in the ancient Longobard capital, whose fame dates from the Middle Ages.

It is not, however, at Milan nor at Pavia that the most important of its monuments now in existence is to be sought, but at Parma. The cathedral of this city, built, doubtless, in the second half of the eleventh century,[1] and reconstructed in great part after an earthquake in the first half of the twelfth, is the largest of all the Lombard churches proper. The plan (see Fig. 34) is especially remarkable for the development of the transept and *chevet*, the large number of apses in the transepts and the vastness of the crypt, which extends under the whole structure from the last bay of the nave. We must call attention to the position of the bell-towers, which are detached from the body of the church, in accordance with Italian custom, but are symmetrically placed with reference to the façade. Doubtless the architects felt the necessity of apparently attaching them to the edifice while at the same time effectually isolating them. One of the towers only, that on the right, is completed; the other has not been carried up above the first story.

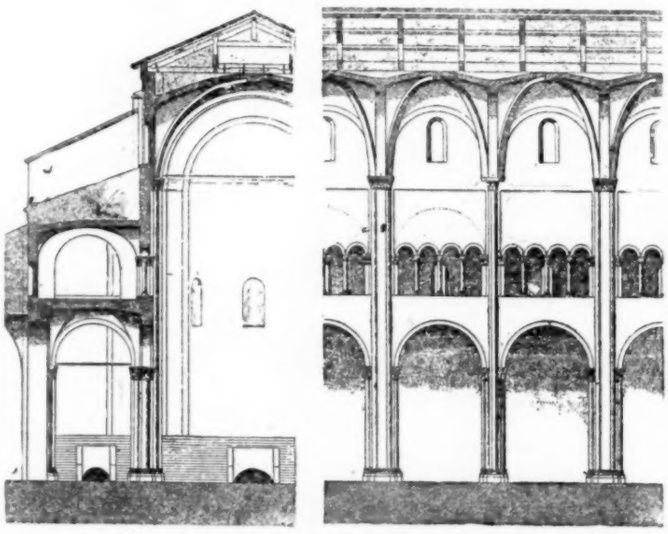


Fig. 35. Section of the Cathedral of Parma.

It was the intention, according to the original plan, if we can judge from the alternation of the pillars in size and shape, to cover the nave with groined vaults on a square plan; but this disposition seems to have been abandoned, at least, after the earthquake of 1117, for oblong bays, which offer better conditions of stability. The thickness of the vaults and the size of their ribs justify us, moreover, in referring the establishment of the vaulted roofing to the reconstruction of the church. The ties that supported the thrusts at first were afterward still further strengthened by rampant walls erected above the lateral roofs. The architecture of the naves is remarkable for litheness of form and slenderness of proportion.

[1] Odoriel, "*La Cathedrale di Parma*," Milan, 1864.

The external walls are covered with mural bands and, like the dome, elegantly crowned with arcades of divers sizes. The façade (Fig. 36) is revetted with marble and is admirable both on account of its wealth of decoration and its robust and imposing character. The ampleness of the bays is all the more impressive because of the relative pettiness of the arcades. The elongated form of the central motive comprising three superimposed bays, a form emphasized by that of the undecorated portions at the extremities, imparts a character of slenderness to this broad wall, all the parts of which — central motive, lateral borders and arcaded galleries — are very fittingly united and bound together.

The deep arch, partially supported by two columns resting on lions, which precedes the main entrance, exhibits the usual type of porch adopted from the twelfth century. The older

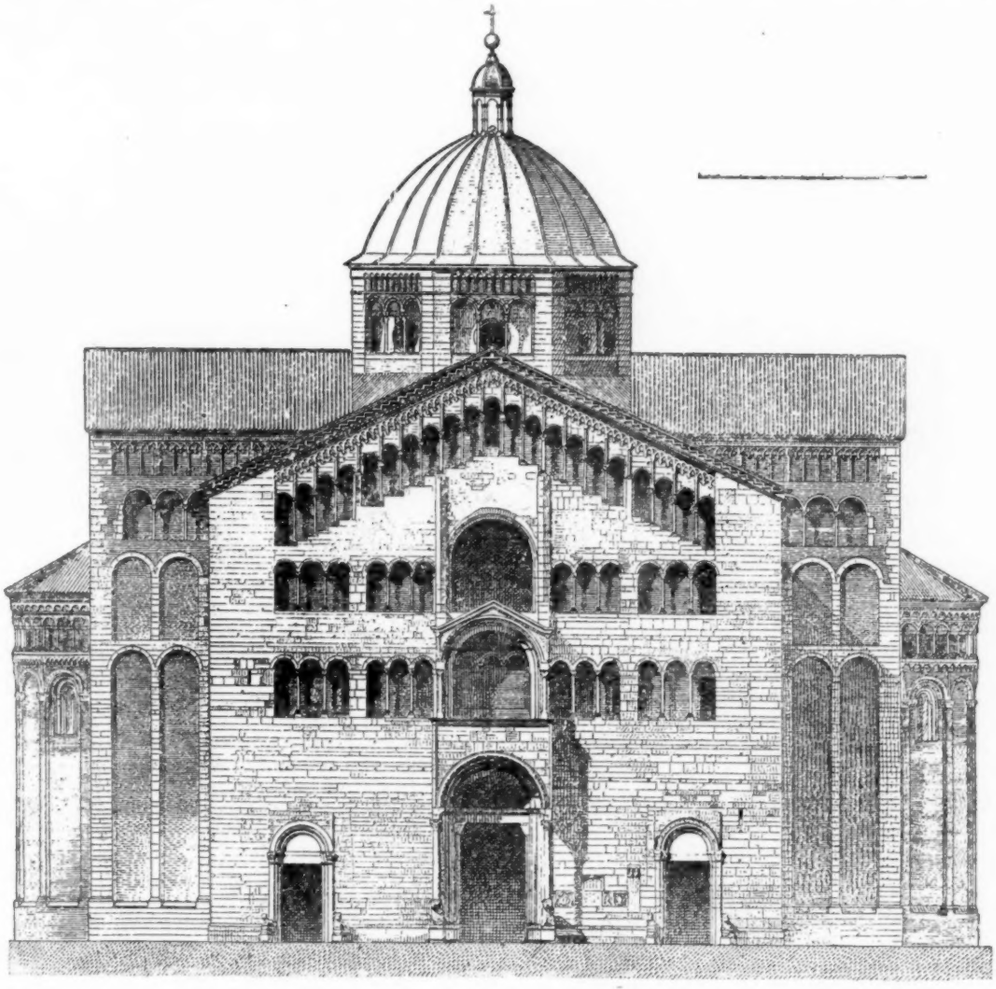


Fig. 36. Façade of the Cathedral of Parma.

porches were often much more spacious, especially in the churches of central Lombardy. They consisted of low constructions, entered through arches and running across the entire façade, which they masked in great part. Traces of them are still to be seen at San Pietro in Cielo d'Oro, at Pavia, in the cathedral of the same city, in San Abbondio at Como, etc. The Church of San Donato, near Sesto-Calende, offers one of the very rare examples of a well preserved disposition of this sort. Porches, similar to that of the Cathedral of Parma, exist at Placentia, Modena, Ferrara, Verona, etc.

We should overlook a large and very interesting class of monuments if we omitted any mention in this study of edifices on a radiating plan or, in other words, of rotundas. These are generally baptisteries, but are sometimes churches. The forms are varied; the outline is sometimes circular, sometimes cruciform with equal arms, and sometimes rectangular or semicircular. A two-storied interior gallery frequently encircles the structure. In certain cases, the upper gallery surmounts broad open niches in the ground-floor. These rotundas are almost always vaulted throughout; the vaults of the upper galleries, which are ordinarily groined vaults, are arranged so as to bear the slate or tile covering directly like the dome. The main part of the edifice is thus entirely in masonry and is free from wood. The greater part of the existing rotundas still preserve their primitive vaulting.

One of the most interesting of Lombard rotundas, the one reproduced here as an example, is the small church of St. Thomas, Almenno, Figures 37, 38 and 39 give the plan, the transverse section and a view of the apse. We call attention, in the plan, to the thickness of the walls and the importance of the choir, which makes a prominent external projection; in the section, to the disposition of the vaults, the vigor and decorative aspect of the arches, and the robust summers superimposed on the columns of the upper gallery; in the view of the apse, to the richness and elegance of the crowning, with its consoles and small intersecting arches. The sculpture, which is quite abundant, is carefully executed; it is rarely that we find as good in country structures. This church formerly passed for a very ancient monument; however, it seems impossible to carry its date farther back than the twelfth century.

The edifices of which we have spoken above, from the church of Aurona and San Ambrogio at Milan to the Cathedral of Parma and the rotunda of Almenno, all lie in a quadrilateral having Milan, Pavia, Parma and Brescia at its angles. This territory, with the adjacent districts, includes the domain of pure Lombard architecture, the region within which the church façades have a broad gable embracing the three aisles. Beyond these limits, foreign influence makes itself felt; there is a more or less marked transition between the

Lombard style and that of the neighboring countries. In the east, at Verona and Bologna, Byzantine influence appears; in the south-east, at Modena, Tuscan; in the west, in Piedmont and Montferrat, French; and in the north, in the valleys of the Alps, German and Burgundian.

We will confine our attention to this last region, to the city and province of Como, where a group of very remarkable monuments may be observed. The interest which they inspire is not limited to their architecture; it extends also to their architects to whom, especially in recent times, considerable artistic activity has been attributed. The *Comacini*, or Como builders, whose obligations as contractors and the prices of whose work were specified in the laws of Rothari and Liutprand, have been represented as the revivers of Italian art in the early part of the Middle Ages.

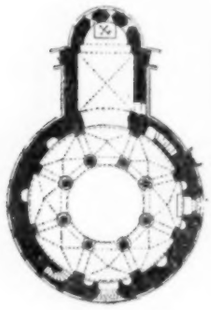


Fig. 37. Plan of St. Thomas, near Almenno.

Fig. 39. Apse of St. Thomas, near Almenno.

That the dwellers along Lake Como were very clever builders is beyond question true. From early times, the people of the plain had looked to them for stone, marble and timber for their constructions. Trained in getting out and delivering these materials, they were better prepared than others to use them; and, as their mountainous country was inadequate for their support, they had early fallen into the way of earning a living by conducting the various building industries abroad. This is true from the Longobard period; and it is apparently because the Como emigrants carried on their business in Lombardy especially, that the Longobard kings, after the manner

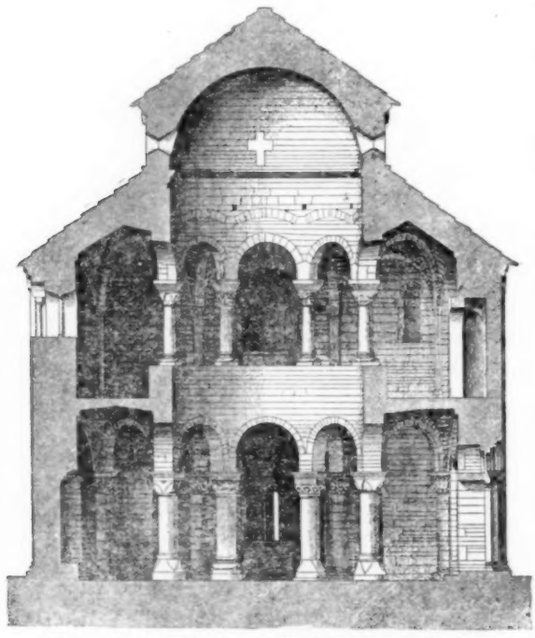


Fig. 38. Section of the Church of St. Thomas, near Almenno.

of the people among whom they usually dwelt, termed builders in generally *Comacini*. Not only were these emigrants good workmen, but a large number of them, rising to the rank of artists, distinguished themselves as architects or sculptors. Many of them might be cited, from Benedetto Antelami, who in the twelfth century signed the bas-relief of the Descent from the Cross in the Cathedral of Parma, to the three Fontana and to Maderno and Borromino who, during the sixteenth and seventeenth centuries made themselves famous in the city of Rome.[1]

The question is to determine whether the *Comacini* during the early Middle Ages exercised an art peculiarly their own, whether, in other terms, they created a style or were content to devote their professional talents to carrying out the ideas of others. They certainly kept to this last rôle after the twelfth century. Was it the same before? It is doubtless by the study of the ancient monuments of Como that we shall be best able to settle this question. Of those dating back to the Middle Ages, the oldest belong to the eleventh and twelfth centuries. Let us examine these.

[To be continued.]

ARCHITECTURAL SHADES AND SHADOWS.[2]—XVI.

CHAPTER XI.—(*Continued.*)

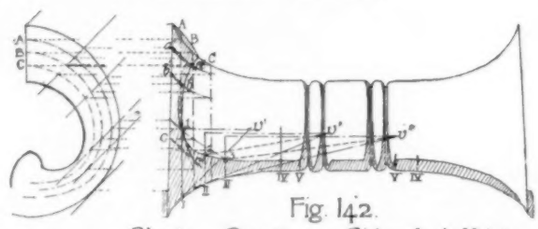


Fig. 142.

Shade and Shadow on Side of Ionic Volute.

Points a,b,c, of Shadow found by Slicing. A,B,C, auxiliary vertical slices. Points of Shade 1,2,3 found by tangent Cones having Vertices v', v'', v''' and Bases, or lines of contact I, II, III, from IV to V, volute is cylindrical.

204. It would be wearisome and superfluous to attempt following in detail all the other operations involved in casting the shades and shadows of Plate VII. Many of those easiest to execute are tedious and difficult to describe. Those we have given at length are more instructive as examples of method and procedure than as particular guides to the solution of future problems. They illustrate the way in which a careful draughtsman goes about his work, the manner in which he attacks his problem, and the variety of his adaptations and applications of rules and processes, rather than the precise *modus operandi* by which any future problem is to be solved. It is well to go carefully over these operations at least once, to follow all their several steps, and by all means to supply such intermediate or additional steps as have been omitted from the above explanations or have been taken for granted in them. The remaining operations will be briefly summarized, and the details of the procedure left to the experience, ingenuity, or skill of the reader.

205. Figure 142 shows how the shade on the lateral surface of the volute may be found. The surface is a difficult one to treat, because its elements are not those of regular or symmetrical geometric solids, but constantly changing in form and curvature. Consequently the "slicing" method is difficult of application, the parallel elements or contours of the auxiliary sections being spiral curves very difficult to determine except by numerous and minute measurements of the object represented. In the absence of such measurements we are compelled to draw these parallel vertical sections as accurately as possible by referring to the side-elevation and transverse section of the volute, which give us two or three points in each. The oblique slicing-planes cut these auxiliary slices in points which determine the profiles or slices shown, and by means of which the shadow of the lip or edge is cast. But these slices are not accurate enough for the line of shade, which is better approximated by means of the method of tangent cones (§§113-114, Figure 94 in No. 755 of the *American Architect*). V', V'', and V''' are the vertices of the cones approximately tangent to the surface of the volute along the heavy lines I, II, III. The points where their lines of shade, (found by the abridged method described in §110, Rule XIII) cut these parallels of tangency are points in the required line of shade, which we draw through them, continuing it along the "corner" of the cylindrical portion of the baluster.

206. The line of shade on the other half of the baluster may be

[1] "*Cantu, Storia della città e della diocesi di Como*"; Florence, 1856.

[2] By A. D. F. Hamlin, Adjunct Professor of Architecture in the School of Mines, Columbia College. Continued from page 198, No. 874.

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

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

found by a similar method. Upon the inverted plan of the capital the lines of shade on the volute will be nearly similar to those on the side elevation, varying slightly because the volute viewed from below, has not quite the same profile as in side elevation, owing to its constant change of curvature. A peculiarity in the present example is the deep under-cutting, or cutting away of the volute next the shaft, shown by the beak-like profile to the right of the side elevation. This removes a portion of the line of shade, that would otherwise be visible on the left-hand volute in the plan. Another peculiarity of the drawing is that this plan is treated as if it were vertical, or as if it represented the detached capital placed on edge. The light comes from above and from the left, as in the elevation; not from the left-hand below, as in plans ordinarily. This is, of course, a mere matter of conventional rendering, and M. Girault's treatment certainly contributes to the unity of effect of the whole drawing.

207. The shadows on the faces of the volutes in front elevation are found by means of 45° slicing-planes perpendicular to $V'P$, giving sections which may be drawn upon the volute itself. The data for these sections are easily obtained from the horizontal section shown in the plan and the vertical section to the left of the side elevation in Plate VII. These show the depth of the hollowing-out or channelling between the successive turns of the fillet. If the slicing-sections are drawn upon the elevation (as though the slices were turned down upon it) care must be taken to draw the rays of light at 35° 16′ to the traces of the slicing-planes, and then to project the points of incidence back upon these traces. This method of proceeding — very convenient in many cases where the plan is of such a nature as to be of little or no service — is more fully illustrated in the discussion of Plate VIII, further on; where it is used to find the shades and shadows on the mouldings of a Gothic cusped arcade.

208. We have discussed the drawings of M. Girault with an amount of detail which, though leaving many minutiæ of the work unmentioned, has already assumed unforeseen dimensions, and has perhaps overwearied even the most patient reader and student. He may perhaps be comforted by the assurance that the next plate will be much more briefly discussed; and that, in fact, a problem like this one of the Ionic capitals, full of minute decoration and mainly composed of ungeometric and irregular surfaces, is far more difficult and tedious to manage than that of a complete architectural composition, having many plane surfaces and composed almost entirely of lines and forms of a simple and decided geometric character, like those in Plate VIII.

209. It has perhaps seemed to some of the readers of these studies that the applications and illustrations thus far presented, have been too exclusively confined to Classic forms, and that the rules and formulæ hitherto given are, perhaps, not readily applicable to other forms than these. It would at least seem true that the French, to whom we owe in such large measure the modern progress of architectural sciography and the finest examples of its application to draughtsmanship, have confined themselves mainly to Classic and Renaissance forms. This, however, is but natural, for the simple reason that modern French architecture is derived from Renaissance origins and built up on Classic traditions, to which the *Prix de Rome* and the École des Beaux-Arts have greatly ministered. For this reason the sciography of Classic forms has been by the French more completely reduced to rule than that of other styles, so that the characteristic forms of the shades and shadows of Classic bases, capitals, cornices and other details are soon learned by heart and drawn as matters of habit; and this has by no means to the same extent been done with the forms of Gothic or other styles. But it does not follow that these forms are in any degree less amenable to rule and experience, and the splendid architectural works published by French houses offer many beautiful examples of Gothic forms represented with carefully cast shades and shadows in plan, elevation and section.

210. Plate VIII is offered as an illustration of the happy effect of applying our rules and processes to a bit of Gothic architecture. In Volume VI of the British "*Architectural Association Sketch-book*," Plate 55, will be found a drawing in outline by Mr. F. C. Deshon of a Piscina in the cathedral at Fécamp (France). Plan, elevation and section are given, but without shades or shadows.[1] These have been supplied in Plate VIII, [See Illustrations] bringing out the actual form, the grace and elegance of this little bit of architecture, in a manner surprisingly in contrast with that of the careful but dry and uninteresting drawing in the sketch-book.

211. In this plate some of the construction-lines have been retained, in order to dispense with supplementary figures and explanations. The plans of the capitals by means of which their shadows were cast are for the sake of simplicity, omitted from the finished drawing, although in its actual preparation they were plotted out on the general plan. The abaci are octagonal on the capitals of the three main columns, and square on the two jamb-columns behind. The shadows of the shafts and capitals require no explanation, though attention may be called to the way in which they break out over the belt-course behind, describing true sections of its mouldings. The only part of the plate that is at all intricate is the arches, which are treated by the process shown in Figure 143. Here, (as was suggested for the volute-faces in Plate VII) slicing-planes perpendicular to $V'P$ are used, and the section of the mouldings made by each is shown on the elevation, as if revolved down upon it around the trace of the slicing-planes as an axis. The section-profiles are easily drawn by laying off, for each element of the moulding, a perpendicular distance from the trace of the plane, equal to the projection or horizontal distance of that element from some assumed vertical reference-line in the section of the arch at the right of Plate VIII. Rays of light are then drawn at 36° 15′ to the trace, and tangent to the prominent points of each slice; and the points of contact as well as those where the rays again touch or intersect the same slice, are projected back upon its trace. The former give points of shade, the latter of shadow.[2] Carefully drawing the lines of shade and of shadow through the points thus formed, we have the result shown in Figure 143 and in Plate VIII, from which it becomes apparent that the outer mouldings of the arch cast no shadow on the wall behind, except a very small portion near the apex of the arch, where its shadow quite passes over and beyond the cusp-mouldings, and must, therefore, fall upon the wall. It happens, however, that it falls behind the middle capital, and so does not trouble us.

212. The shadow cast on the wall by the cusps is found, as with other arches, by casting separately the shadows of the front and rear of the intrados of each cusp, (and as it is an open cusp, and there is a possibility of light reaching the wall through the triangular opening) those of the extrados as well. As so often happens, a large part of the resulting shadow either falls behind the columns and is out of sight, or is "swallowed up" by other shadows, proving that the shadows so "swallowed up" (shown by dotted lines in the plate) really fall upon the objects whose shadows seem to do the "swallowing." Thus a large part of the shadow cast by the cusp

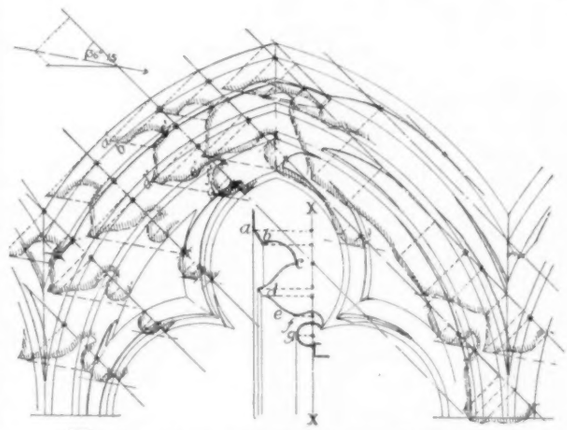


Fig. 143. Shade and Shadow on Gothic Arch

The true Section is shown in middle of Figure. "Slices" taken perpendicular to V'P, sections are drawn by laying off perpendicular distances of a'b'c' etc from Trace of Slice equal to distances of a,b,c etc from XX in Section in the middle. Rays are drawn at 36° 15′ to Traces, and their points of contact and incidence on Slicing-sections projected back onto the traces, giving points of required Shade and Shadow.

falls upon parts of its own soffit, or upon the projecting portions of the abacus of the middle column. This column, by the way, is peculiar in supporting, by a curious corbelling-out of its capital rearwards, the impost of the group of arch-mouldings which are seen behind the cusps, springing from the minor jamb-columns at the sides of the recess.

213. A rather neat problem is afforded by the two bowls of the piscina in plan, which are not complete hemispheres (in which case the shadows would have been as shown in Figure 117, §139[3]), but somewhat less than hemispheres. To find, first, where the shadow on the interior surface begins, we use the method of tangent cones. From the section we find the cone tangent to the spherical surface at the rim of the bowl to be the one whose vertex is at v'. The shadow of its vertex, inverted on the plan (as if the shadow of the cone were so moved parallel to itself as to bring the circular shadow of its base directly under the base itself; *i. e.*, under the bowl) falls at v in the plan, OB being equal to $O'B'$ in the sections. Tangents from v mark, at their contacts with the circle, the terminal points of the line of shade on such a cone, and, consequently, the limits of the shade on the edge of the bowl, which are, of course, the initial points of the shadow on its interior surface. The curve of its shadow will be an elliptical arc passing through the shadow of the point p. The shadow of p may be found by passing

[1] The English draughtsmen seem to have been quite as backward as our own in the practice of careful rendering of architectural drawings with shades and shadows correctly cast. It is at least possible that the dryness and poverty of much of the Victorian Gothic architecture may be due to the coldness and poverty of their outline studies and drawings.

[2] The rays are drawn at 36° 15′ to the trace, and not at 45°, because the slicing-contour or section thus revolved down is a true projection of the slices cut by a plane passing through a ray, and the true direction of the ray must, therefore, be drawn upon it instead of its apparent direction as projected on the horizontal plane.

[3] In No. 766 of the *American Architect*.

a vertical slicing-plane through p (as in the left hand bowl) and drawing the section as though revolved down upon the plan. The resulting slice will, of course, be an arc of a great circle of the sphere described from d, which represents its centre. The ray drawn through p at 36° 15′ to the slicing-trace gives, by its intersection with the arc projected back onto the trace, the point p_1 as the required shadow of p. The curve drawn through p_1 is elliptical, but somewhat less than a half-ellipse, the latter being the form of the shadow only in the case of a complete hemisphere.

214. The above explanations must suffice for the plate under consideration, as they fairly illustrate the ordinary procedure in such cases. The careful reader will have observed the variety of methods and processes employed, and the frequent change from one to another for different parts even of the same object. Thus, in studying the *ove*, we made use concurrently of slices perpendicular to the vertical plane and of the five-point method. The draughtsman should be familiar with all the various methods and rules, in order to turn from one to another the moment the first proves unavailable or inconvenient for a given case. He has to exercise much the same sort of judgment as is required in algebraic problems. The mathematician has at his disposal certain fixed rules and formulae, and certain short-cut methods of applying them, and his skill and proficiency are shown by his quickness to discern, in any given problem, which one of these is the most likely to meet the particular difficulties of the case, and to recall the special formula which may be the key to its solution. This sort of readiness in sciography, as in algebra, comes only with practice, and cannot be replaced either by mere memorizing of the rules given in the preceding papers of this series, valuable as these are in summarizing the main principles of the science, or by clever guess-work and rule-of-thumb approximation. Steady and constant practice upon progressive problems, beginning with the simplest and advancing to the most difficult, solving each with pains and accuracy, in every case accounting for the shadow of every part of the line of shade, and rendering shades and shadows in a workmanlike manner. This is the necessary prelude to success in this branch of draughtsmanship. Guess-work, it is true, has its place at times, but only when and where geometric methods are at fault, or where the problem relates only to wholly insignificant details. But even in such cases guess-work should be founded on experience obtained in the previous solution of problems somewhat akin to the one in hand, or from the careful observation of the actual shades and shadows of similar forms in sunlight falling at the conventional angle.

215. When one has once acquired this experience and this readiness of resource, he can hardly fail of finding a new pleasure in his work of design, and of adding a new charm of effect to his own draughtsmanship; for both his draughtsmanship and design will gain immensely in quality and seriousness by the addition of carefully-rendered shades and shadows. In the following and closing chapter of the series we shall endeavor to briefly set forth the æsthetic importance of sciography in its relations both to design and delineation, with a few remarks on the general question of rendering, and on the treatment of aërial perspective and reflected light, illustrated by plates showing the work of some of the best American and foreign draughtsmen.

[To be continued.]

Scarfed Beams. — Where neatness is more essential than strength, scarfed joints are preferred to any arrangement of "fishing," because a beam united by scarfs and bolts is of the same breadth and depth at the joints as at other parts. In order that the bolts may not be screwed through the timber and to increase the clamping surface it is advisable to add a plate of iron on the faces of the beam where the heads and nuts of the bolts pass through. The ends of these plates may be turned into the wood to give greater grip. But it is desirable to avoid depending solely upon bolts for the strength of a scarf, owing to the effect of the shrinking of the timber and the liability of the bolts to be, in consequence of their small dimensions, pressed into the wood. Keys or wedges can be often used to keep the upper and lower parts in their places. Varieties may be almost infinitely multiplied by increasing the number of the faces, whether oblique or square, and uniting the parts either by tabling, keying or a combination of the two; but in most cases the greatest simplicity should be aimed at, in order that the parts may the more readily be made to fit each other with accuracy. Very complicated scarfs have been used by some old carpenters, respecting which Robison observes that "many seem to aim at making the beam stronger than if it were of one piece," an absurdity too manifest to need refutation. Where a scarfed beam is exposed to transverse strains the joint should be varied from the ordinary form. When a piece of timber, subject to compression in the direction of its length, has to be scarfed, oblique faces should be avoided, because of their tendency to slide upon each other. Though bolts are commonly used to secure scarfed joints, iron hoops or straps, driven on tightly, have been recommended in their stead and possess the advantage of not weakening the timber. In joints that depend wholly on bolts, Tredgold recommends that the sum of their areas should never be less than two-tenths of the area of the section of the beam. He has also given the following rules for the length of scarfs: — In oak, ash or elm the whole length of the scarf should be six times the depth or thickness of the beam, where there are no bolts. In fir, without bolts, twelve times the depth. The whole length of a scarf dependent wholly upon bolts should be in oak, ash or elm about three, and in fir six times the depth of the beam. When bolts and indents are used together the length of the scarf may be in hard woods twice, and in soft woods four times the depth. — *The Architect.*

CONSTRUCTION.[1] — XV.

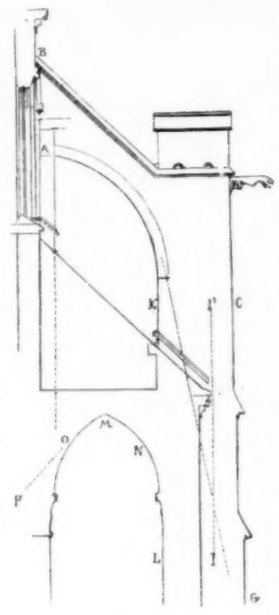


Fig. 79.

We have already said that the architect of Notre Dame at Dijon had at his disposal a limited area crowded in between narrow streets; so he could not give to the buttresses of the nave supporting the whole system a great projection beyond the perimeter of the aisles.

If he had followed the methods adopted by his time, if he had remained submissive to routine, or, to be more accurate, to the rules already established by experience he would have designed the flying-buttresses of the nave as indicated in Figure 79.

The thrust of the great vault acting from A to B, he would have placed the last voussoir of the arch at A, and its coping at B, and he would have moved the front of the buttress from C in such a way that the oblique line of the thrusts should not pass the point G. But he cannot go beyond the point I: since the width reserved for the public road does not allow it; and on the other hand, on the interior he cannot pass the point K, which is on the vertical of the engaged pier L, under pain of causing a false bearing and of breaking the transverse arch M, whose curve it is important to keep; for if a too considerable weight acts upon the haunches of that arch at N, that arch will push the detached pier on the interior in the direction O P. Hence the architect must fix the pier of his flying-buttress in the space included between K and I. But we know that this pier must be passive, immovable, for it is the true point of support for the whole system; and it can evidently acquire that immovability (its narrow base being taken into consideration) only by a particular arrangement, a supplementary vertical resistance. Accordingly, the constructor solves the problem as follows: he builds the pier between the two points desired (Fig. 79*b*); he loads heavily the summit of the flying-buttress at A; he slopes the coping B C so as to make it tangent to the extrados of the arch; then he brings the rear surface of the pinnacle D, over to the point E out of the vertical of the wall F, so that the space P F may be a little less than a third of the space F G. Thus the thrust of the great vault is strongly opposed, in the first place, by the weight A, and is neutralized by that pressure; so that now only the flying-buttress itself acts upon the pier K, so far as it is loaded at A. Accordingly, if that arch were to be put out of shape, it would be in accordance with the drawing R; it would break at S and the pier K would bend.

But the architect moves back his pinnacle, and loads the pier outside of its perpendicular as far as the point E, that is to say, as far as the point where the rupture of the flying-buttress might take place; he thus checks that rupture, for under its load the point S' of the flying-buttress cannot be displaced; but the pinnacle D only presses against the arch, while it does not weight it, since the space C O is greater than the space O P; hence the weight of the pinnacle, which is a well-built, homogeneous construction of large stones, rests on O C, the centre of gravity of the pinnacle being between O and C; consequently if the arch were torn down, this pinnacle would remain upright; thus he loads the pier K, with greater weight than that of a pinnacle having only F G in breadth; and hence assures in this way the stability of the pier F G, too feeble by itself to resist the thrust without the addition of this weight, while, at the same time, he compresses the haunches of the flying-buttress at the point where that arch would tend to break if thrust out of place.

Fact is more conclusive than all logical deductions; the construction of the nave of Notre Dame at Dijon, in spite of slightness of its exterior supports, has not undergone the least deformation. Let us not lose sight of the interior; let us notice that the vaults do not push directly upon the tops of the flying-buttresses, and that between the tops of these arches and the skew-back of the vault there exists, above the triforium U, an interior support V just at the height of that thrust, neutralizing its action in a singular manner. Let us study the details: the block of stone T, against which the last voussoir of the flying-buttress rests, is no other than the lintel carrying the support of which we were just speaking, and at the same height as this lintel are fixed the two capitals which carry the wall-arches of the vault (See Fig. 78). This lintel is set just on the level of the action of the thrust from the great vault.

Let us analyze this construction piece by piece (Fig. 80).

We see at A the column, the principal support of the triforium at

[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. 875, page 10.

the height of the piers carrying the extremities of one transverse and two pointed arches, a support flanked by the two lesser columns *B*.

At *C* are the large pillars set against the stratum upon the abacus of the large capital on the ground-floor and passing in front of the

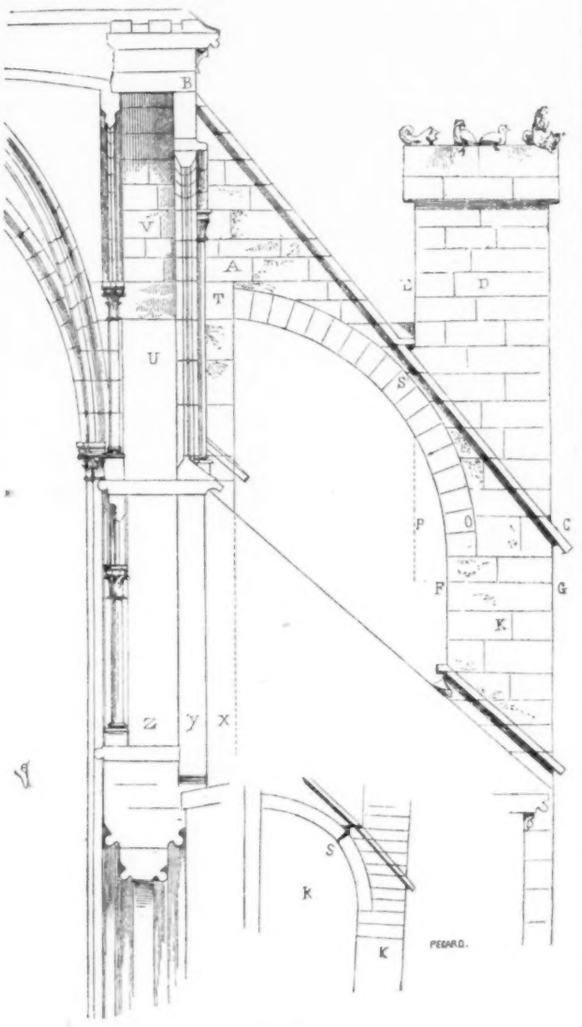


Fig. 79*b*.

group *B A B* in order to arrive under the course *M* of the capitals of the great vault; a course consisting of a single stone.

At *D* is the capital of the triforium.

At *E* is the architrave of the arcade of the triforium, also consisting of one stone.

At *F* are the two blocks closing the arcade.

At *G* is the course forming the ceiling of the triforium, and connecting the arcade and the course of the capitals *M* to the exterior support, under the roof, a support whose courses are drawn at *H*.

At *G'* is one of the slabs, placed next to that at *G*, and connecting the rest of the arcade to the partition built under the upper windows, of which *I* is the support.

These slabs *G'* carry the fillet *K*, projecting over the roof of the aisle.

At *L* is the first section of the exterior counterfort seen above the roof.

At *M* is the course of the capitals of the great vaults, carrying the bases of the two pillars, set against the stratum, which sustain the wall-arches.

At *N* is the skew-back of the great vaults, whose upper bed is horizontal, and which carries the extremities of the two pointed and the transverse arches.

At *O*, is the second skew-back carrying the two pointed arches and the transverse arch, the upper bed of the latter being now normal to the curve, while the beds of the two pointed arches are still horizontal.

At *P* is the third skew-back, no longer carrying the transverse arch, which is henceforth independent, but still carrying the two pointed arches whose beds are horizontal.

At *Q* is the fourth skew-back, carrying nothing but the shoulder-piece behind the pointed arches, for laying the first filling-stones.

At *R* is the lintel, of which we were just speaking, and which connects the skew-backs with the pier whose courses are at *S;* this lintel carries the shoulder-pieces behind the pointed arches, for it is important to give firm support to these now independent pointed arches whose voussoirs are represented at *T*, while one of the voussoirs of the transverse arch is given at *V*.

At *X* is the course of the exterior counterfort carrying the ledges of the windows, the bases of the exterior pillars of these windows, and the fillet passing above the list (or fillet-ridge) of the roof, as the perspective detail *Y* indicates.

The terminus of the voussoirs of the flying-buttresses then rest against the lintel *R*, and, beginning with the lintel, the interval between the pier and the vault is filled (see the interior view, Fig. 78).

If we examine the section (Fig. 79*b*), we see that the buttress *X*, the wall of the triforium *Y*, the passage *Z*, and the inner pier present a considerable thickness; for the passage is quite wide, and the wall and buttress together measure about 60 centimetres, and the group of columns forming the inner pier, about 50 centimetres.

Now, all this must rest upon a single capital, crowning a cylindrical column.

There will be evidently an imperfect balance, and if the buttress *X* bears upon the haunches of the transverse arch of the aisle, the pressure that it will exert will push the column inward, and make it lose its upright position, and, the upright position once lost, the whole equilibrium of the building is destroyed.

The builder has at first given to the capital (Fig. 81) the form *A*; that is, he has moved the axis of the column into the vertical plane passing through the middle of the archivolt *B*.

Upon this capital he has placed the two skew-back stones *C* and *D*, with their beds horizontal: the first skew-back *C*, carrying the bases of the pillars set against the stratum and rising to the beginning of the great vaults, while the third skew-back *E*, has its section normal to the curves of the transverse arch, the pointed arches and archivolts, for, on starting from this skew-back the arches detach themselves from one another.

Having set free the arches, which henceforth are laid in independent voussoirs, the builder has erected a pier, having projections to the right and left, *F, G, H, I, K*, in corbels, up to the vertical of the buttress *L;* and in the course *I*, he has taken care to reserve

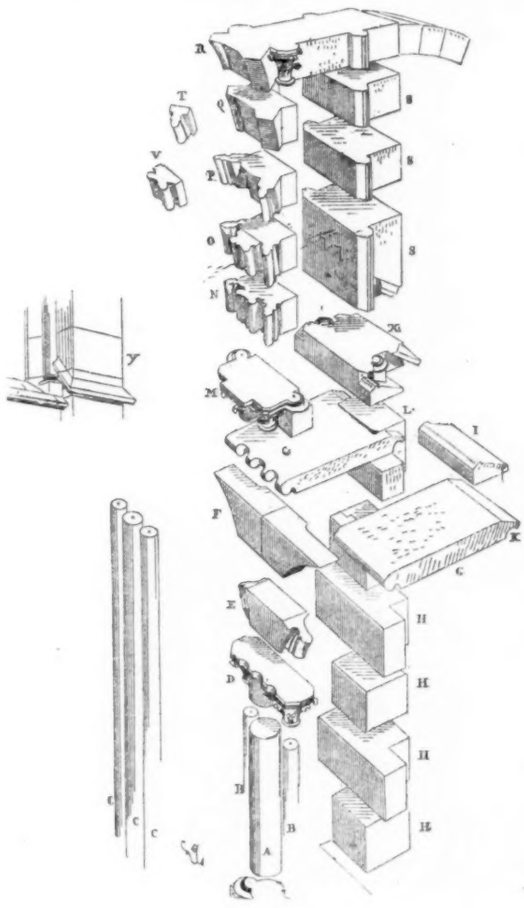


Fig. 80.

two hollow spaces *M*, to receive the arches sustaining the wall of the triforium *N*.

The interior pier *O*, composed, as we have said before, of a cluster of pillars, set against the stratum, rests upon the inner part of that

pier. It is understood that its courses *F, G, H, I, K,* are each in one piece, and strong.

The heaviest weight and the most stubborn resistance are those of the pier *O*, since it carries vertically the buttressed vaults; for the buttress *L* carries almost nothing, since the summit of the flying-buttress does not weigh upon it (see Fig. 79*b*), and it merely keeps the structure in equilibrium. Accordingly the stones *K, I, H,* being weighted at the ends *K' I' H'*, cannot sway; hence the buttress is held firm.

As to the thrust of the transverse arch *P*, and that of the pointed arches of the aisle, it is wholly neutralized by the weight which presses downwards in the vertical of the pier *O*. It is now understood how essential it is that the pier *O*, should be composed of large stones set upon end, and not of courses, for this pier, supports a two-fold pressure: that from above downward, caused by the weight of the vaults, and that from below upward, in consequence of the tendency to tip, produced by the buttress *L* upon the ends of the stones *K, I*.

If, then, these piers *O* were built in courses, it might happen that the mortar joints, if strongly compressed, by that two-fold action

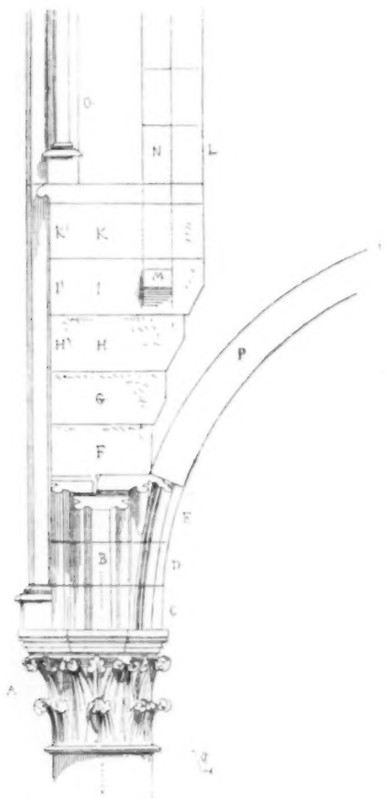


Fig. 81.

would diminish in thickness; now the least settling in height of the piers *O* would result in deranging the equilibrium of the entire system.

On the contrary, the leverage produced by the courses *I* and *K*, under the pier *O* has the result (those pillars being perfectly rigid, and incompressible) of sustaining very firmly the starting point of the great vaults.

We shall the better understand this system of building by supposing, for example, that in order to execute it, cast-iron, stone and wood have been employed. (Fig. 82.)

Let the column *A* and its capital of cast-iron be set upon a pedestal of stone, and let them support the stone skew-back *B*.

The builder gives a broader projection to the capital toward the interior of the nave, than on the side of the aisle. Upon this capital he raises the courses *B, C, D, E, F, G*, etc., in the form of corbels. He sets three iron columns *H* along the inner wall and augments them by three other columns *H'* (see section *H''*); these columns *H H'* are attached to the buttress *I* by rings, and a cramp-iron *K*, in order to make the buttress fast to the pier, and to hinder the rounding outward of either.

The buttress *I*, is built of courses of stone. Upon the columns *H H'*, the architect places the skew-backs *L* of the great vault; the two side columns *O O* continue alone up to the lintel *M* which buttresses the arches of the great vaults.

On the outside he raises a pier *N* of stone, in order to be able to keep the interior structure in the vertical, by means of the prop *P*, strengthened to prevent its displacement, by the cross-pieces *R*.

There is no inconvenience, on the contrary, in case the buttress *I*, built in courses, should be compressed, or should settle; for the lower the point *Q* falls, the more rigid will be the prop *P* against the back of the lintel *M*. Nevertheless, this buttress *I* is needed to keep the back of the lintel *M* in a horizontal plane, but most of all to give stability to the column *A*. In fact, one need not be very well versed in the knowledge of the laws of equilibrium, to know that if, between a column *Y* and a column *S*, both slender (Fig. 82*b*) we place several horizontal courses, it will be impossible, however well loaded the columns *S* may be, and however well propped may be the courses, in one sense, to keep these two columns in a vertical plane, parallel to the plane of the props; while, placing on the column *T* (Fig. 82*c*) horizontal courses *V* propped in one direction, and upon these courses two pillars *X X'* passing through a vertical plane perpendicular to the plane of the props (always supposing the two pillars *X X'* to be loaded) we shall be able to keep the columns *X X'* and *T* in planes parallel to the props. In this consists the entire system of construction of Gothic naves set upon columns.

That is the explanation of the galleries set one above another in Burgundian architecture, a sort of empty buttress whose inner wall is rigid and its outer wall compressible, thus giving great strength of resistance and of impost to the extremities of the high vaults, avoiding enormous abutments to support the flying-buttresses, and destroying, by its equilibrium and its pressure upon two distant points, the effect of the thrusts from the vaults of the aisles.

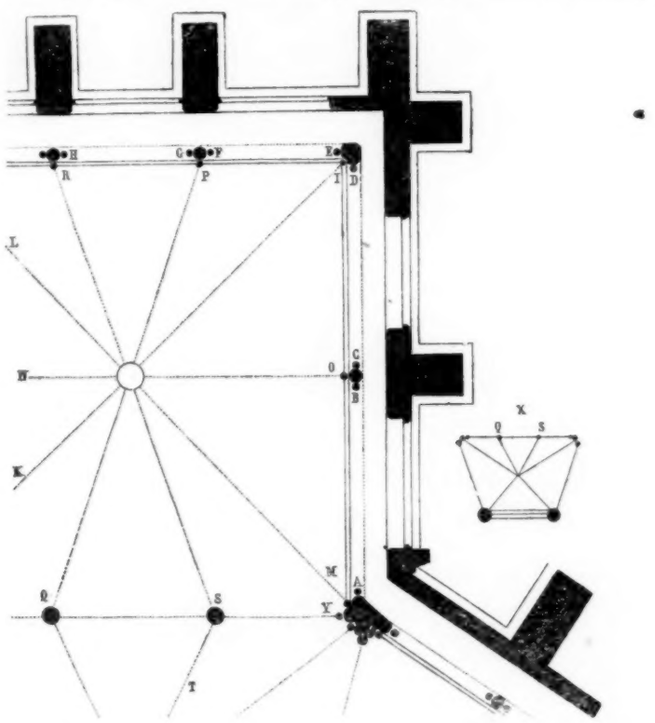


Fig. 83. Chapel of the Sainte Vierge, Cathedral of St. Etienne, Auxerre.

In truth, all this may well appear complicated, subtle and labored; but it will certainly be conceded us that it is ingenious, very skilful and scientific, and that the authors of this system have made no confusion of Grecian art with the art of the North; of the Roman with the Oriental; that they have not put caprice in the place of reason, and that there is in these constructions more than the appearance of a logical system.

We freely admit that one may prefer a Grecian, Roman or even a Romanesque construction to that of the church of Notre Dame at Dijon; but we shall certainly be permitted to believe that there is much to be gained here, by us architects of the nineteenth century, called upon to raise very complicated edifices, to strive with matter, while possessing materials very different in nature, properties and mode of use; forced to arrange our constructions in view of new needs, of widely varying purposes, very different from those of the ancients; . . . that there is more to be gained here, we repeat, than from the primitive and simple structure of the Temple of Minerva at Athens, or even than from the solid immovable structure of the Pantheon at Rome.

It is unfortunate that we could not always build like the ancients, and perpetually observe the very simple and very beautiful rules of the Greek or Roman builders; but we cannot reasonably build a railroad-station, a market, a hall for our assemblies, a bazaar or an exchange, in accordance with the workings of the Grecian or even of the Roman system, while the supple principles already applied by the

architects of the Middle Ages, after careful study, place us upon the modern path, that of incessant progress. This study permits us every innovation, the use of all kinds of material without abandoning the principles established by these architects, since these principles consist essentially in submitting everything, materials, form,

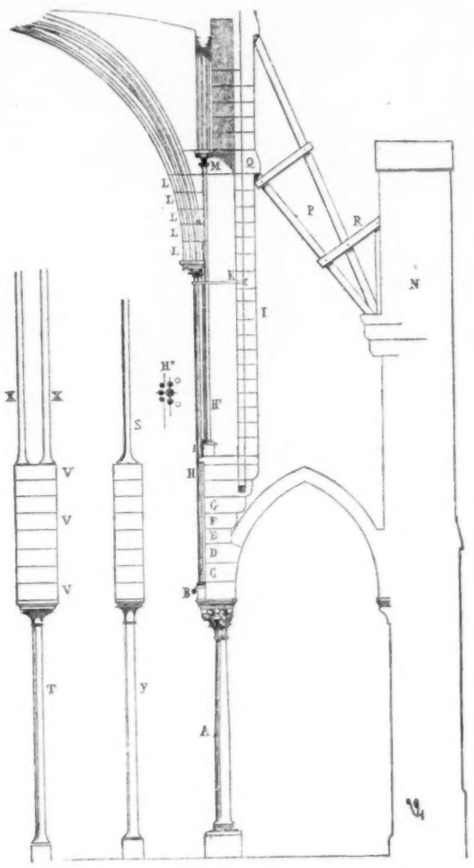


Fig. 82c. Fig. 82b. Fig. 82.

general arrangements and details to the reason; in reaching the utmost limit of possibility, in substituting the resources of industry for inert force, and the search after the unknown for tradition.

It is certain that if the Gothic builders had had at their disposal large pieces of cast-iron, they would not have failed to use that substance in their buildings, and I would not guarantee that they would not sooner have arrived at results more judicious and more logical than those obtained in our time, for they would have taken that substance frankly for what it is, profiting by all the advantages that it presents, and without trying to give it other forms than those appropriate to it. Their system of building would have allowed them to use at the same time cast-iron and stone, a thing that no one has dared to attempt, during our epoch; so much power has routine over our builders, who never cease talking about progress, like the singers in the opera, who cry "Let us start!" for a quarter of an hour without moving from the stage.

We are not aware that any one has attempted, in France, up to the present day, unless it is in the building of houses in several large cities, to place considerable masses of masonry, vaults of bricks or even stones, good structures well planned and executed, upon detached supports of cast-iron.

It is because *classic* teaching can hardly permit these attempts, which the architects of the Middle Ages would certainly not have failed to make, and probably with entire success.

We certainly cannot reproach the Gothic builders with stopping halfway; we shall see with what ardor they throw themselves into the more and more rigorous application of the principles which they have laid down, and how they succeed, in a few years, in carrying these principles to their limit, in using materials with an exact knowledge of their qualities, and in mastering the most intricate problems of descriptive geometry.

The church of Notre Dame at Dijon is a small edifice, and one might suppose that the Burgundian architects of the first half of the thirteenth century did not permit themselves similar hardihood in monuments with broad extent of surface, and very high. It is the contrary, which takes place; it seems that working on a large scale these builders gather more assurance and develop with still more boldness their means of execution.

The choir of the Cathedral of St. Etienne at Auxerre was rebuilt from 1215 to 1230, over a Romanesque crypt (see *Crypte*), which led to the adoption of certain arrangements, unusual in the large churches of that period. Thus the chancel is surrounded by a simple aisle with single square apsidal chapel.

As to its construction, it presents a perfect analogy, in the lower part, to the Church of Notre Dame at Dijon. At Auxerre, nevertheless, the structure is lighter yet, and certain difficulties resulting from the Romanesque arrangement of the plan, which they did not wish to change, have been solved in the most ingenious manner.

We give (Fig. 83), half of the plan of the apsidal chapel, known by the title of Sainte Vierge. This plan is taken at the height of the gallery of the ground floor, resting, as in Notre Dame at Dijon, upon an arcade. At *X*, we have represented, on a smaller scale, the horizontal projection of the vault of the aisle in front of that chapel.

According to the Burgundian method the wall-arches are detached from the wall, they rest upon the pillars *A B*, *C D*, *E F*, *G H*, etc., set against the stratum.

The central pillars, likewise set against the stratum, sustain the force of the pressure, and the vault consists of two pointed arches *I K* and *L M*, one transverse arch *N O*, and the intermediate arches *P Q* and *R S*.

These two intermediate arches fall, at the right of the aisle, upon two detached columns *Q* and *S*, set against the stratum, each in one piece, and having twenty-four centimetres of diameter to six metres sixty centimetres of height from base to capital. The difficulty was to neutralize so exactly the different thrusts, acting on these columns *Q S*, that they could not leave the vertical.

It was a problem to be solved, similar to that which the builder of the chapels of Notre Dame at Chalons-sur-Marne, had set before himself, but upon a much larger scale and with points of support incomparably more slender.

Let us take our stand for an instant in the aisle, and look at the summit of the column *S*, whose diameter, as we have already said, is only twenty-four centimetres. Upon this column is placed a capital,

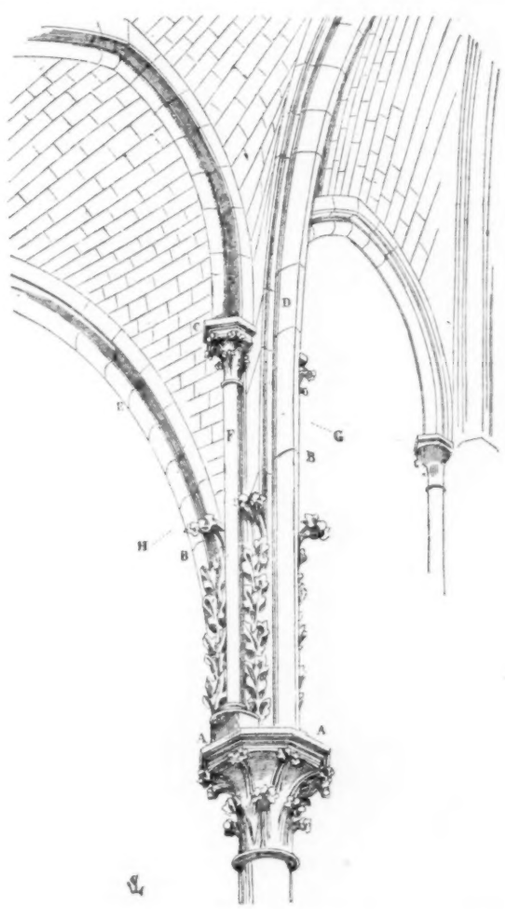


Fig. 84. From the Chapel of the Sainte Vierge, Cathedral of St. Etienne, Auxerre.

whose abacus is octagonal, and broad enough to receive the beginning of the two arches *S T* and *S R*, and in addition two small columns carrying the transverse arches *S Q* and *S Y*.

A tall skew-back, whose lower bed is at *A* (Fig. 84) and its upper bed at *B*, is reinforced in the angles obtained between the arches and the pillars by sheaves of foliage. Up to the level of the abacus

of the capital *C*, the arch *D* of the aisle rises and curves already, by means of two other skew-backs with horizontal beds, while the arch *E* (the intermediate arch of the chapel) of a greater diameter, is farther out of the vertical and is composed, after leaving the bed *B*, of independent voussoirs.

The pillars, *F*, of the transverse arches at the entrance of the chapel are monoliths and balance these skew-backs, keep them rigid, and rest firmly upon the two faces of the abacus. Figure 85 gives the section of the beginning of the vaults at the level *G H*. This construction is bold, one cannot deny, but it is perfectly solid, as during six centuries and more it has undergone no alteration.

We see in this, one of the most ingenious applications of the Gothic system of vaults, the unequivocal proof of the freedom of the builders of their sureness of execution and their perfect familiarity with the resistance of materials.

These pillars are made from the hard stone of Tonnerre, as also the skew-backs.

As to the effect produced by this chapel and its entrance, it is surprising, but does not inspire that anxiety which every too-daring attempt causes.

The arches buttress one another so well not only in reality but also in appearance, that the eye is satisfied.

Even to that four-fold sheaf of foliage surmounting the capital and giving body to the lowest skew-backs, everything concurs in reassuring the observer.

Some one may object to these two columns at the entrance.

Why is not the architect content with throwing a transverse arch from one pier at the angle of the chapel to the other?

To this there is but one reply; let us turn back to Figures 41, 42 and 44, and the explanation is given; it is necessary, because of the radiating form of the aisle, to obtain upon the outer

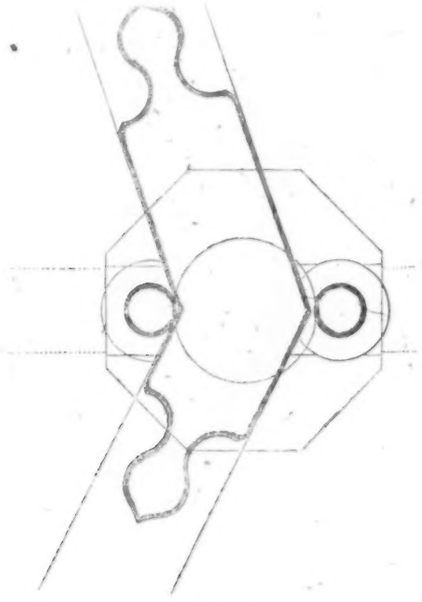


Fig. 85.

boundary a greater number of points of support than upon the inner boundary, in order to have the transverse arches almost equal at the base and exactly equal under the key, to close the triangles of the vaults at the same level.

If the vaults of the chapel of the Sainte Vierge and of the aisle of the Cathedral of Auxerre are arranged like the majority of Burgundian vaults of the thirteenth century, that is, if their wall-arches are distinct from the walls, and if a flagging supporting a water-channel unites these wall-arches to the tops of the walls, the architect of the choir has probably not believed that this process of construction was solid enough to finish off the great vaults of the principal nave.

He has had to fear the equilibrium of this system in a very vast edifice, and he has chosen a middle course between the system of Champagne and that of Burgundy.

The system of Champagne certainly consists in detaching the wall-arch from the wall, but also in fastening between this wall-arch and the wall a cradle-vault over the extrados of the aforesaid wall-arch.

(To be continued.)

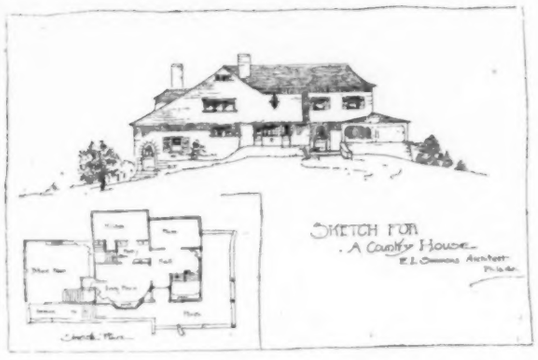
A Queer Bequest. — An aged lady who died recently in a Connecticut town left the income of $100,000 to be used in house-painting. All who apply to have their houses painted are to have it done free, provided they can prove that they have not kept a dog in two years and make oath that they will not keep one in the future. — *Chicago Inter-Ocean.*

THE HOUSES OF PARLIAMENT.

The work of cleaning, repair and alteration annually undertaken in the fabric of the Houses of Parliament is, according to the *Times*, during the present recess on a somewhat larger scale than usual. One of the principal tasks in hand is the renovation of the costly interior of the House of Lords, a labor which will occupy about eight weeks. This is the first time that such a process has been entered upon since the opening of the Palace in January, 1847. The carving and gilding which has earned for the Upper House the title of the "gilded chamber" had naturally lost much of its original brightness, and become coated with dirt, but this is all being washed off with a weak solution of plain soap and water, and the work appears after the operation as perfect as it was at the time of its execution nearly half a century ago. This is the more remarkable when it is remembered that gas has been the illuminating agent used during the whole of this long period. A close examination of the beautiful ceiling shows the surface painting and gilding to be absolutely uninjured, and the circumstance is highly important to those who are concerned in the lighting of apartments in which the preservation of valuable decorative work is an essential factor. Striking evidences of superior workmanship are to be seen in all parts of the building, and it is to this general characteristic that we must attribute the excellent condition in which the interior of the House of Lords appears to-day. Preservation has been greatly assisted by the effective method of ventilation employed. Every panel is slightly raised from its frame, so that the vitiated air passes to the vaulted space between the ceiling and the roof, whence it is carried to the outer air, and ventilation is further secured through the open screen of the cornice to which the finely-executed mottoes in gilt are attached. Before the renovators could begin their work it was necessary for the protection of the carving that the throne, the gallery fronts and the clerks' table should be carefully enclosed in a wooden framework. The woolsack and benches upholstered in red morocco were at the same time removed to be repaired, and the chamber was filled with scaffolding extending from floor to ceiling. These preparations occupied more time than the cleaning which was to follow, but the entire work rapidly approaches completion, and the chamber will be found to present an unusually brilliant appearance at the opening of Parliament next year. Concurrently with this beautifying process the old system of illumination by gas will give place to electric lighting, for which purpose ten electroliers are being made, each containing thirty-six 16-candle-power lights. The candelabra at either side of the throne are to be retained, but these are very rarely used, and the old gas pendants will entirely disappear. This addition to the electric-lighting installation will increase the total number of lights in the Palace to upwards of 2,000.

The principal work in progress within the House of Commons is the rearrangement of the suite of rooms entered from the members' lobby, the changes being made on the recommendation of a committee which sat last session with the object of considering how better accommodation could be given to the Whips of the different political parties. In future the Ministerial Whips will have the two rooms formerly used for the Votes and Proceedings Office, and the refreshment-bar, which was close at hand, has, in compliance with the wishes of several members, been removed from the lobby, to be re-erected in one of the rooms recently devoted to post-office purposes. A new doorway has been cut from the corridor leading to the reading-room and library, so that members will be able to enter the refreshment bar even when the doors of the inner lobby are closed for divisions. The Opposition Whips will be housed in the two rooms which have hitherto been known as the Public Bill Office, while the Whips of the Anti-Parnellite Party, who previously had a small room over the oratory in the cloister court, are now to occupy the rooms vacated by the Opposition Whips, a private entrance being given from the octagonal hall. The post-office is being transferred to the rooms previously set apart for the Government Whips, and the despatch of the mails will be greatly facilitated by an outlet into the Star Chamber Court. The Votes and Proceedings Office will be transferred to the old conference-room, which many years ago was the members' reading-room; the Public Bill Office will take the place of what was at one time the Private Bill Office; and two large conference-rooms for members will be provided in what has heretofore been Hansard's Sale of Parliamentary Paper Office, the latter department being removed downstairs to take the rooms now used by Mr. Jones, the clerk-of-the-works, who goes into what was the messengers' room, near the Commons inner court. The Fees Office will find a place near the old Sale of Paper Office, and the rooms available by this last change will be appropriated by the messengers. It is believed that the effect of these various alterations will be to facilitate the administrative work of the House of Commons. Two other works remain to be mentioned. A direct-acting hydraulic-balance lift has been provided for the convenience of visitors to the Ladies' Gallery, the chief recommendation of the apparatus being its safety; and the ceiling of the Legislative Chamber has been protected against fire, which might arise from overheating, by covering the beams and surrounding woodwork with lead. The whole of these works are being carried out under the supervision of Mr. John Taylor, chief surveyor, Mr. Jones, the clerk-of-the-works, and Mr. Prim, the resident engineer.

ARCHITECTS' COPYRIGHT.



THE important subject of the "Ownership of Drawings," which has been treated in a series of articles by Mr. Wyatt Papworth, published in the *R. I. B. A. Journal* (pp. 169, 188, 231 and 254 *ante*)[1] has occupied the attention of French architects, particularly during the last twelve months, under the more comprehensive title of *Propriété Artistique* — a term which it has been proposed to develop into "*propriété intellectuelle*." At a meeting of the Société Centrale des Architectes Français on December 2, 1891, resolutions were passed respecting (1) a bill relative to literary and artistic property presented to the Chamber of Deputies by M. Phillipon; (2) the fact that, at various times, international agreements which concern the right of artistic property in works of architecture are submitted to the French Parliament; and (3) the probable revision of the International Convention, concluded at Berne in 1886, for the protection of literary and artistic works — the result being that the Council of the Society appointed, for the consideration of the whole matter, a committee consisting of MM. Bailly (since deceased) Boileau, Daumet, Lucien Étienne, Ch. Garnier, Ach. Hermant, Edm de Joly, F. Jourdain, Loviot, Ch. Lucas, Alfred Normand, Paul Sédille, Émile Trélat and E. Vaudremer. Their first report, published April 16, 1892, in *L'Architecture*, showed that the Committee could find but one legal decision, as far as France was concerned, in the matter of artistic property, and one that only concerned the copyright of a picture — a judgment delivered by the Cour de Cassation in 1842, which has ever since guided the Courts in questions of a like kind. The committee were, however, fortunate in obtaining the assistance of M. Harmand, a barrister, who prepared a Report upon *Propriété artistique en matière d'Architecture*, for submission to an International Congress on Literary and Artistic Property held this current month at Milan; and also that of one of their own members, M. Ch. Lucas, whose historical sketch, entitled *De la propriété artistique en matière d'architecture* (*signature de l'œuvre architecturale*), also prepared for the same Congress, both of which pamphlets have been presented to the Institute, and are now in the library — M. Harmand's having received a very careful review, from the pen of Mr. E. Kerr, in *La Semaine des Constructeurs*, of the 17th and 24th inst. Another act of the committee was to appoint, from among the foreign members of the Société Centrale, corresponding members, namely: Messrs. Belmas (Madrid), d'Avila (Lisbon), R. M. Hunt (New York), E. V. Langlet (Upsala), E. Niermans (Amsterdam), Paul Saintenoy (Brussels) and William H. White (London). These gentlemen were asked by M. Daumet, President of the Société Centrale, to forward particulars of the law and custom of architects' copyright in their respective countries, for the information of the Annual Conference of French Architects held in Paris this year.

The communication from the British correspondent, which was read by M. Ch. Lucas on June 22, 1892, the greater part of which is here translated, was as follows:

ARTISTIC COPYRIGHT IN ENGLAND.

The English law of copyright is contained in eighteen Acts of Parliament and a mass of decisions in the Courts of Law. The Acts relate to different subjects of copyright, and for the most part are badly drawn and inconsistent. The actual state of the law and the possibility of amending it have engaged the attention of the public and of the Legislature for many years past.

The only Act relating to copyright in paintings, drawings and photographs is that known as "The Fine Arts Act," (25 and 26 Vict. c. 68). By that Act architectural designs are protected as drawings (*dessins*) so that they may not be copied on paper; but they have no protection as designs or *projets* — in other words, as original compositions. . . .[2]

At the present moment copyright can be obtained on seven distinct classes of works, namely; (1) books; (2) musical compositions; (3) dramatic pieces; (4) lectures; (5) engravings and other works of the same kind; (6) paintings, drawings and photographs; and (7) sculpture. Copyright in a book is obtained by registration, which is optional, but no action can be maintained for infringement of copyright until it has been registered. This registration is effected at Stationers' Hall (belonging to the Worshipful Company of Stationers, one of the ancient Guilds of the City of London) where a "book of registry" is kept under the charge of a Registrar — called the Registrar of Copyrights — who is appointed virtually for life by the Stationers' Company, and who is paid by the fees received for such registration. A copy of all books thus registered must be delivered at the British Museum gratuitously within a certain time after publication; and in default of such delivery the publisher is subject to penalties. Four other libraries (in Edinburgh, Dublin, Oxford and Cambridge) have also a right to demand copies. Musical compositions, dramatic pieces, courses of lectures, engravings and similar works, paintings, drawings and photographs, may be registered at Stationers' Hall, exactly as in the case of books, and the protection of copyright secured thereby. Sculpture, however, is not registered at Stationers' Hall, but by the Commissioners of Patents; though, under the International Copyright Act, copyright in foreign sculpture is registered at Stationers' Hall — strange procedure quite characteristic of British legislation.

The Royal Commissioners on Copyright, in their report of 1878,[3] stated that in their opinion the appointment of a Registrar for such purposes as those above described should not be vested in a private society. They thought that the registry should be under Government direction, and the Registrar responsible to Government. They also stated, in the same report, that it would be impracticable to reserve a right of property in a work of architecture, but that the protection of architect's works which existed under the Fine Arts Act, 1862, ought to be maintained. The Commissioners, however, admitted that as such protection had reference only to an architect's drawings, there might be cases in which injustice was done.

Much doubt exists, even among legal experts, as to whether the copyright in a picture when sold should remain with the artist, or whether it should go to the purchaser. At present, if an artist sells a picture without having the copyright assigned to him by written agreement he loses it, but it does not vest in the purchaser unless there is an agreement signed in his favor. If, therefore, there is no agreement in writing, the copyright is altogether lost on a sale; but if the picture is painted on commission, instead of being sold after being painted, the copyright, in the absence of any agreement, vests in the person for whom the picture is painted. Artists, however, have made it quite clear that they desire to have the copyright in their pictures reserved to them by law. But the Royal Commissioners, in their report of 1878, arrived at the conclusion that in the absence of a written agreement to the contrary the copyright in a picture should belong to the purchaser, or the person for whom it is painted, and follow the ownership of the picture; and they thought that the same rule should apply to drawings. But they suggested that the copyright in a photograph should belong to the proprietor of the negative.

A great legal authority — one of the Royal Commissioners on Copyright, Sir James Stephen — appended a note to his signature at the foot of the report of 1878. In his opinion artistic reputation was too delicate a matter to be made the subject of legal protection. He approved of copyright in books because the MS. had no money value till it was printed, and because, when it had been printed, every copy was of equal value: for the same reason he approved of copyright in engravings, photographs and other works of art capable of being mechanically reproduced in large numbers, each copy being of the same, or nearly the same, value as the original. He did not approve of copyright in pictures and statues, because a picture or a statue had a value of its own which was not affected by its being copied, and copies of it were themselves works of art of various degrees of merit. But, said Sir James Stephen significantly, "The "Commission reject the proposal that architects should have copy- "right in their buildings, and it seems to me that in consistency "they ought to recommend the repeal of the Act which gives copy- "right in works of art. I cannot understand why an artist should "have a right to prevent a statue from being photographed, while "an architect has no right to prevent the building in which it is "being exhibited from being photographed."

No bill to afford the protection of copyright to executed buildings has been introduced into Parliament. It has only been proposed to develop the ordinary law of property, actually in force, though optional, in works of architecture regarded as drawings and not as designs (*projets*) to be put in execution. A bill on the right of property in works of art, including photographs, was introduced into the House of Commons in 1886, but, like many others of the same kind, with little success.

Lord Monkswell's Bill,[4] introduced into the House of Lords in 1890, to amend and consolidate the law relating to copyright, was divided into six parts, three of which related to (1) literary works; (2) dramatic and musical works and (3) works of fine art and photographs. The recommendations made in 1878 of the Royal Commission were not followed as regards copyright in paintings,

[1] See *American Architect* for October 1, 1892.

[2] The portion omitted refers to the action of the Institute in 1869, and the evidence given by Mr. Charles Barry in 1877, before the Royal Commission on Copyright — a reference to which is made at page 19 *ante*, under the heading of "General."

[3] *Copyright Commission. The Royal Commissions and the Report of the Commissioners.* Lond., 1878. The first Commission was appointed October 6, 1875 and the second April 17, 1876.

[4] *A Bill entitled; An Act to amend and consolidate the law relating to Copyright.* Most of these Bills, with the Acts of Parliament relating to Copyright and the Reports of the Copyright Commission, are now in the Institute Library.

etc., for under Lord Monkswell's Bill it was proposed that the copyright should remain with the artist unless expressly assigned to the purchaser. In that Bill the definition of "design" was "the expression or representation in any form of art of an artist's conception or idea"; and by it an artist was to have copyright in his design if original, the infringement of such copyright being prohibited. But nothing was said of how one was to judge of the originality, or otherwise, of the conception or idea in question, nor of the authority who was to decide it. The terms "architect" and "architecture" nowhere appeared in the Bill; and — on the assumption that the Bill had passed into a law — even if an attempt had been made to include in the definition of the word "design" an architect's executed design, it is extremely doubtful if it would have been successful, as the expression "work of fine art" was declared to mean and include merely a painting, sculpture and engraving.

As regards architects and their actual enjoyment of copyright protection in their designs, everything depends upon the question, *Do the architect's drawings representing his design for an executed building belong to him, or to his client who pays for them?* At present, unless there is a prior agreement to the contrary, the architect delivers up the contract drawings and specification of an executed building to his client when the work has been paid for. This custom has arisen from the system, almost exclusively English, of general contract — a system introduced by the Commissioners of H. M. Works and Public Buildings early in the century — for public buildings all over the country, and in London for small buildings as well. Further, the drawings for an unexecuted design are, as a matter of course, delivered to the client, who gets only these drawings in exchange for the two and one-half per cent on the estimated value of the building they represent, which he is expected, if not required, to pay for them. How can a right of property be reserved to the architect in drawings thus sold? How can a right of property be reserved to the architect in the conception or original idea of an executed building when the drawings of that building are no longer in his hands? Though registration might protect the architect's copyright in his drawings — even in the conception or the original idea which reigns therein — it would not suffice to prevent the drawings being used again for the purpose of constructing another building of the same kind.

Should provision be made in any future copyright bill for protecting original design in architecture, the questions touching the ownership of drawings after the completion of the building for which they were drawn would have to be definitely answered before copyright in such building could be satisfactorily assigned. Without that, the right of artistic property in the conception or idea of a building cannot be assigned in a satisfactory manner; and, personally, I am of opinion that such a right is not to be desired even by architects, because of the constant disputes it would inevitably cause, most often without possible compensation, at least between confrères.

William H. White,
Fellow of the Royal Institute of British Architects.

Other communications from the foreign correspondents were published in *L'Architecture* on the 10th inst., but those from Madrid and Amsterdam were simply excuses, and that from Milan contained little practical information.

Mr. Langlet, of Upsala, member of the Swedish Academy of Fine Arts, stated that it was not the custom in Sweden for an architect to sign his name on a work, though he had seen edifices in Upsala and other towns bearing the architect's name, and he thought that the right to do so was incontestable. In a Royal decree, dated 21st March, 1789, it was ordered that "every church, new or enlarged, "shall be inscribed, above the door, with the year of its erection "and the name of the reigning sovereign." Another Royal decree, dated 23d March, 1786, declared that "every inscription, etc., to be "placed on public buildings, monuments, statues, obelisks, medals, "etc., public or private, shall be submitted to the Academy of Anti-"quities." He and another (the pastor of the church) had, without provoking criticism, inscribed their names upon the bells of the Church of St. Paul, at Malmö; and it seemed to him proper that the right to sign his work should be acquired by the architect.

Mr. R. M. Hunt, of New York, *Correspondant* of the Institut de France, and formerly President of the American Institute of Architects, stated in his communication that he and his brethren regarded the drawings and specification of an executed work as the property of the architect, but he based his contention only on a clause of the "Schedule of Charges" published by the American Institute, which declared them to be working tools or instruments. As for the right of reproduction in the case of architectural works, Mr. Hunt knew of only one instance of attempted plagiarism. The client of a member of the American Institute was intending to build a house similar to one already built, when the architect of the executed work, having been made aware of the proposal, patented his façade, and notified the fact to the client in question, who then sought the said architect's assistance in the erection of the new building.

The importance of this subject is apparent in the interest shown, both in Paris and London, to the opinions thereon of well-known architects, the majority of whom appear to be fully alive to the inherent difficulties involved.

ADDITIONAL OPINIONS.

A correspondent last week suggested that architects should write on the drawings "Copyrighted by ———," in order to keep the copyright in their own hands. But it is obvious that, if the law assumes that the legal right to the drawings is in the employer, and not in the architect, the mere fact of writing these words on the drawings would not reserve the right unless the employer agreed to the reservation. Silence does not give a consent in law, and, if a dispute arose in regard to the ownership of such drawings, the mere fact that these words were on them, and that the employer did not assert his right by any actual words, would not justify a court of law in saying that he had parted with the assumed right. The fact is that, having regard to the state of the law, an architect can only make sure of keeping a right to the drawings in his own hands by informing his employer at the time when he receives the commission that he will retain the copyright himself. It will be observed that in what we have said here we have drawn no distinction between preliminary drawings and approved final drawings. But it is obvious that there is a fundamental legal distinction between the two cases, and the very principle of the rule by which final drawings become the property of the employer appears to militate against preliminary and unapproved drawings being considered the property of the employer. The object of this note, however, is to point out the futility in law of the words, "Copyrighted by ———," and not to discuss the question of copyright or the case of Barry and the Government, the importance of which, from a legal point-of-view, has probably been much overrated by the architectural profession. — *The Builder*, Sept. 24.

The *British Architect*, having put the question, "Does the payment of the usual five per cent commission on the design and erection of any given building entitle the owner thereof to build [from them] other exactly similar buildings without further payment of commission to the architect?" has received replies, more or less valuable, from several architects, and printed them in its issues of the 16th and 23d ult. One is from Mr. Ernest George, who is of opinion that it is almost impossible to establish a copyright in the matter of architectural designs; and another from Mr. Salomons, of Manchester, who is afraid that there can be only one possible answer to the question; namely, that the owner of any drawings can do what he likes with them, and use them as he pleases. Other and fuller opinions are printed, three of which are interesting: (1) from Mr. Norman Shaw, R. A.; (2) Mr. T. G. Jackson, A. R. A.; and (3) Mr. T. Mellard Reade, a past President of the Manchester Society. They are here given:

(1) The question you raise is an exceedingly difficult one on which to give a decided answer, as so many cases might arise which ought to be settled on their merits. I don't very well see how you can establish a hard and fast line. I cannot help feeling that if a man has bought and paid for a design at the ordinary rate of remuneration, he has the right to do what he likes with it, and build it as often as he likes. Of course, one has often built two and three of a thing, and, as far as I am concerned, I have always charged five per cent for the first and two and one-half per cent for the others. In the case of the first, I believe you are supposed to charge two and one-half per cent for the drawings [including, of course, the design] and two and one-half per cent for superintendence, so that, in cases where more than one has been built, I have been paid for the design only once, and each of the other two and one-half per cents has been for superintendence, which, of course, means an expenditure of time for which one is remunerated. If you are not required to superintend it, you are not required to expend the time, and so do not get the remuneration! Of course, it is easy to state exaggerated cases; but suppose a client was to get an architect to prepare him a design for which the architect's commission was to be £200, one-half of which was for drawings and one-half for superintendence, and then suppose the client to repeat this design one hundred times! Is he to pay the architect £10,000? If so, that would be a highly remunerative work! But, on the other hand, it would be sharp practice *not* to recognize the architect and pay him something. It has been decided, rightly or wrongly, that the drawings are the property of the client, and I don't see how you are to prevent a client doing what he likes with his own property. — *R. Norman Shaw.*

(2) The question you propose is one on which only a lawyer could pronounce so far as the legal rights of an architect are concerned. So far as his moral rights go, I think any architect who found that his design for one house, for which he was paid five per cent, was being used again without any regard to his authorship, would consider himself used dishonestly. But, though the thing might be little better than a gross swindling transaction, I venture on no opinion as to his having any legal remedy. It would also be found very hard to say where unfair copying began. We all follow old examples, and we are all influenced by the work of our contemporaries. That is right and proper. It is only in that way that styles of art are formed and developed. That is not copying, but it sometimes comes near enough for a lawyer to argue that it is the same thing, and the difference would be hard to define. If, for instance, the actual drawings of the first house were used again for a dozen others, the author of the design would plainly be in a position to argue the question of his rights over it. Again, if there were no old drawings, but the first house were measured and drawings of it made, which nobody could prevent, and a dozen other houses built accordingly, would the architect have the same claim to consideration? Take a third case: suppose that no working-drawings, old or

new, of the first house were employed, but the design-arrangements of the first were obviously copied in the other dozen, what chance would the author of the first have of establishing any claim or proving any infringement of his proprietorship of the design? — *T. G. Jackson.*

(3) Architects have been receiving payment for a lengthened period upon what is called the five per cent scale. The principles of professional charges of architects have been formulated and reduced to system by the Royal Institute of British Architects, and adopted, with unessential modifications, by most provincial societies. Notwithstanding this, in the absence of special arrangements, it is not always clear what the client is entitled to for the five per cent payment. The lawyers say that not only are the contract-plans the client's property, but the minutest details belong to him also. Then comes the question of architectural copyright. Does the ownership of the plans entitle the possessor to use them over and over again in the reproduction of the same design without further payment to the architect? It is evident that this latter point, on which I am asked to express my opinion, can only arise in special cases. Usually it is impossible to use the same plans again, even for buildings of the same purpose, for the conditions of the site are seldom, if ever, the same. Besides, no sooner is a building erected, than it is seen that by modifications certain improvements can be effected. In the thousand and one things the architect has to consider in designing a building, the possibilities are generally altogether against repetition as a means of solution. There are, however, some classes of buildings in which repetition is the essential element, as it is the foundation of all machine-work in manufactures. It is in such cases that the architect asks himself whether he has any copyright in the design he furnishes and carries out for the usual five per cent. It appears to me that this problem hinges upon the ownership of the plans. If the client really owns and possesses the plans, it is difficult to see, in the absence of an agreement to the contrary, who is to prevent him using them again, and as often as he likes. I am not saying that he is fairly entitled to do so — far from it — but the longer one lives in the world in these days of commercial competition, the more one sees that such questions of fairness rarely trouble people, not even architects. . . . — *T. Mellard Reade.*

SOCIETIES

PHILADELPHIA T-SQUARE CLUB.

THE Philadelphia T-square Club opened their winter competitions, on Wednesday evening, October 5, 1892, by an exhibition of summer sketches, at the rooms of the club, 29 N. 13th Street. The meeting was well attended, and over two hundred sketches were hung. The majority of the work was highly commendable and showed a sincere and conscientious study of the subjects chosen, with an absence of trickery and affectation. Wilson Eyre's crisp and sparkling sketches were voted first place; John Stewardson's quiet and refined mountain scenes, second place; and Percy Ash's landscapes, third place.

The following officers were elected for the ensuing year: *President*, F. M. Day; *Vice-President*, John Stewardson; *Treasurer*, W. K. Boyd; *Secretary*, Percy Ash; *Executive Committee*, Wilson Eyre, Jr., Frank A. Hayes, John Dall.

PERCY ASH,
Secretary.

THE TORONTO ARCHITECTURAL CLUB.

THE fourth annual meeting of the Toronto Architectural Club was held on Monday evening, October 3, at which the election of officers took place — the following were elected: *President*, A. H. Gregg; *Vice-President*, Henry Speratt; *Secretary*, Fred P. Kelley; *Assistant Secretary*, W. Ford Howland; *Treasurer*, W. Percy Over; *Directors*, J. A. Pearson and J. J. Woolnough.

SKETCH-CLUB OF NEW YORK.

IT is the desire of the Executive Committee of the Sketch-club of New York that the younger members of the architectural and allied arts should know something of the advantages which our club offers to them and as your journal has a large circulation among such we hope you may deem it worth while to give us some notice.

The first regular meeting of the season of 1892 and '93 was held at our club-rooms, 47 West 42d Street, Saturday, October 1, a large proportion of members being present. A large number of sketches by members made during summer months were exhibited.

After the dinner, the drawings which were submitted in the Toll-Bridge competition were ably criticised by Mr. W. Boring, architect, who made awards as follows: first to Mr. R. A. Greenfield; second to Mr. Edward J. Brown; third to Mr. Chas. H. Israels.

The drawings submitted in the competition for a City Front, designed from outline furnished by the committee, were informally criticised by the members present.

An announcement was also made of classes which will be held during the winter months for benefit of members.

The following well-known gentlemen have kindly volunteered their services in conducting them. Mr. Clarence S. Luce, class in water-color; Mr. Henry P. Kirby, class in pen-rendering; Mr. Chas. E. Miller, C. E., class in construction.

Thus the club is able to offer a rare opportunity for instruction in these branches, which is not surpassed anywhere.

Application for membership and other information for those desiring to become members, may be obtained by addressing the Corresponding Secretary.

Very truly yours, FRANK H. QUINBY.

THE ILLUSTRATIONS

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

HOUSE OF MRS. THOMAS BUCKLER, BALTIMORE, MD. MESSRS. J. A. & W. T. WILSON, ARCHITECTS, BALTIMORE, MD.

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

THIS house, which is placed on North Avenue, cost about $67,000. The materials used in its construction are yellowish mottled Pompeiian brick and light-colored Indiana sandstone; the roof is covered with dark slate and all exterior woodwork is painted a creamy white.

THE METROPOLITAN LIFE INSURANCE BUILDING, NEW YORK, N. Y. MESSRS. N. LE BRUN & SONS, ARCHITECTS, NEW YORK, N. Y.

THIS building, now approaching completion, is situated at the corner of Madison Avenue and 23d Street in the City of New York. It is designed in the Early Italian Renaissance style and the exterior is faced throughout with pure white Tuckahoe marble. It has a frontage on Madison Square of 125 feet and on 23d Street of 150 feet and its height is 164 feet to the top of the marble crowning balustrade. The construction is thoroughly fireproof — the masonry is massive, the floors are supported upon iron beams and terra-cotta arches and surfaced with smooth granolithic concrete, the roof is covered with tiles. The interior door and window trimmings and doors and sashes are of San Domingo mahogany in the lower three stories and of quartered-oak in the upper ones, all cabinet finished. The floors, walls and ceiling of the main hall and the interior of the central court — up to the dome over same at the level of the third story floor — will be finished with highly polished variegated marbles, and the building will be completely equipped with the latest modern improvements and conveniences. The company will occupy the basement story, part of the first story and the balance of the building up to and including the fifth story, above which it will be divided for offices to be rented.

HOUSE OF MR. E. L. CLARK, ARCHITECT, WEST NEWTON, MASS.

HOUSE OF W. H. STARBUCK, ESQ., RYE, N. Y. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

ARCHITECTURAL SHADES AND SHADOWS: PLATE VIII.

SEE article elsewhere in this issue.

[Additional Illustrations in the International Edition.]

HOUSE ON THE AVENUE DE L'ALMA, PARIS, FRANCE. M. L. PARENT, ARCHITECT.

[Copper-plate Photogravure.]

FOR description of this building see Paris letter in the *American Architect* for July 30, 1892.

PERSPECTIVE SECTION OF THE SAME.

[Copper-plate Photogravure.]

HÔTEL DE VILLE, UTRECHT, BELGIUM. AFTER A DRAWING BY SAMUEL PROUT.

THE SCUOLA DI SAN ROCCA, VENICE, ITALY. SCARPAGNINO, ARCHITECT.

DOORWAY OF THE SAME.

HOUSE AT STREATHAM, ENGLAND. MR. E. TURNER POWELL, ARCHITECT.

SKETCH FOR A HOUSE FOR C. P. CUNLIFFE, ESQ. MR. DUDLEY NEWMAN, ARCHITECT.

NOTES AND CLIPPINGS

A Series of Mistakes in a Boiler-room. — It is a wonder that more serious accidents do not occur when boys and inexperienced persons are set to repairing steam boilers, or superintending their operation. The *Locomotive* tells the following story, and the editor vouches for its accuracy: A short time ago our attention was called to some most remarkable doings in a boiler-room, which we proceed to relate. The boiler was originally built to furnish power, and was good for about 75 pounds steam-pressure; but it is now used only for heating purposes. Some of the steam and return valves to the large coils leaked about the stems, and the owner of the boiler, instead of sending for a steam-fitter to repack them, called in a plumber. The plumber being busy, sent his boy helper. The boy began work on some of the valves that were within sight of the boiler front, but being troubled by the steam that escaped, he shut off the steam valves, leaving the return valves open. The coils were large, and when the steam in them had condensed, water began to back up from the boiler, for there was no check-valve on the returns. As the boy worked away he noticed that the water in the guage glass was going down somewhat rapidly and also that the steam-pressure was rising. He did not know where the water was going to, nor did he know how to feed it more; but he thought that if he opened the furnace door and so checked the fires, the evaporation and the rise of pressure would proceed much more slowly. Jumping down into the pit in front of the boiler, he opened what he thought, in the darkness, were the fire-doors, but it appeared subsequently that he did open the ash-pit doors, this making matters worse instead of better. The fire brightened up and the pressure began to rise rapidly, and the water level to go down. The boy was greatly troubled at this, and when the rubber diaphragm in the damper-regulator burst from the increasing pressure, he "went all to pieces," as the saying is, and ran for his boss. The boiler being originally intended for furnishing power, the safety-valve could not be set to blow at less than at about 20 pounds, while the damper-regulator was designed to carry not more than six pounds or seven pounds, so that its diaphragm burst, naturally enough, before the blowing-off point of the safety-valve was reached. The plumber came in haste and found the people in the building overhead badly frightened, and the boiler-room filled with steam, so that he could not make out precisely what had happened. He told the boy how to turn on the feed, however, and that well-meaning but badly "rattled" individual went to the back end of the setting, and, instead of opening the plug-cock in the feed-pipe, he opened the plug-cock in the blow-off pipe, which only added to the noise and confusion. Meanwhile, the plumber hauled the fire out onto some pine boards that the regular attendant had laid in the damp pit. The boards took fire and smoke was soon added to the escaping steam, to the intense horror of the occupants of the building, who by this time were on the other side of the street. When the fire had been hauled and the danger averted, the plumber soon learned the cause of the disturbance, and quiet was speedily restored by shutting off the damper-regulator and the blow-off, and throwing a few buckets of water on the burning boards. It seems hardly possible that such a succession of mistakes could follow one after another in so orderly a manner, but we can testify, from personal observation, that they did. And we may add that not long afterward, when the boiler was out of use, a coal dealer put 100 tons or so of coal into the same boiler-room, piling it up in such a manner that some of it ran down into the open manhole, and the rest of it covered up the blow-off pipe and the rear door of the setting, which were both open, so that there was plenty of trouble digging them out before the boiler could be started again.

How an American enjoys his Tapestries. — The following instructive paragraph is from the New York *Tribune* of September 30: "Mr. Charles M. Ffoulke, formerly of Philadelphia and now a resident of Washington, a good Republican and a vice-president of the National Art Association, has a great passion for tapestries, of which, says *Kate Field's Washington*, he has a greater knowledge than any one on this side of the Atlantic. So great is Mr. Ffoulke's love for this rare department of art that he leases an abandoned convent in Florence for the sole purpose of keeping there tapestries belonging to him which he cannot enjoy at home because of a high tariff. It is cheaper to keep them in Italy and to make pilgrimages to their shrine! Mr. Ffoulke's collection is in part composed of 130 examples of the celebrated Barberini tapestries purchased from the Barberini family of Rome, and 70 tapestries from other sources, making 200 in all." Thus are the ancient tapestry-workers of this favored land shielded from the blighting and degrading competition of those pauper tapestry-artists of Venice and Rome, who have only been dead for from two to six centuries. — *Dry-Goods Economist, October* 1.

Trieste to Have an Obelisk. — An obelisk of red granite, seventy-one feet in height, with a pedestal of black porphyry, said to surpass in beauty both Cleopatra's Needle and the column on the Place de la Concorde, is shortly to be brought to Austria from Alexandria where it has been lying in the garden of the Austrian Consulate since 1847. It is to be erected at Trieste, to which town it was long ago bequeathed by the late Austrian Consul, Herr Laurin. The Trieste Town Council has only just made up its mind to vote the necessary funds for the conveyance of the pillar from Egypt and for its erection on the shores of the Adriatic. — *Vienna Correspondence, London Standard.*

One Economy in Ocean-going Lumber-rafts. — It is claimed that $3 to $3.50 in slabs and chips, for every thousand feet of logs, were saved in the recent instance of floating a cigar-shaped raft from Fort Bragg to San Francisco. If that can be done on the Pacific coast, why cannot it be made profitable on the lakes. Slabs are getting to be in great demand in this city, and they are brought in from Green Bay by rail. A saw-mill in Chicago should make a good thing out of the slabs, edgings and sawdust. Dust is brought in from Muskegon by the vessel load. Why not make dust in Chicago? Rafting logs on Lake Michigan should be as feasible as on the Pacific coast, Lake Huron or Lake Superior. Recently 7,000,000 feet of logs in one raft was floated from Georgian Bay to the Saginaw River. As big a raft could be floated from northern shores to Chicago. The trouble in this city would be the difficulty in getting ground on water frontage for a mill site. But it could be done at South Chicago, up the Calumet, and possibly up the south branch or the north branch of the Chicago River. — *Northwestern Lumberman.*

Tools of the Pyramid-builders. — A two years' study at Gizeh has convinced Mr. Flinders Petrie that the Egyptian stone-workers of 4,000 years ago had a surprising acquaintance with what had been considered modern tools. Among the many tools used by the pyramid-builders were both solid and tubular drills and straight and circular saws. The drills, like those of to-day, were set with jewels (probably corundum, as the diamond was very scarce) and even lathe tools had such cutting-edges. So remarkable was the quality of the tubular drills and the skill of the workmen, that the cutting-marks in hard granite give no indication of wear of the tool, while a cut of a tenth of an inch was made in the hardest rock at each revolution, and a hole through both the hardest and softest material was bored perfectly smooth and uniform throughout. Of the material and method of making the tools nothing is known. — *London Exchange.*

TRADE SURVEYS

Unrest prevails throughout the business world on both sides of the water. The reasons are apparent, the causes are not. The remedies are a matter of guess-work. Methods and systems are changing. Capacity of all kinds is being increased faster than it can be profitably engaged; at least, this is seriously threatened. As a result, prices have been steadily declining, but the decline of the past two years has been due to other causes than that named. That a reaction of some magnitude is near at hand seems to be quite generally entertained among those who make a study of the course of trade and of the influences and agencies which control it. The practical point just at present is: To what extent will the declining tendencies affecting prices go? Another inquiry worth making is: Will this declining tendency of itself check the expansion of capacity, or must some other outside and, at present, not visible, tendency arise? Bankers are, perhaps, studying the situation more carefully and intelligently than any other class of men. They do this because of the responsibilities which come upon them to select the best channels for investment. An upward step will soon be taken, no doubt, but there is a hesitancy apparent in all directions. So much money has been lost during the past ten years in remote localities enterprise has been checked near at home. Railroad building in the United States for three or four years has been unimportant. In Canada, a blighting influence seems to have operated to prevent a full and free expansion of enterprise. In South America, discouragements of no ordinary magnitude have exerted a powerful influence upon investors in foreign countries and upon promoters of new enterprises. In Australia and other English colonies other unfavorable conditions have arisen. In East India, the returns from enormous outlays have hardly been sufficient to warrant a bold prosecution of a policy of liberal outlays. In European countries, conditions are improving little by little, but there are still a great many causes at work to hamper and restrain, and to induce the generals of trade and industry to look abroad for wider opportunities. In all directions there is a downward tendency in prices; this in and of itself is not dangerous or hurtful. Managers of industries and of businesses are studying the situation very closely, but not suspiciously; meanwhile, there is an accumulation of funds for investment in nearly all the civilized countries. Whether it is wise for German, French and British financial managers to make such a struggle for gold is a question. From their present standpoint it is all right; new standpoints may arise which will make the struggle for gold less necessary. It is this possibility which American money-lenders and bankers are contemplating. One of the Rothschild's has consented to act on the International Monetary Commission. As long as the interests of that family were confined to Europe they adhered closely to the old-fashioned mono-metallic idea; now that a new era has dawned, and opportunities must be sought for throughout the world for the employment of capital, they see what we on this side have seen for a long time: that some expansion of old ideas must take place, and that we must build a broader platform. It is this that is now under consideration. Strong prejudices exist against any departure from the old gold idea; danger may be threatened in departure. Worse conditions, instead of better conditions, may come from such a course; the British and Continental financiers have this whole matter under discussion, and the monetary conference may probably express the conclusions that have been arrived at up to this date. In regard to domestic affairs, the downward tendency in railroad freights during the past year is remarkable. It is strange that it should be so, considering the enormous volume of harmony which has been maintained among managers. Industrial conditions continue favorable. Manufacturers have a strong grip upon production. Consumers throughout the country feel no necessity for buying faster than they need goods. It would be well if this conservatism would continue indefinitely. Fluctuations in values are a fruitful cause of commercial failures. Several causes are at work to prevent fluctuation in the future. Safer methods of doing business are being established. In all the smaller industries there is a healthful activity. Manufacturers predict, possibly with not the best of judgment, and partly through prejudice, that Republican successes this autumn will greatly benefit business. Expressions of this character are frequently heard in trade and manufacturing circles, but the consumptive requirements of this country, as previous presidential campaigns have shown, do not depend upon such trifling causes as the election of this or that individual to office. A more important point is the removal of purely business and commercial questions from the domain of party politics.

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

SHADES AND SHADOWS. PLATE 8.

FÉCAMP CATHEDRAL

PISCINA IN

SOUTH CHAPEL.

(from Arch! Association Sketch Book.)

HELIOTYPE PRINTING CO. BOSTON.

RESIDENCE OF
MR. EUGENE L. CLARK,
WEST NEWTON, MASS.
E.L. CLARK, ARCHITECT.
BOSTON, MASS.

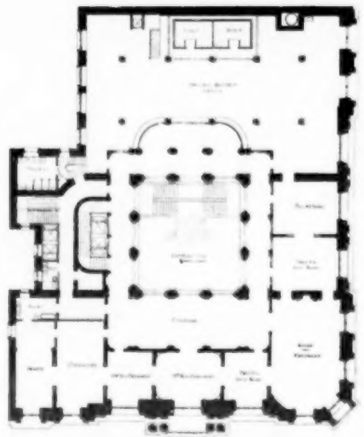
T.W. JAMES '92.

HELIOTYPE PRINTING CO. BOSTON.

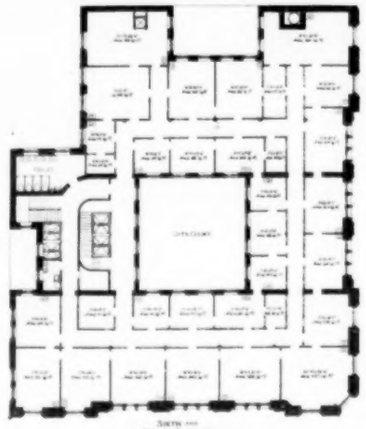
Residence · W. H. Starbuck · Rye · N.Y. · Lamb and Rich · Arch'ts ·

HELIOTYPE PRINTING CO. BOSTON

First Story



Second Story



Sixth and Upper Stories

METROPOLITAN LIFE INS. CO. BUILDING

NEW YORK CITY.

N. LE BRUN & SONS, ARCHT'S.

HELIOTYPE PRINTING CO. BOSTON