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VOL. XXX.

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THREE OTHER COMPETITIVE DESIGNS FOR THE SAME MONUMENT.
DESIGN FOR A MONUMENT TO JOAN OF ARC.

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OCTOBER 18, 1890.



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WE print elsewhere a letter to our Legal Department, with the reply given by our legal adviser, that an architect who makes plans for a client has no claim to compensation if the latter uses them to build duplicates of the building for which they were intended, unless some special arrangement has been made to cover that point. In the language of the reply, the architect "sells the plans to his client, to use as he pleases." As we all know, the profession holds a very different view of the claim which the client has on the plans; but, as we also know, it has never been able to get the public, still less the lawyers, to agree to its view, except by courtesy. It is fortunate that courtesy prevails so generally among clients, for if they were to enforce what the lawyers tell them are their legal rights, all the architects' offices would soon be closed. This is a matter, which, with other things, needs regulation at once. Either architects should copyright their plans, or some public and unmistakable notice should be given that they are not objects of sale, any more than a doctor's note-book and formulae; or in some other way the interest of the profession should be guarded against the attacks to which it is now exposed through the doctrine in question. There is another legal assumption, which we have heard stated by a lawyer in these words, that "if a contractor fails to comply with his contract, the owner is entitled to the option of collecting damages from the contractor out of the contract price, or paying the contractor in full, and collecting the damage from the architect." Between these two maxims, which are unquestionably generally prevalent among lawyers and in courts, architects suffer enough already, and would suffer more if the sense of justice in the community did not generally revolt against them; but we ought not to expose ourselves to robbery every day, merely because the robbers only attack us occasionally. With a little determination, and united action, the plunderers who use these tools against us might be disarmed forever, by having the legal theory on such matters brought into accordance with fairness and common sense, and the Institute, the only body which can deal with them, might well take them in hand in earnest.

THE *British Architect* relates two stories about eccentric leases, which should serve as a warning to tenants. In one case, the lease stipulated that the tenant should not have more than three children. A tenant, whose family was

within the specified limit, moved into the house, and lived there happily until his fourth baby came along, when he immediately received notice to quit, and was obliged to find new quarters. Another lease provided that if the tenant ever had onion soup cooked in his kitchen the lease should be forfeited, and the premises should be vacated at a moment's notice. The tenant read his lease, but supposed that this clause was a joke, and thought no more about it. Some time later, having a fancy for some of the proscribed delicacy, he ordered it made; but before it was ready to put on the table the landlord smelled it, and made his appearance on the scene with witnesses. The latter found evidence that the agreement had been violated, and the tenant was packed out of the house forthwith.

MR. FERDINAND GAUTIER, a mining engineer, contributes to *Le Génie Civil* an interesting study of the modern processes for producing aluminium, and the uses to which it is already applied. It seems that in France and Germany aluminium is made by a wet electrolytic process, at ordinary temperatures, while most of the aluminium produced in America is made by the Cowles process, which also uses electrolysis, but under the enormously high temperature of the voltaic arc. The cost of the product appears to be about the same by both processes, the German and French aluminium being sold at a dollar and eighty cents a pound, while the wholesale price of the American metal is two dollars; but M. Gautier says that while the Continental metal is nearly pure, the Cowles product is a carbide of aluminium, bearing much the same relation to the pure metal that cast-iron does to the purified wrought-iron, the reason being that, under the intense heat of the Cowles furnace, the carbon used for reduction dissolves in the metal. He thinks that the carbide of aluminium might be purified by puddling, or a Bessemer process, like that applied to cast-iron, but the experiment has not yet been tried. Another result of the high temperature at which the Cowles process is carried on is that a great deal of the metal escapes in vapor, which is either lost up the chimney, or may be absorbed by other metals, such as copper and iron, forming aluminium bronze, or ferro-aluminium. The pure metal, such as is now made in large quantities on the Continent, is coming rapidly into use there as a substitute for silver. Bulk for bulk, aluminium, at present prices, costs thirty-three times less than silver, while it resists chemical action quite as well, and can be beaten into sheets as thin, and drawn into wire as fine, as silver. Hence, in Nuremberg and Furth, the great centres of the leaf-metal and bronze-powder manufacture, aluminium is being generally substituted for silver. When beaten into thin leaves, aluminium is acted upon by boiling water. Bubbles of hydrogen form upon it, and, after some hours, it is converted into hydrate of alumina. Larger pieces of the metal are, however, not perceptibly affected by pure water at any temperature. Salt, or salt water, is popularly supposed to corrode aluminium, but M. Gautier says that this is a mistake. Vegetable acids, such as acetic acid, have a certain action, but they act also on tin, and the acetate of alumina is decomposed by boiling into harmless alumina and acetic acid; while the acetate of tin, which is more poisonous than the alumina salt, is not affected by boiling. Aluminium, however, is corroded by strong alkalies, and, unless this property can be corrected by alloying it in some way, it must be employed with caution in the kitchen, where carbonates of soda and potash are in constant use.

DR. HECTOR GEORGE gave a lecture not long ago, at the Conservatoire des Arts et Métiers, in Paris, on the Hygiene of Adolescence, which *Le Génie Civil* reports nearly in full. Dr. George always makes his lectures interesting, and this particular subject is an important one for all those, such as directors of schools, architects of school buildings, and employers of child labor, on whose care or skill may depend the permanent physical condition of helpless and susceptible children. According to Dr. George, the period of adolescence, from the twelfth to the twenty-first year, is the time when the form and position of the bones is irrevocably determined by the complete ossification of the bones. In the young child the bones are cartilaginous in character. They are incapable of

resisting a severe bending strain, but if they should be slightly deformed, they can be bent back into shape by restoring the proper action of the muscles. As the child grows, calcareous matter is deposited in the substance of the bones, diminishing their flexibility, but adding to their strength. This deposition does not take place uniformly through the bones, but begins at the ends and in the middle, leaving a portion near the ends of the larger bones, which does not become entirely ossified until about the twentieth year. So long as even this slight flexibility remains, a natural or acquired bending of the skeleton can be corrected; but the complete hardening, which marks the close of adolescence, fixes the shape permanently. If the form which has been given to the skeleton is a good one, the hardening of the bones much increases the strength and resistance of the body. During the Napoleonic wars, it was found by investigation that in all the armies engaged, including German as well as French, practically all the soldiers under twenty years old were in the hospital, while those over twenty-two endured all the fatigues of the campaign. This observation led to the fixing of the age of conscription at twenty-one. At this age the bones become completely solidified, as is shown by the person ceasing to grow. Rarely, a conscript is found to increase in height up to the twenty-sixth or twenty-seventh year.

WHETHER the skeleton be that of a dwarf, like the one mentioned by Buffon, who was seventeen inches high when full-grown, or of a giant like the Finlander described by M. Sappey, who measured nine feet four inches in height, the conditions of its regular and symmetrical development are, sufficient nourishment to the body, pure air, and muscular exercise of the entire body. Every one knows that "growing children" have good appetites, and that they breathe quickly and energetically; and nature thus provides the desire for the nourishment that it needs. But with plenty of pure air, and abundant food, must be given proper exercise, and this is best obtained, unless some deviation from symmetry already exists in the skeleton, which must be corrected by special exercises, by a variety of plays and movements in the open air. As a rule, to every bone are attached two sets of muscles, which draw it in opposite directions. After exercising one of these sets of muscles for a time, the other set should be brought into action, to correct the strain on the bone, or it will be bent; and by certain exercises, unduly persisted in, the skeleton may be deformed, at the same time that the muscles are developed. As to the brain, its peculiarity during adolescence appears to consist principally in its susceptibility to impressions, which remain permanently fixed upon it. Before the age of eight years, the impressions received appear to be transitory. If a child which has been taught to talk becomes deaf at or before the age of four, it always becomes dumb also, through the disappearance of the impressions previously made on the brain through the medium of the ear. If deafness comes on between the fourth and eighth year, the child usually, but not always, becomes dumb; but when deafness comes on after the eighth year, a child which has been taught to talk retains its speech. This seems to show that a sort of progressive hardening goes on in the brain, which enables it to retain impressions more forcibly, until, probably, about the twenty-first year. As the development of the brain in this way is not accompanied by an equally rapid development of the faculties of reflection, the period of adolescence is usually marked by an unthinking violence in the imitation of some striking example. In the year 1875, at Brunoy, near Paris, a Parisian who was spending the summer in the village, was sitting at lunch with his little daughter, a child three years old. The father went out a moment, leaving the child alone with a pet monkey, which happened to be in the room. Hearing cries, he ran back, and found that the monkey had seized a knife and cut off the child's nose, and one of its ears. A shot from a revolver put an end to the monkey's mischief, and the father, while caring for the little girl, recollected that he had brought home from Paris, on the previous evening, a print, showing a Chinese punishment, which consisted in cutting off the nose and ears. The monkey had been seen to gaze long and earnestly at the picture, and had evidently seized the first opportunity to put his new idea into practice. With young persons during the age of adolescence, as Dr. George says, the condition of the brain resembles that of the monkey, in being strongly imitative, but unreflecting; and, as he says, in the so-called "epidemics of crime," which follow any peculiarly atrocious robbery or assassination, the criminals who imitate the perpetrator of the

original deed are always boys from fifteen to twenty years old. For this reason, as he thinks, the excessive publicity given to the description of crimes is to be deplored; and every effort should be made by those who have the care of the young to see that the books, the pictures, words and actions which are presented to the attention of children at this critical age, are such as it is desirable to have them retain in memory as inspirations and examples.

THE British Foreign Office has published a little report on emigration to the Argentine Republic, which has an interest for Americans as well as Englishmen. It seems that the Argentine Government is very friendly to new-comers, all persons landing in the country who desire it being lodged gratuitously for five days after their arrival, and then sent, free of expense, to any part of the Republic. There are, however, comparatively few English-speaking people in the country, and it is important for those who wish for business or employment to speak Spanish. It would be advantageous for them to speak Italian also, since the Italian population is very large. We, who have been accustomed to consider our own country the paradise of immigrants, are likely to hear with a somewhat qualified satisfaction that in 1889 about one hundred and ninety-three thousand immigrants landed in Argentina. More than eighty-eight thousand of these were Italians, seventy-one thousand Spanish, twenty-seven thousand French, and the rest English. All these people need houses to live in, and roads and railroads to travel over, and not only surveyors and engineers, but architects, builders, masons, carpenters, painters and so on, easily find employment. The Italian masons, who are, as they are in this country, excellent workmen, will have the preference over a careless and bungling Englishman or American, but a good mechanic of any nationality soon makes himself appreciated.

A STORY is in circulation to the effect that a company has been formed in Illinois, with a capital of twenty million dollars, to engage in the construction and operation of a new kind of air-ship, which, according to the newspapers, is to draw trains of cars, resembling Pullman cars, through the air. Concerning the mechanism by which this is to be effected, we have no particulars, but we are informed that contracts have been made for the erection of a factory-building, eight hundred feet square, in which these atmospheric locomotives are to be built, and that one of them will be on exhibition in Chicago in about sixty days.

IT seems as if some firm or company might with advantage introduce in this country the stone-preserving process of Messrs. Faure, Kessler & Co., of Clermont-Ferrand, France. This process has been known in France for fifteen or twenty years, but has only within a comparatively recent period been used as the basis of a large business. Now, however, the firm has a very extensive practice on the Continent, and the right of applying the process in England has just been sold to the corporation known as the "Bath Stone Firms, Limited." In this country, although the process is known to architects, the application, we think, has been made only as a scientific experiment; yet we have a great deal of sandstone, in use for building, which would be much improved by some treatment of the kind.

IT seems likely that a vigorous attempt will be made to revive the Panama Canal project, and, if possible, carry the work to completion. Through the intercession of M. Bonaparte Wyse, the Colombian Government has consented to prolong the concession granted to the company until the year 1902, on condition that the company is reorganized by 1892, and a payment made to the Government of thirteen million francs, with an agreement for a contribution of fifty thousand francs annually towards the maintenance of the garrison of the Isthmus. If the company is not reorganized before 1892, the concession lapses, and all the buildings, machinery and other property on the Isthmus belonging to the present company, valued in its inventory at thirty million francs, are to revert to the Colombian Government, without any compensation. If this property includes the Panama Railway, which is a very profitable investment, the shareholders in the Canal Company will try hard to save it, and it seems not impossible that the reorganization may be effected. Whether the canal will ever be finished is a different question.

AUSTRIAN ARCHITECTURE.¹—II.

ROMANESQUE PERIOD.—II.

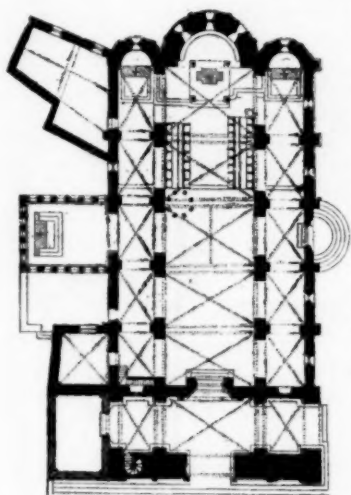


Fig. 5. Plan of the Cathedral at Trau.

much attracted to the simple mouldings of the pillars and vaults, which are in the Transition style, as to the beautiful ciborium (Figure 8) which, though probably dating no farther back than the fourteenth century, nevertheless recalls the ancient types; with its system of four columns, bearing a square entablature, on which rest two low octagonal stories of colonnades crowned with a pyramid, it closely resembles the ciborium of S. Lorenzo at Rome. The white marble pulpit [fifteenth century] also deserves notice, as bearing evidence to the long survival of Byzantine types and forms in the decorative sculpture of the Adriatic provinces. It consists of eight columns with rich capitals, connected by semicircular arches and supporting an octagonal parapet ornamented with blind arches.

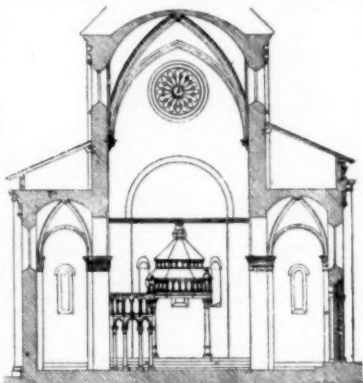


Fig. 6. Section of Trau Cathedral.

Passing to the outside of the cathedral, our attention is first of all drawn to the magnificent sculptured marble doorways, by Radavan [1240], which give entrance and exit to the porch. The Lombard-Romanesque decorative system prevails in the

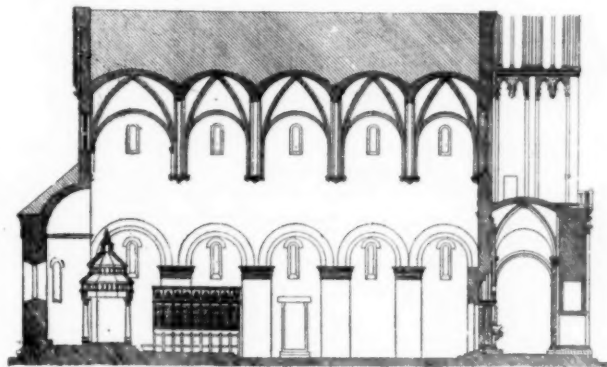


Fig. 7. Section of Trau Cathedral.

external ornamentation, while the three-storied tower rising above the severe and massive porch displays the Venetian transitional forms, and is remarkable for its grace and harmony.

The small churches of St. Martin and of the abbey of St.

¹ From the French of H. Sempier, in Planat's "Encyclopédie de l'Architecture et de la Construction." Continued from page 20, No. 772.

John at Trau, are also types of the Lombard-Romanesque basilica of these provinces.

At Spalato, in Dalmatia, there is one of the most beautiful bell-towers of Lombard-Romanesque art, and a pulpit (Figure 9) of the thirteenth century which much resembles the one at Trau, though it is of older date.

Quitting the Austrian shores of the Adriatic and entering South Tyrol, where the Italian style of architecture still pre-



Fig. 8. Ciborium in the Cathedral of Trau.

vailed at this period, we will first examine the most important structure for our purposes, namely, the Cathedral of Trent.

In 1048 the Bishop Udalricus began the construction, on a much larger scale, of a new cathedral with a crypt in the place of the small church of St. Vigilus, which dated back to the earliest days of Christian architecture; in 1124-1149 and in 1204-1218 the cathedral was partially rebuilt. The plan and a few details of the north side probably belong to the time of its original construction; but most of the architectural members and the ornamental details are apparently of the third period; they already exhibit transitional forms.

The cathedral has three aisles, vaulted and divided by piers; it is in the form of a Latin cross, though the transept projects but slightly. The design included two towers flanking the façade, but only one of these was completed. Over the centre of the transept rises an octagonal dome. The choir is closed by an apse, and the eastern sides of the transept are also occupied by two small apses facing the lateral aisles. The pillared stairways along the inner side-walls, which lead, or were designed to lead, into the towers, produce a very picturesque effect. The façade, in spite of the sculptured doorway, round window, and colonnades, seems poor and incomplete. The most beautiful portions of the exterior are the north wall and the walls of the apse, which are richly ornamented with galleries, arcades, and other decorations in the pure Lombard style. But a careful examination of the *ensemble* and the details reveals a certain compromise between German and Lombard conceptions. The position of the towers, and the soaring and slender proportions of the aisles recall the German style, while the major part of the decorations, the architectural members, and the profiles are purely Lombardic, although rather of the transitional period.

There are a few other three-aisled Romanesque churches in Tyrol worthy of notice. They are mostly built with three

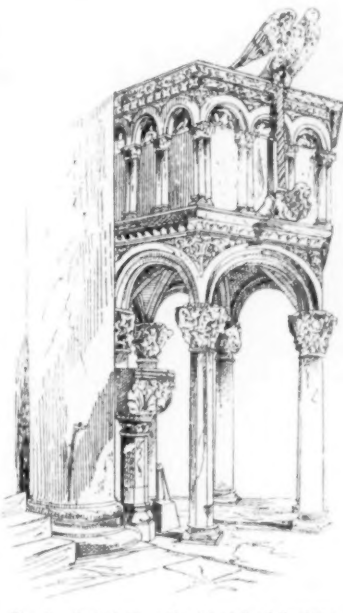


Fig. 9. Pulpit from the Church of Spalato.

apses, either with or without a transept, and belong to South German types. The church of S. Lorenzo at Trent has three aisles with two columns on each side, and a transept, not projecting beyond the side-walls, in the centre of which are four huge columns disposed on a square plan and supporting an octagonal dome. The arms of the transept are of the same breadth as the aisles, and of the same height as the nave and the square choir. By this disposition the nave and transept form on the outside a Latin cross rising above the aisles. The lateral apses are concealed externally by means of straight walls.

The old cathedral at Brixen originally had a porch with two towers, three pillared and vaulted aisles, a projecting transept with a central dome, and three apses terminating the aisles. But it was remodelled in the seventeenth century, and nothing now remains of the early construction except one southern doorway and the exterior arcades of the cloister.

In the church at Innichen, of the thirteenth century, the plan just described is found reproduced (Figure 10), while we again encounter the Lombard influence in the details, particularly in everything pertaining to the southern *prothyrum*, a

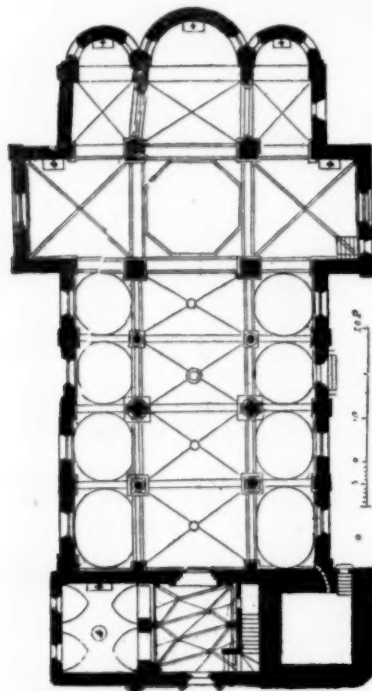


Fig. 10. Plan of the Church at Innichen.

projecting porch with two columns resting on the backs of lions. The parish church of Botzen, previous to its Gothic transformation, belonged to a yet simpler type. It was a vaulted basilica divided by pillars into three aisles, which terminated in three apses. The church of the convent of Marienberg in the Vintschgau, on the other hand, was a vaulted basilica, supported by pillars, with a transept, and with one apse; this was concealed on the outside by a rectangular wall. Nothing now remains of it except the beautiful Romanesque west portal.

Square or oblong chapels are often met with in Tyrol which, though undivided, are nevertheless triapsidal; such are St. Margaret's Chapel at Lana, near Meran, the chapel of the Schloss of Hohenepappau, near Botzen, and St. Bartholomew's in the valley of Non. The chapel of St. Vigilius at Morter in the Vintschgau furnishes a unique example of a trefoil choir. Chapels with one apse are very common in Tyrol.

A peculiar type, perpetuated during the Gothic period, is that seen in certain chapels with two aisles, separated by two or three pillars and terminating in two apses; such are St. Martin's at Schenna, near Meran, and the chapel of the convent of Sonnenberg in the Puster Thal.

The circular chapels in Tyrol are used for worship, rarely for funeral services, as is the case in the other provinces; some of them are very ancient, as the chapels of St. George at Schenna, St. Buirin at Gries, St. Michiel at Neustift near Brixen, and St. Sebastian at Clausen. The influence of Lombard decorative sculpture, which we noticed in the Cathedral of Trent and the abbey-church at Innichen, is also observable in the two sculptured doorways of the large hall and of the chapel in Schloss Tyrol (Figures 11, 12) at Meran, in the double-arched windows of the same hall, as well as in the chapel doorway in the castle of St. Zeno at Meran—all works of the twelfth century. Their fantastic and grotesque carvings are exactly like the rude Lombard chiselings of the same epoch, and are really nothing more than a perpetuation of Longobard sculpture, such as it is exhibited at Cividale for example.

At Salzburg, we encounter traces of Lombard influence in a few porches supported by two columns resting on lions; one of

these may be seen at the western entrance to St. Peter's, and another before the southern door of the Franciscan church. Otherwise the German style predominates. On the Nonnberg,



Fig. 11. Doorway of the Chapel of Schloss Tyrol.

near the Benedictine monastery, there is a Romanesque cloister of the eleventh century, antedating any in Germany. The rudimentary character of the vaulting, the heavy and squat forms of the columns, the bases of which look like reversed



Fig. 12. Doorway of the Chapel of Schloss Tyrol.

capitals, and the small windows, taking the place of arches, give a gloomy and primitive appearance to the construction. The western porch of the church and the chapter-house exhibit similar forms.

St. Peter's at Salzburg, erected in 1127-1131 by the Archbishop Conrad I, who had lived for some time as an exile in Lower Saxony, bears some evidence of the influence of the

Saxon style on its architecture; this is chiefly manifested in the regular distribution of the two columns coupled on a single pillar.

This same Saxon characteristic appears in the cathedral at Sekkan in Styria (built after 1145), where, moreover, the plan

teenth] is exactly like the Cathedral of Gurk; only, the three rectangular apses are not of earlier date than the fourteenth century. The details are simple, except in the doorways, which are richly sculptured (Figure 14). There is a remarkable cloister here of the twelfth and thirteenth centuries.

The church at St. Paul (Figures 15, 16) in the Lavant Thal in Carinthia (1170, 1280), differs from the churches cited above in its projecting transept and in the greater depth of the choir; it resembles them, however, in its porch with two quite simple towers, and in its three semicircular apses. The nave was originally covered with wood, but in the fifteenth century it was vaulted. This church has also a richly decorated portal.

[To be continued.]

SAFE BUILDING.¹—XLVI.

CHAPTER XL.—GRAPHICAL ANALYSIS OF STRAINS IN TRUSSES (Continued).

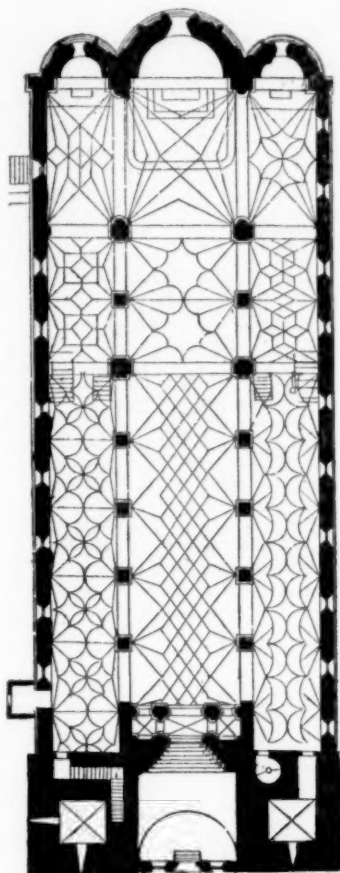


Fig. 13. Plan of the Cathedral of Gurk.



Fig. 14. Doorway in the Abbey-Church of Millstadt.

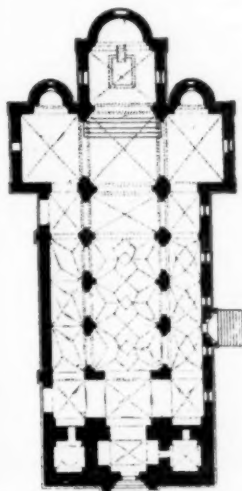


Fig. 15. Plan of the Abbey-Church at St. Paul, Lavant Thal.

is a reproduction of those simple and ancient types so frequently encountered in South Germany as well as throughout Austria, and the origin of which it is difficult to determine with certainty. It comprises a porch flanked by two towers with a rich portal, three aisles, a transept without lateral projections, and three apses corresponding to the aisles.

One of the most characteristic examples of this type is found in the Cathedral of Gurk (Figure 13) in Carinthia,



Fig. 16. Church at St. Paul, Lavant Thal.

built in the second half of the twelfth century. The supports consist exclusively of pillars. The details are more elaborate than in the cathedral at Sekkan. The inner portal of the porch is especially fine. And the magnificent crypt with its hundred marble columns, producing a really magic effect, is indeed a masterpiece of rare excellence.

This same type is repeated with but slight variations in several other churches of Carinthia. The abbey-church of Millstadt, [eleventh and twelfth centuries, restored in the four-

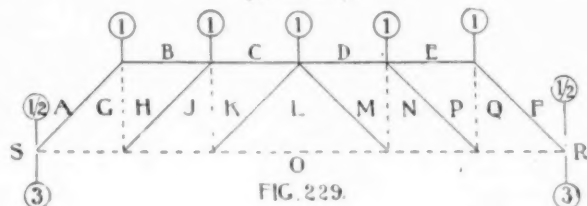


FIG. 229.

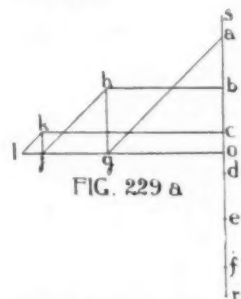


FIG. 229 a.

WHERE are, of course, many different truss designs, based on those given in Figures 213 to 228 and they can be similarly analyzed. Figure 229 shows a "Howe" truss with six bays, it will present no difficulty in analyzing. The end loads of this and subsequent trusses have been omitted, as they do not affect the strain diagrams, and unnecessarily increase the number of letters used.

The central vertical member is not needed unless the weights are placed along the bottom chord, in which case it will be needed to

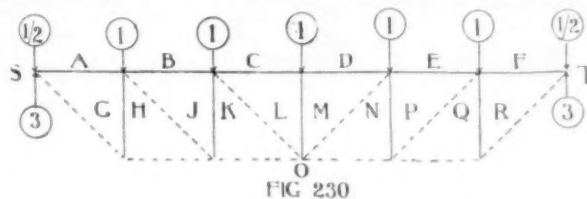


FIG. 230.

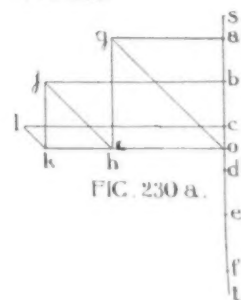


FIG. 230 a.

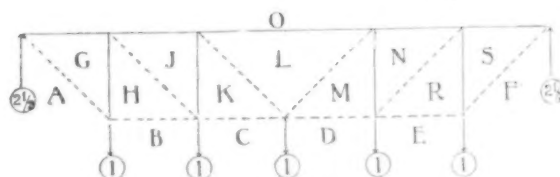


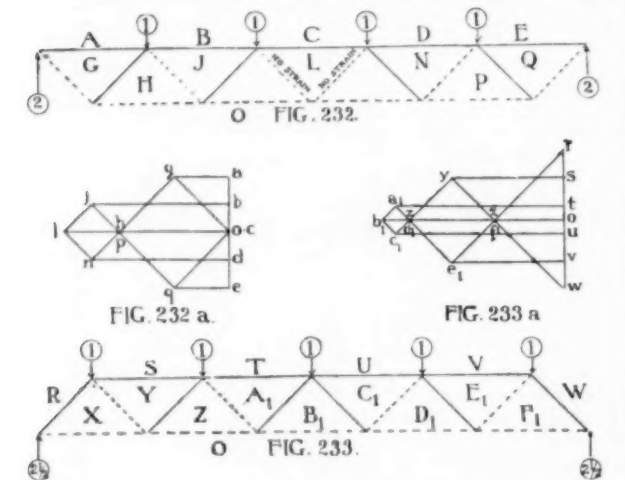
FIG. 231.

transfer the load to the top, and all the other verticals will be increased over the strains shown in diagrams by the amount of their respective loads on bottom chord.

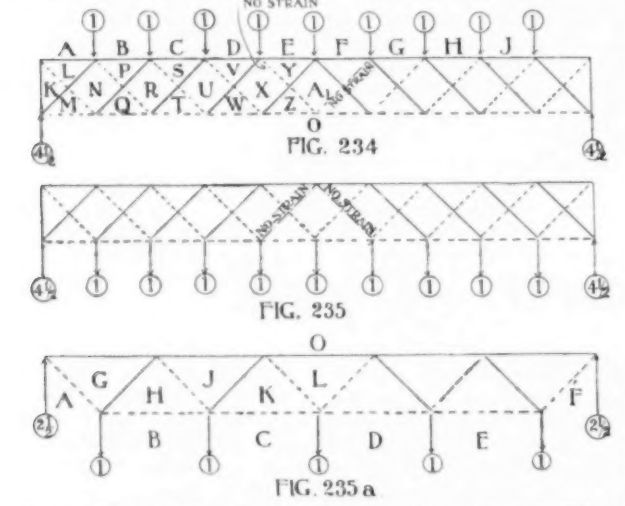
¹Continued from No. 770, page 198.

This truss is frequently drawn and used upside down from that shown in Figure 229, in which case all the strains will be reversed (see Figure 230), those in compression in Figure 229 becoming tension in Figure 230; and those in tension in Figure 229 becoming compression in Figure 230. It will also be found that the central vertical member is needed, if the loads are placed along the top chord. If the loads (in the reversed truss, Figure 231) are placed along the bottom chord the central vertical will not be needed, and as the loads will be taken up to the top chord by means of the slanting ties, it is better in this case to make a strain diagram with the load arrows in their right place and as shown in Figure 231. It will be noticed that we have drawn the reactions above the truss, as if it were hung in place, and that the entire strain diagram and each part, is the reverse of what it was in Figure 229. There is, however, no difficulty in analyzing this truss.

In Figures 232 and 233 we have two examples of the "Warren" truss.¹ Here, too, it will be seen that the reversing of the truss reverses all the strains. If the loads were along the bottom chords we should have to draw the arrows in



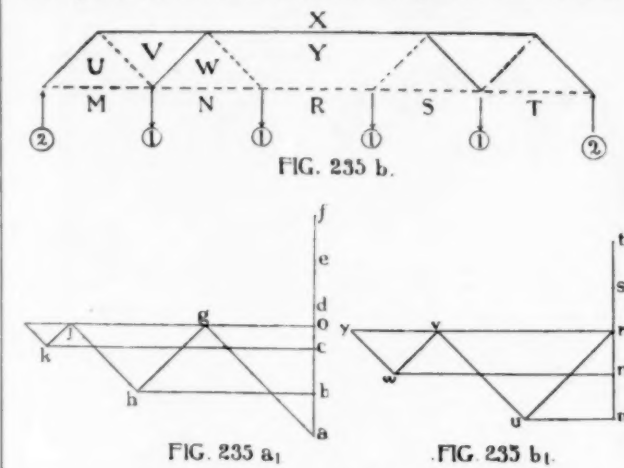
their proper places, and put the reactions above the ends. Figure 235 gives an example. In Figure 234 we have an example of a "lattice" truss. This cannot be analyzed unless we divide it into two reversed Warren trusses as shown in Figure 232 and 233. We analyze each of these separately, and then imagine them laid over each other, adding together the separate strains, where they cover. If there were vertical members in Figure 234, we should analyze it by dividing it into two reversed Howe trusses, like those in



Figures 229 and 230. In this case our widths of panels would be the same as in the original truss, and we should use all the verticals in both trusses, the loads therefore to be assumed on each of the joints of the divided or part trusses should be only one-half of the original loads. The "Whipple" truss is on the Howe truss principle with verticals bisecting the diagonals. This truss can be analyzed same as the Warren latticed

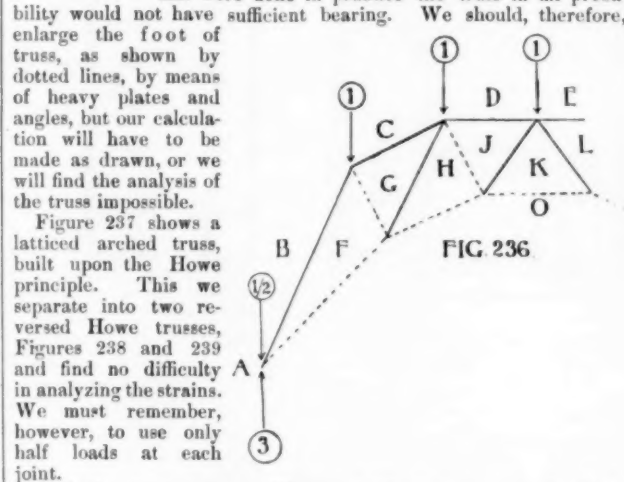
¹The true "Warren" truss usually has the diagonals drawn at 60° inclination.

truss, by dividing it into two halves, each having every other vertical and every other diagonal, and consequently a full load on each joint. Arched trusses are usually built up of a series of panels formed on the Howe or Warren truss principles, the only difference being that their top and bottom chords instead of being horizontal, are made



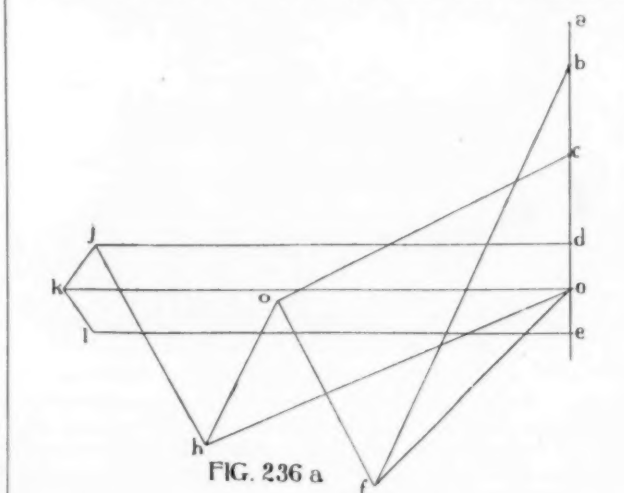
up (or assumed to be made up) of a series of straight lines at different inclinations. They are analyzed without difficulty, where they do not have horizontal tie-rods or abutments to take up their horizontal thrusts.

Figure 236 is an example of an arched truss built on the Warren principle. It will be noticed that the struts BF and FO are shown as if coming to a point. If this were done in practice the truss in all probability would not have sufficient bearing. We should, therefore, enlarge the foot of



Had the truss been a Warren latticed truss, we should in separating find that we had only half the number of joints and hence would use the full load on each.

Where there is a horizontal tie or abutment to take up the horizontal thrust of an arched truss, we must find the amount of



this thrust by the rules given at the end of Chapter I and at the beginning of Chapter V (both in Vol. I.) Having found this we draw an arrow at the foot of the truss in the proper direction to

represent this tie (if a rod) or thrust (if an abutment) and then proceed to analyze the truss without difficulty.

In Figure 240 we have what is known as a "scissors" truss. It can be built in either wood, or iron, or a combination of both. For small spans it is a cheap truss where a vaulted ceiling is needed. If we attempt to analyze this

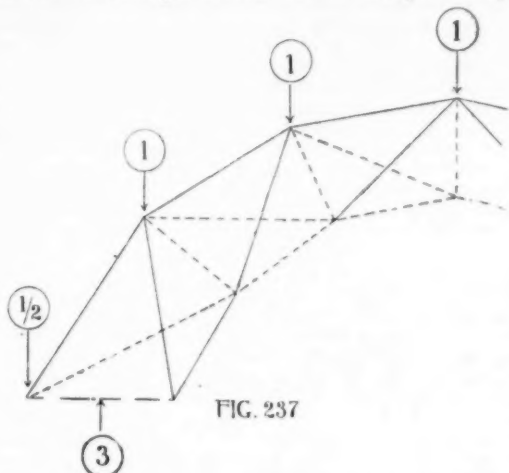


FIG. 237

truss in one strain diagram, as is done in Figure 242, we first take the lower joint $A B$ and find the two unknown strains $B G$ and $G O$.

At the next joint $B C$ there remain three unknown strains, we therefore abandon it for the present and pass to the joint at the

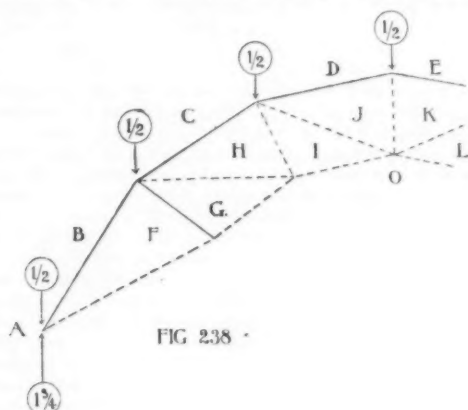


FIG. 238

apex, here there are but two unknown strains $D J$ and $J C$ and we find them by drawing in our strain diagram Figure 243 the lines $d j$ and $j c$ parallel to them.

Having now found the point j in the strain diagram there is no difficulty with the rest.

This truss is really a combination of two trusses; we might build it by dividing it horizontally along the line $J H$ as shown in Figure

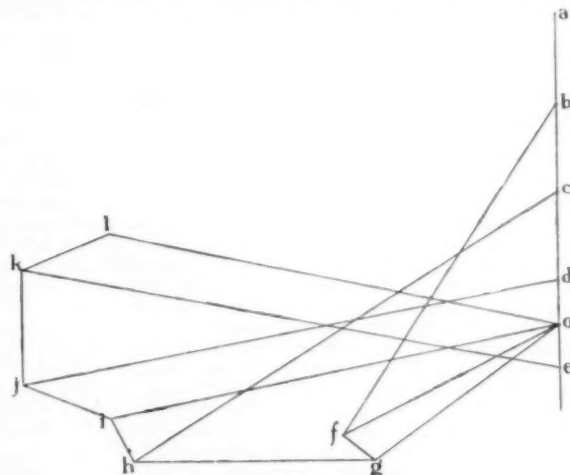


FIG. 238a

240. We should then have a bottom truss with two inclined struts $B G$ and $E K$, and one horizontal strut $J H$ and two ties $G O$ and $K O$, the loads on the joints $B J$ and $J E$ will each be increased by half of the apex load. Over this truss we should have another truss, with two inclined struts $J C$ and $D J$ and a horizontal tie

$J H$. This truss transfers its load to the lower truss. Now the remarkable thing that we have discovered is that the member $J H$ is at one and the same time both in compression and tension. If we analyze the top truss separately (Figure 241) and also the bottom truss (Figure 242) we find that the compression greatly exceeds the tension; the member, however, should be designed to resist both, having straps at the ends, sufficient to take up the tension. The actual

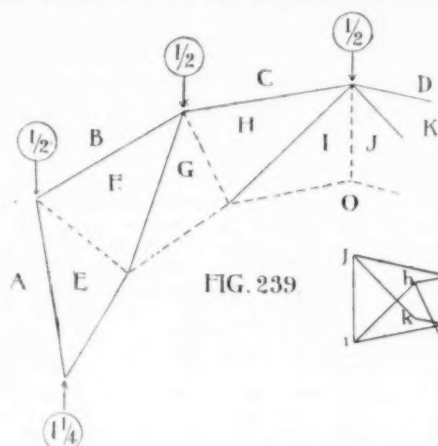


FIG. 239

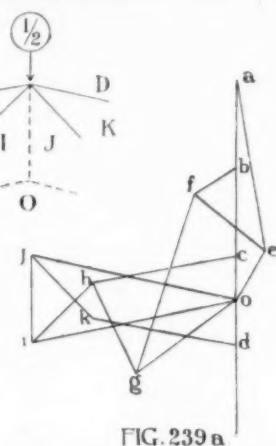


FIG. 239a

stress in the member itself will, of course, be the difference between the two, and by referring to our single strain diagram (Figure 243) we see this clearly, for $h j$ is the difference between $h o$ the total compression and $j o$ the total tension. Usually there is a bolt at the joint $H O$ connecting the two ties. This is done, as, when the wind blows from one side only, the tie pointing to that side becomes a strut and is stiffened by being reinforced at this joint.

Figure 244 represents what is known in Gothic architecture as a "hammer-beam" truss. We can analyze this truss in two ways, first (Figure 244) assuming that the wall takes up the thrust of the truss, due to the absence of any horizontal tie; or second (Figure 246) we can con-

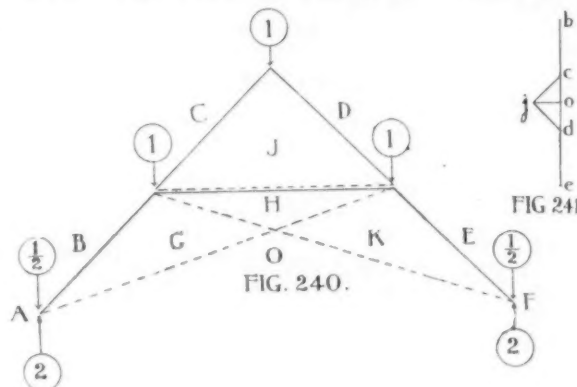


FIG. 240.



FIG. 241

sider the truss as composed of two inclined trussed rafters united at their upper joints and so taking up their own thrust.

The latter method will require a very much heavier truss.

In the latter case the semicircular member in the central panel becomes a tie, but the two lower quarter-circle members do not act at all, while in the first assumption the reverse is the case, the two lower quarter circle members acting as struts, while the semicircular member has no duty. In either case, however, these members come

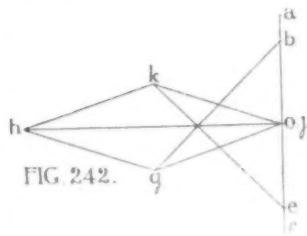


FIG. 242.

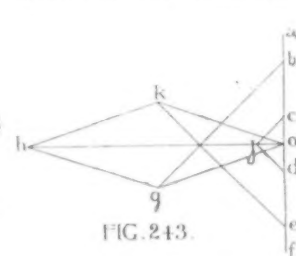


FIG. 243.

into play under wind-pressure calculated from one side only; it should be remarked here that when drawing the strain diagram all curved members must be assumed to be straight — (as shown at $L O$ in Figure 244 and at $Y O$ and $Z O$ in Figure 246). Of course, the stress to resist the strain thus found will be greatly increased when the curved member is called upon to do the same duty as a straight member. The increase in stress is equal to that produced on a beam of the length of the curved member with a bending-moment at its

centre equal to the original strain multiplied by the (longest) versed sine of the circle, or:

Increased stress
in curved
members.

$$m = s \cdot x$$

(129)

Where m = the (cross) bending-moment, in pounds-inch, existing in a curved strut or tie at its centre due to longitudinal strain.

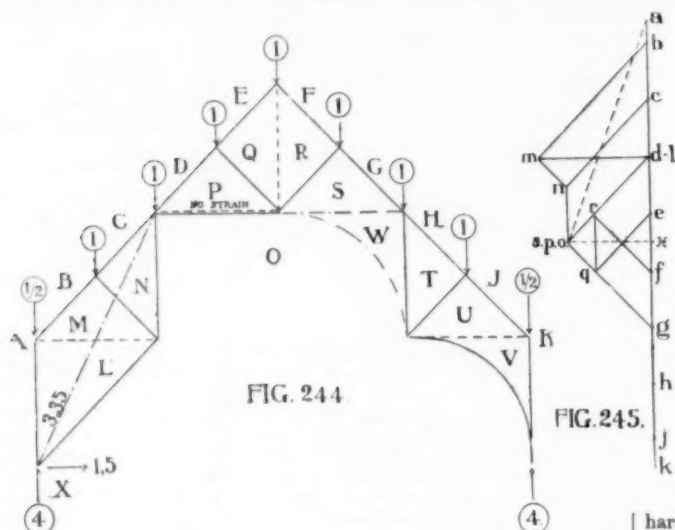
Where s = the calculated longitudinal strain that would come on the strut or tie if it were straight, in pounds, per square inch.

Where x = the length, in inches, of the longest versed sine of the curve (at the centre.)

If the longest versed sine is not at the centre, the bending-moment m will be at the point where the longest versed sine is located. Of

the swimming-bath is necessarily a more or less public institution. It is in its nature large and expensive to establish and maintain, but it is almost unequalled as affording to great numbers a means of healthy, pleasant exercise, and as furnishing an opportunity for the young and others to acquire the valuable art of swimming. No pains should be spared to make it attractive as well as convenient.

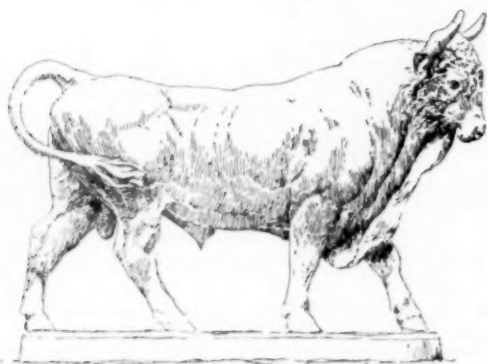
A swimming-bath of modern construction is a large tank, usually long in proportion to its width, shallow at one end and fairly deep at the other, walled in and roofed over, with a floor all round and numerous dressing-boxes. The interior should be light and airy, the water should be sufficiently warm, perfectly fresh, bright and clean, and the dressing-boxes should secure some degree of privacy. As the swimming-bath, if successful, will be worked pretty



course, the curved member must be designed to resist both the longitudinal strain and the additional strain due to the bending-moment.

[To be continued.]

BATHS FOR THE PEOPLE.



AT the recent annual Sanitary Congress at Brighton, Professor T. Roger Smith, F. R. I. B. A., presided over Section II, "Engineering and Architecture," and took as the theme of his Presidential address the subject of "Baths." Commencing by describing the Roman thermæ, of which he said that Professor Aitchison's lectures at the Royal Academy last year¹ had given the most learned and complete account known to him, he went on to speak of "Turkish" baths and vapor-baths. Coming to the subject of cheap and popular baths, he said that a very considerable number of establishments, some of them opened as private speculations or by small companies, but for the most part provided under the Public Baths and Wash-houses Act, existed. Mr. Rosher stated the number of public baths in England having a swimming-bath as part of their installation at 200, out of which seventy were in the metropolis alone. The avowed aim of many of these was to reach the general mass of people. In addition to the wash-houses, we found in one of these establishments one or more swimming-baths and a series of warm baths. Proceeding to examine the nature of each of these provisions, and premising that those who desired further information as to the Baths and Wash-houses Act and its results would find it in a compact and serviceable form in the comprehensive report of Mr. Ernest Turner on the subject, prepared at the time of, and in connection with, the recent Paris International Exhibition, the Professor said

¹ Printed in *extenso* in the *Builder* at the time, with illustrations.

hard, it is necessary to have the means of rapidly and thoroughly cleansing every part in use, and of quickly emptying and refilling the bath. Gas should be provided. In some cases provision may be made for employing the bath as a room for public meetings or a gymnasium, or in some such way during the winter time when it is not in request. Let us look into the means of carrying out this programme. The most important part of the whole, the swimming-bath tank, requires to have extreme care bestowed upon its construction, lest it should leak. Portland cement concrete is so well fitted for constructing the bottom and sides that it is not now likely that, save under exceptional circumstances, any other material will be used: formerly brick-work, backed up by clay puddle was the best material available, but there was more chance of leakage, and it is said that defects were not infrequent. The pressure of the water against the bottom and sides is not formidable in amount, but the various weights are quite sufficient to cause a partial failure if the foundation gives way, so every care must be taken to ensure a uniform and solid foundation for the bottom, and similar supports for the sides, as the smallest settlement will be followed by a crack, and the crack by a leak. Cement concrete is not itself water-tight and a lining of almost pure cement is required. The actual face of the tank should be of glazed brick or tiles, though when economy is of importance this may be dispensed with. Bands of dark brick or tile running from end to end of the bath are sometimes introduced into the bottom as a guide to swimmers in swimming-races. It is desirable to put in at least the foundation of the external walls before beginning to dig for the bath-tank, so that the excavations for the baths, when once made, shall not be again disturbed. If the tank be dug and concreted first, the subsequent disturbance of the earth in digging for the footings of the enclosing walls may be enough to cause a crack. Any outlets and inlets required should be decided, as to both size and position, before beginning; and the valves, sluices, etc., put in as the concreting goes on, so that there may be no excuse for disturbing the work and cutting holes in it. I know of one successful case where the side walls of the tank were first formed in trenches, and then the dumping, or great mass of earth in the middle was got out, and the bottom put in last of all; but there is some risk of making a bad join, and it is better to excavate the whole before beginning to concrete, and then to do the bottom first, and to bestow especial pains and not to stint material in making the join between bottom and sides. The water at the shallow end should be rather over three feet deep, sloping to about six feet at the deep end, and it is not uncommon to have the deepest point about ten feet short of the end, so that persons diving-in may plunge into the greatest depth. However this may be, every part of the bath must slope sufficiently to one point, to enable the water to be completely run off from the bottom. For cleansing purposes the corners and the join between the bottom and sides should all be rounded so as to prevent any lodgment for dirt. It is desirable to have along the shallow end a perforated pipe with water laid on, so that when the bath has been emptied the attendant may be able, when necessary, to turn on a shower of water while the tank is being cleaned out. The depth of the water should be legibly painted at the sides in several places. The edge of the paving should be rounded, and between it

and the water there should be a space of about six inches, and here a stout teak rounded handrail, or an iron pipe two inches in diameter, should be securely fixed on brackets for bathers to hold. The perforated pipe already alluded to may serve this purpose where it occurs. It is desirable also to fix spittoons at regular distances round the edge of the bath, and there should be a stout step-ladder at each corner. The dimensions of the tank must be settled with regard to the probable number of bathers and the means disposable. Every additional foot adds to the cost of original construction and of maintenance, but adds also to the value of the bath to the bathers. For a public bath, less than 25 feet width and 60 feet length of water area is not desirable. The length may, with great advantage, be increased to 70, 80 or 90 feet, then the bath should be 30 feet or even more wide. At most baths there will be swimming-clubs, and races will be sure to be instituted, and these festivals have to be considered. Less than five feet width will not do for a racer, so that not more than five competitors could well race in a 25-foot wide bath, and four would be more comfortable. It is rather desirable, in the interests of the races, to have the length an even number of feet divisible by ten, then three laps make a similar number of yards, and 60, 70, or 80 yards can be swum readily in a bath 60, 70, or 80 feet long. The water delivered into the bath, whether pumped up or from the mains of a water company, will be too cold for bathing in most states of the weather; and how to warm it is a most important point, for it is not only essential to be able to raise the temperature from the point at which it is delivered, which may probably be from 50 degrees to 60 degrees, up to say 75 degrees, or at least 72 degrees Fahrenheit, but it ought to be uniformly raised through the entire mass of water in the bath. If there are cold zones and hot zones in the water, bathers will not like it, and a bath that is disliked will be of comparatively little use to its owners or the public. In some cases hot water and steam is circulated in pipes within the bath itself, the pipes, being, as a rule, fixed in a recess formed for them in the walls of the bath. In others a long chamber is formed outside the bath tank and filled with hot-water pipes or steam-pipes and the water is admitted into this cool and returned to the bath warm. In another arrangement the water is drawn off from the bath, heated in a furnace, and returned warm. Sometimes steam is simply blown into the bath, itself, an expeditious but noisy way of raising the temperature. Most of these plans are more or less liable to heat the water unequally, and in more than one of them there is apt to be introduced a pipe, or a jet, or a something which is found to get too hot for bathers to touch without injury. The plan, the results of which, so far as my experience extends, are the best, is one differing from all these. It was put up for me at the baths of the Carpenter's Company, at Stratford, by Messrs. Fraser, and I can speak strongly of the success of this apparatus as a means of warming the water uniformly and effectually, and helping to keep it fresh. At the deep end of the bath, and near the bottom, an iron pipe is introduced, which is carried (outside the tank) back to the shallow end, and to which the water has free access. In the course of this pipe is introduced an iron chamber, into which a powerful jet of steam under considerable pressure is thrown; this acts upon the contained water on the principle of a Giffard's injector, and hurries it on, so that it is returned into the bath, travelling at some speed, and of course the water that takes its place is drawn out at the same speed. The steam mingling with the water in the chamber raises its temperature and the result is that a stream of warmed water is always pouring in near one corner of the shallow end of the bath, while an equal quantity of cold is always leaving at the opposite end. The temperature is, by this simple means, gradually and equably raised to what is required, and is easily maintained; and what is satisfactory is, that the warmth is found to be uniform all over the bath, and that, as the water is always in gentle motion it keeps remarkably clear. A method resembling that of Messrs. Fraser, but carried farther, is that of Mr. C. H. Rosher. He employs either the steam-jet just described, or a pump, to effect a circulation of the water in the bath-tank during the heating process; but he admits the heated water at the bottom of the tank, distributing it over the floor of the bath by means of discs or spreaders. It is claimed that this method promotes uniformity of temperature, and rapid heating, and prevents steaming from the surface of the bath and loss of heat. With this system of heating this engineer combines a second improvement, directed to secure economical working of a bath. The heaviest expense in working a swimming-bath is usually the cost of water. It will take about 60,000 gallons of water to fill a bath 25 feet by 80 feet. This, at 6d. per 1,000 gallons, a usual price, will cost 17. 10s.; and should the bath be refilled daily, except Sundays, the expense would be 9l. per week for water only, in addition to the cost of fuel used in warming the incoming water. Mr. Rosher proposes to filter and to aerate the water by appropriate machinery placed in a small chamber formed for the purpose, and so to render the same supply fit to last much longer. Filtration will, it is considered, remove the solid impurities, such, for example, as those which the settlement of dust on the surface of the water occasions. Aeration will oxidize, and so neutralize some organic impurity. I believe this system has been successful at Woolwich and other places, where it has been tried; and there can be no doubt that a plan which will diminish the amount of water used in a bath without rendering it less pleasant or less healthy, promises to effect a very great economy in working. Other plans for filtration have, I believe, been brought forward, but this is the most complete that has come under my notice, and the only one

which includes a provision for constantly re-charging the water with air. The rest of the swimming-bath may be dismissed more briefly. There should be a platform not less than four feet, or, better, five feet to six feet in clear width at the sides, and 10 feet at the ends, and at the deep end a stage should be erected for diving. The interior should be bright, but direct sunshine on the bathers is undesirable. A bath is best lighted by a series of ample side and end windows, but generally there is not room for that, and a great skylight has to do duty, which it does very well. There should be ample ventilation, under the control of the attendant, and not of the bathers. Ventilation in a swimming-bath is a little difficult to maintain without discomfort to the bathers, especially when the atmosphere is much colder than the air in the bath. A few steam-pipes, or hot-water pipes, to warm the dressing-boxes are of essential service, both to aid in this, and to keep the place comfortable in cold weather, though it must not be forgotten that the large mass of tepid water radiates heat into the chamber that contains it. There should be near the entrance a small shallow bath supplied with hot and cold water and a tepid spray—often called a soap-hole—for bathers who come in from dirty work and desire to wash themselves clean before plunging into the swimming-bath. A small laundry for towels and bathing-dresses should adjoin, and can be worked by the same boiler that supplies steam for heating water for the swimming-bath and the warm-baths. It will include some tanks, a boiler, a centrifugal wringer and a hot-closet; and my experience, so far as it goes, is that the hot-closet will be better worked, and with more certainty if it has an independent furnace, and is heated by hot air, than if the heat be obtained from a steam-coil.

Professor Smith then proceeded to describe in detail the requirements of that part of an establishment of public baths which provides warm baths for individual bathers. In his concluding remarks he said:—It must be admitted that, while the operation of the Bath and Wash-houses Act has brought a means of bathing within the reach of large numbers of people, it has not gone far enough. I believe it has been the experience of the managers of many of these establishments, that they are not frequented to such an extent as to make them self-supporting; and it needs no long consideration to see that the prices charged, though very moderate even if they reach the maximum fixed by the Act, do not place the bath within the reach of every class of working people; while the mere fact that these establishments must be on a considerable scale, and therefore cannot be very close together, removes them from the easy access of some of those who would use it if they could. Can we bring the bath nearer to the doors of the people, and can we give them a cheaper bath than anything accessible at present? In London and other crowded towns and cities, I have no doubt that simple, cheap, and accessible bathing establishments, formed in crowded neighborhoods, set up as a rule in existing buildings, and adapted to the wants and the purse of the crowd, would be popular and largely used; and my impression is that they could be made to pay their expenses, and possibly to yield a profit to those who established them. If so, few better openings for practical benevolence seem to exist than the multiplication of appliances of this sort under prudent and careful direction, and I wish the subject may attract the attention of philanthropists. Alluding to the means of cheapening baths, the Professor mentioned the spray-baths provided by Mr. C. C. Walker at Donnington, near Newport, in Shropshire,¹ where a private bath with clean towel is supplied for one penny. He said that a trial of these is about to be made in London, on the Carpenters' Company's estate at Stratford. He also referred to Mr. David Grove's spray-baths and to Mr. E. A. Reynolds's spray-baths as likely to be of great service in meeting a great public want for cheap baths.



WHEN in spring, the newspapers are filled with reports of graduations and commencements, there is unwonted activity in the office of the architect charged with the designing of public schools. Who this person may be, or whether his designs be excellent from the point of view of the practical man, concerns us not here. But the thing that does concern us is that the vast sums of money necessary to provide increased accommodation for the ever-growing multitude of children of schoolable age in a city of a million inhabitants, are expended in the erection of buildings almost devoid of artistic interest. Nowhere is there one that rises above the commonplace of mere utilitarianism, nowhere one that stirs in us the slightest thrill of approval, nothing that indicates that even a reasonable care for the exterior effect has been maintained. If we apply to them the tests of a good building

¹ Described and illustrated in the *Builder* for October 12, 1889, p. 261.

(tests concerning the excellence of which, both Ferguson and Ruskin, curiously enough, agree) we may find them "technically" all that is praiseworthy. "Phonetically," also, they are not so bad for they look like nothing but school-houses; more's the pity that school-houses should look as they do! But their success in this respect arises from the fact that they are all cast in the same mould, a mould known to us as the "typical school-house," and not that the phonetic expression proper to a school-house has been considered in their design. Turning to the third test, and regarding them "aesthetically" they are flat failures. It is useless to protest that there is no money to spare for architectural effect. Every building of enduring materials of the size of those of which we are speaking affords scope for artistic effect. The disposition of the masses and the proportions of the parts alone are, in the hands of a competent designer, means of expression, ample for securing an artistic result; yet not the slightest regard seems to have been paid to them, and chances easily within reach have been allowed to escape unseized.

This lack of artistic excellence in our school-houses is all the more to be regretted in its influence upon the children, as at the present time, under the able direction of Professor McAllister, the Superintendent of the city schools, a very determined effort is being made to spread some rudimentary ideas of art among the children—with what success is as yet doubtful. Certain it is, however, that after years of labor Professor McAllister has finally convinced the authorities that it is their duty, not only to develop the brain-power of the children but to educate their eyes and hands, and the work at last proceeds bravely enough.

This autumn, two new educational forces, interesting to the architect, will be put to work. Of the first and more important, the School of Architecture at the University of Pennsylvania, much has been said from time to time in these columns; but it has not been brought out clearly enough that the inception and organization of the movement is almost entirely due to Mr. Theophilus P. Chandler. To his energy and interest in the work is due the fact that a corps of lecturers, whose names include those of almost all the able members of the profession in Philadelphia, has been organized to assist the regular lecturers by courses on allied subjects.

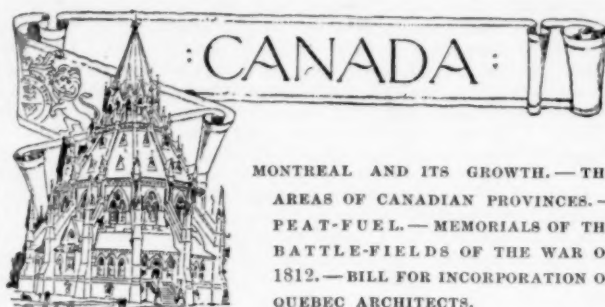
The School is much to be congratulated on having secured the assistance of Mr. Charles E. Dana, whose admirable collection of water-colors, all the work of his own brush, formed the most interesting exhibition yet given at the new galleries of the Art Club. The fact that such men as Mr. Chandler and Mr. Dana are giving a portion of their time to organization and instruction speaks well for their public spirit; but the School, if it is to be a public factor in art education, must be put on a basis that will render it independent of the vicissitudes that a dependence upon voluntary effort would necessarily entail. In short, the School must have an endowment. And it is of the utmost importance, that the men connected with it should make every effort to speedily secure this endowment. With it, success; without it, failure will be the result. That the School will ultimately be for Philadelphia what the Institute is for Boston, or Columbia for New York, is what all hope, but to achieve this result money must be forthcoming. It is easier to make bricks without straw than to run a college without money.

The second of the two educational forces beginning work this autumn is the Trades-school of the Master-Builders' Exchange. In the new Exchange Building rooms have been made ready and classes are every evening at work getting ideas as to the laying of bricks, the wiping of joints, the putting-on of the rough coat and the smooth coat, the joining of wood, the jointing of stone. In short, the innumerable details of the several building trades are here taught in practical form, so that a boy who has passed a year in the School will find himself at the end of it in better case, than the one who has spent two in gaining what he could from the chance instruction of the journeymen about a building. If the master-builders can do anything to make the average mechanic more competent, they will earn the thanks of all architects.

The merits of the numerous important buildings in course of erection in the city, for instance, the University Library, the Drexel Institute, the Penn Mutual Building, the Cold Storage Warehouse, Mr. Warden's Apartment-House, form too lengthy a topic for consideration in the few lines that remain to us. Another letter must be devoted to them for they are all interesting and one, at least, is fearfully and wonderfully made, and will stand as a solemn warning to the youth of the city, who may have to gain their earliest ideas of architecture almost within its shadow.

The most important structures projected for next year, are the Betz Building, which is to stand on Broad Street alongside of the recently completed Girard Building and opposite the new City-Hall, and the Hotel Metropole, the site of which at Broad and Locust Streets, is already being cleared. One is naturally anxious to see what manner of design this may be, as it is heralded in the newspapers as being an ingenious combination of Romanesque and Moorish. The newspapers exultingly add that it will cost a million dollars, but they forget to point out that, when done, such a building is not unlikely to be "*monstrum horrendum, informe, ingens*."

THE NATIONAL MONUMENT TO BISMARCK.—The success of the Bismarck monument fund in Germany, which now amounts to \$190,000, seems to show that the best time to erect a monument to a man is before he dies. — *Boston Herald*.



THE city of Montreal, the largest at present, in the Dominion of Canada, contained in 1760, when it was ceded to England by France, a population of 7,000. The treaty of cession was signed in a little stone cottage, the ruins of which still stand on the roadside some distance outside the present city boundary, waiting for some zealous antiquary to buy the field in which it stands and preserve it as a relic for the city. In 1840 Montreal had grown to a population of 27,297; in 1852 to 57,715; in 1854 to 65,000; in 1857 to 90,323; in 1863 to 100,000; in 1871 to 107,225; in 1872 to 117,865; in 1881 to 140,747; in 1886 to 186,542, or with its suburbs to 230,700. A recent census (this year's) shows the population to have risen for the city, to 212,000, and with the suburbs to 283,000. That is to say, this is the estimate made up in the following way, which, however, is hardly satisfactory to statisticians: the actual census of the city is 212,000 to which the assessors add for absentees, ten per cent, making 233,000, and to that they add a round 50,000 for the suburbs, not included in the authorized count. The amiable rivalry between Montreal and Toronto on the subject of population is apt to influence estimating assessors, to clap on, rather than understate figures. There can be no doubt that Toronto increases much faster than Montreal, it having gained about 70,000 in the last seven years, and continues to gain in a manner that bids fair for its ultimate supremacy over Montreal in the not far distant future.

A comparison of the Provinces of "The Great North-West" with other well-known Countries or States is not uninteresting and shows what a tremendous area of territory there is, as yet hardly opened up.

Manitoba has an area of 60,520 square miles—larger by 2,000 square miles than England and Wales together. Saskatchewan has an area of 114,000 square miles,—only 410 square miles less than Italy. It is larger than Colorado, with its 105,818 square miles and larger than the united areas of the States of Massachusetts, Connecticut, Maine, New Hampshire, Vermont, New Jersey and Delaware which equal 113,307. Alberta's area is given in round figures as 100,000, which, if correct, makes it rather larger than Illinois and Ohio together, which contain 95,369 square miles. Assiniboine has an area of 95,000 square miles,—larger than England, Scotland and Wales together, which contain 88,584 square miles.

A new form of fuel has been lately on exhibition at Ottawa which will, if there be no failure of the supply, probably interfere considerably with the coal trade. The fuel is peat, but compressed into solid, cylindrical blocks about twelve inches in circumference and twelve inches long. Its composition is said to be almost pure carbon: it is very heavy and in appearance black and shiny. The railway companies could use this peat almost exclusively, and as its power of producing heat is said to be greater than coal it would be very serviceable for boilers and furnaces. The material is found in immense quantities in the meadows of the "Mer Bleu" in Russell County and mineralogists believe it will be used instead of Pennsylvania coal for smelting ore at the Ontario Mines. Although we are said to have great coal fields in the Dominion they are undeveloped and therefore we hail with joy any thing that will save at least import duties, and perhaps some freight, on commodities so essential to comfort. Tests have been recently made on the semi-anthracite, smokeless coal of British Columbia, with a view to using it for the Pacific Coast fleet. At present all the coal for this purpose is brought from South Wales, but if this coal at Canmore can be used, and it seems as if it could, the Imperial Government will save at least \$5 a ton. The North Pacific squadron uses about 11,000 tons annually, and other vessels on the coast about 7,000 tons more, so that the saving would amount to some \$90,000 annually, a thing certainly worth taking into consideration.

The Dominion Government is having plans prepared for the erection of monuments on Canadian battle-fields in commemoration of the War of 1812. The necessary appropriation was made by Parliament last session. The first monument to be erected will be at Lundy's Lake Niagara, to be followed by a memorial of Champlain, the "maker" of Montreal, in Montreal. Near Toronto a monument, or perhaps I should say memorial, exists of a sad occurrence of this war. It is a pond some two or three acres in extent. History relates that a regiment of grenadiers crossed Lake Ontario on the ice,—the only time that the lake is known to have been frozen over: a thaw set in on their arrival in Canada, but they assayed to cross this pond when the ice gave way and the whole regiment was engulfed. It goes by the name of "The Grenadiers Pond" to this day.

The architects of the Province of Quebec are getting their papers

into order with the intention of attempting to receive incorporation at the next session of the Provincial Parliament, but whether they will succeed where the Ontario men failed, will be doubtful for some time to come. A great deal of merriment has been caused to the professional world at large, over the Act passed as it is supposed for the benefit of the Ontario architects, on account of the absurd introduction of the word "registered" before that of "architect," for which the stupidity of popularity-hunting legislators is absolutely responsible, and none regret it so much as the Ontario architects themselves, or feel the thorough absurdity of it more keenly. It is hardly necessary to say that none of them intends to make use of the word; but the Act has a few good points which no one will deny, and at least it is the thin end of the wedge. All architects, properly so-called, recognize the value of legislation if it can be secured,—such legislation as has been accorded to doctors and lawyers, and I am sure their sympathies will be with their brethren of Quebec, and they will watch with interest the result of their attempts; but it must always be borne in mind that the refusal to incorporate, given by such men as Provincial M. P.'s, is no guide as to the advisability of the bill or a sign that it is not good for the public.

A judicious application of "butter," a vigorous effort of wire pulling, friendly hob-nobbing, and that sort of thing go a long way to prove to the M. P.'s that such and such a thing is *pro bono publico*; but then the opposition may also apply the same means against the passage of the bill and perhaps do it on a larger scale, and so the public suffer. If it were possible to show that the Jesuits as a body would be specially benefited by the passage of the Quebec Architects' Bill, why the Act would become law in no time. And then there is the other side of the Bill, as to the protection of the public against the ignorant, unscrupulous and sometimes manslaughtering practitioners. The public need protection, not the architects. One American architectural journal publishes remarks on the architects of Canada which are intended to be very sarcastic, both on account of the Ontario Architects' Act and the duty upon architectural drawings imported from the States by those who employ American architects to carry out their buildings in Canada for them. It imagines (and upon what ground we do not know) that it is the architects of Canada who have imposed the duty, whereas if the writer think for a moment of the manner in which the profession is treated, all over the world, by "men in authority," he would find there is little reason to suppose a government would impose a duty on anything at their request. But if the Government thinks that an architect's drawings are legitimate prey and worth taxing, that is their work and they are entirely responsible. As to the Act, I have already shown that our architects think half a loaf better than no bread, and the fact that they register under the Act, does not mark their approval of the Act, and as none of them intends to call himself a "registered" architect, they are no worse off at any rate, than they were before.



THE EXCURSION OF THE ARCHITECTURAL ASSOCIATION TO OXFORD.—THE OLD COLLEGE BUILDINGS.—SOME OF THE NEW WORK.—THE LACK OF INSTRUCTION IN ARCHITECTURE AT THE UNIVERSITY.

THE month of August is not a prolific one for general professional news as it is the time set apart by architects for touring and holiday-making generally, but it possesses a special interest of its own as it is the time when the various architectural and archaeological societies select for their annual excursions to various parts of the country. This year the Architectural Association and the British Archaeological Association each chose Oxford as their trysting-place, the Royal Archaeological Institute went west, to Gloucester, whilst the Cambrian Association pitched their tents at Holywell, in Flintshire.

Of these various visits perhaps the most interesting to architects is the visit of the Architectural Association to Oxford. It will be remembered that the same society paid a flying visit to the city last month which I briefly recorded, but this annual assembly is of a more important character, and therefore, I do not think I can do better than devote my attention this month to Oxford, the city of all cities which deserves an occasional notice from the architect, and explain the recent alterations that have been made within its precincts.

Oxford is unlike any other city in the world. Neither on the European Continent, nor on your side of the Atlantic, is there to be found a city which has so long and so exclusively devoted its energies to education, and even in England itself the only town that approaches it is the sister university-town of Cambridge, which, however, cannot attempt to vie with Oxford in the interest of its buildings.

To understand Oxford, it will be necessary to say a word or two on its constitution, which resembles a federation of republics rather

than an autocratic kingdom. Each college is practically independent and controls its own finances and general arrangements. The whole of the colleges joined together forms what is known as the University, which is really the examining body, but which performs other functions in addition.

The colleges are mostly of mediæval foundation, but some have been recently founded, and in late years two have been added to the already long list, viz, Keble and Mansfield, both erected to foster certain schools of theological thought.

The largest college in the University is Christ Church, "Edeas Christi." This was founded by Cardinal Wolsey, and is entered from St. Aldate's under the picturesque "Ionic" tower of Wren's. The main quadrangle is by far the largest in Oxford and was intended at one time to be surrounded by a cloister, and indeed, the springing-stones for the vaulting and the bases of the buttresses were already formed when the work was stopped. The college chapel is large and important enough to be used as the Cathedral of the Diocese and it was restored very cleverly by Sir Gilbert Scott some time ago. Scott restored the east wall with a circular wheel-window with two small round-arched windows under, which is, I think, a unique treatment of the eastern wall of an English cathedral, but subsequent discoveries showed that he was amply justified in taking the course he did.

If Christ Church is the king, Magdalen is the queen of the Oxford colleges. It is situated right at the end of the town on the banks of the Cherwell and is unrivalled for beauty of form. The simple, graceful dignity of its tower commands one's warmest admiration, and the picturesque character of the quadrangles is very charming. Magdalen is one of the colleges which has been adding unto itself and one of the first things which arrests our attention on entering the college is Messrs. Bodley & James's new President's House. The architects have been very successful in their effort to catch the spirit of Oxford work, and when time has cast its kindly mantle over the building it will quite accord with the restful feeling prevalent in the older work.

The main quadrangle is surrounded by a cloister and over the entrance is a fine example of an Oxford Collegiate tower on a large scale; and passing on by a severe Classical terrace of rooms and between some delicately-wrought iron gates one comes to Addison's Walk by the side of the Cherwell, one of the most beautiful little bits of scenery in Oxford.

Another college of great interest to us, from the fact that it was founded by our great mediæval ecclesiastical architect, William of Wykeham, is New College. This college also contains a cloistered "quad," though smaller than that at Magdalen. The chapel is noted for its brasses and is of itself beautiful.

Merton is another college which contains a fine chapel. It is of fourteenth-century date and is specially interesting from the fact that it was the first chapel that took the curious T-shape common now to college chapels. The edifice was originally intended to serve as the parish church, in which the choir was set apart for the students, the nave and transepts being open to the general public. As it happened the nave was never built, so the church remained of a T-shape instead of the cruciform originally contemplated. This was subsequently copied and became the acknowledged form for college chapels. The chapel is a beautiful example of late geometrical work, with a tower somewhat of the same character as Magdalen's, but of sturdier and lower proportions.

Corpus, Oriel, Pembroke, Lincoln, University, Worcester, Exeter, Jesus, Balliol and Wadham each contain features of interest, though hardly sufficient to warrant a special mention in a paper of this character.

Trinity is, perhaps, most remarkable for some new buildings by Jackson, facing the first quad. They are a sort of mixture between French Renaissance and that prevalent in Northamptonshire, about the date of Kirby Hall and are extremely successful.

Brasenose is another college which has lately been considerably extended. Mr. Jackson is responsible for a row of new buildings in the High Street, which are nicely treated with a range of gables and a small oriel at the angle of the street. A curious feature is the very naturalesque foliage treatment which he has bestowed on the balustrade of the bay-windows.

St. John's is a later college than most of the others, and contains some of Inigo Jones's best work, which shows what that architect could do when he had the chance. It is a very graceful piece of work, full of feeling, although in a sadly weather-worn condition, like so many of the buildings of Oxford. It is interesting to note the extent of the decay in the stonework of Oxford buildings. We are informed that a great many of the decayed buildings were faced with a local stone obtained from Headington Hill near Oxford. Probably the stone originally was of bad quality, and peculiarly liable to the attacks of the Oxford atmosphere; but whatever the cause, the effect is singular. In some cases the mouldings have gone beyond recognition, and many of the buildings have had to be refaced altogether.

There are two other colleges in "the High" that have not yet been mentioned. All Souls', a Gothic college, with its famous reredos, and its neighbor, Queen's, the north-country college, a heavy Renaissance building by Hawksmoor, which is successful enough perhaps, so far as that goes, but which does not seem quite the thing in Oxford High Street. Hertford and Keble complete the colleges. Keble, alas! it is difficult to persuade one's self to like. It seems so out-of-touch with the quiet, peaceful feeling which pervades or should pervade

Oxford architecture. What rest or comfort can be obtained from a tall, red-brick building striped at irregular intervals with bands of parti-colored brickwork? It is distressing and worrying, and makes one wish for the time when its luxuriance of colors will be toned down by foliage and creepers.

Rivalling the colleges of Oxford, however, are the University buildings. These are attached to no particular college but are chiefly valuable aids to learning under the care of the University as a corporate body. Many of these buildings are known all the world over: the dome of the Radcliffe Library, the Bodleian Quadrangle, and the apse of the Sheldonian Theatre are familiar features to all students of architecture. Mr. Basil Champney's new Indian Institute is possibly not so well known. This is situated at the corner of two streets and is, perhaps, one of the most original as well as one of the most successful pieces of modern Oxford architecture. The severe solidity of the lower portion of the angle tower contrasts well with the freely treated summit, and the proportion is also good. Perhaps the criticism, if there be one, is the want of connection of the angle with the remainder of the building. Mr. Jackson's new Examination Schools in the High Street is also one of the most notable recent additions to Oxford. It is a carefully conceived and well thought-out design, and in places decidedly original. A striking effect is obtained at the lower hall by a projecting balcony carried on huge stone corbels.

The New Museum is one of the legacies left to us by the Goths of twenty years ago. It is a curious example of the change of fashion, how what was once admired is now looked upon with dislike. This building, says Fergusson, "was designed to be Gothic in conception, Gothic in detail, and Gothic in finish." This may be, but it is the work of Gothic copyists, rather than of Gothic students, and therein lies the secret of its failure.

Of the churches, the spires of the University Church of St. Mary's, and the parish church of All Saints, are conspicuous features in "the High." All Saints' is being restored or rather refaced. St. Barnabas is a not very successful modern building by Blomfield, and follows the lines of a basilica, while Street is represented by the church of St. Peter and St. Paul in the new part of the town.

It is impossible, however, in so brief a paper as this must of necessity be, to give more than the most meagre account of the progress of architecture at Oxford. There are many new buildings, and more



Balcony in the Examination Schools, Oxford.

old, to which I have not been able even to refer, but the place is full of interest, a veritable encyclopædia of architecture, and it is in the highest degree satisfactory to be able to pass so favorable a judgment upon the character of the new work that is continually being erected.

And yet with all these influences playing on the minds of the governing powers at Oxford, is it not singular that more efforts should not be made to instruct those studying at the University Town, how to read the lessons written in stone before their eyes? The

opportunity to further the cause of architecture by teaching those who will in time become its patrons, is great but neglected, and it is not uncommon to find Oxford graduates who dwell in the midst of this luxuriance for the most impressionable part of their lives, absolutely ignorant, often worse than ignorant, of even the most elementary principles of architecture. This is a pity and we must hope that the advance of education and the accession of younger men to power may in time alter it.

For Oxford, itself, no praise from an architect can well be extravagant. It is, as I said last month, an architectural jewel, and let us hope that future generations may continue to regard it as such, and may indeed be animated by the same spirit which moved their ancestors, and that amidst a changing world, the Oxford that we knew may stand untouched, as a silent monument to all that is true, and great, and pure and noble in man.

RUIN AT VERSAILLES.



"All the Modern Improvements."—No. 21.

MUCH popular interest is manifested in the project recently submitted to the Legislature by M. Yves Guyot, the Minister of Public Works, for the restoration and preservation of the old Cour des Comptes, the magnificent ruins of which have been slowly crumbling away for the last twenty years. It seems strange that one of the most beautiful and attractive places—one replete with historic interest, and containing many priceless masterpieces of the seventeenth century—should have been allowed to fall into such neglect and abandonment. The original demand of the Government was for a Parliamentary grant of 440,000 francs, which were, however, devoted to another use, and spent in absolutely necessary restorations and repairs at Versailles and at the Trianon. It is difficult to comprehend, however, in what manner the money has been spent. For both Versailles and the Trianon display the most

heartrending conditions of ruin, destruction and neglect. The repairing of the Louis XIV façade has been completed: but nothing has been done to the great front of the palace, which remains in the identical condition of ruin as before. If the frequent falls of portions of the structure have not resulted in loss of life, it is merely because the entrance at the foot of the great wall is protected by iron gratings, which temporarily hold it in position. There is an enormous scaffolding, erected upon wheels, which is to be used in the repairing of the front—but it is by no means a solid structure. This was constructed at great expense, but has not yet been utilized. In the case of the fountains of the park, the work of reconstruction has been delayed, with the object in view of obtaining a further grant of money. The only one fountain that has received any attention is the Basin of Latona, which occupies a conspicuous position at the foot of the grand staircase, leading to the Tapis Vert. This, too, would doubtless have been allowed to go to pieces were it not that it happened to be the point most frequented by visitors. The pedestal has been repaired and cemented, the blocks of veined marble readjusted and the group of statuary by Marcy, which surmounts it, has recovered a portion of its former beauty. But the vases which surround it have been left full of black mould and are fast crumbling away, while the two smaller basins are already in ruins. The celebrated frogs in the larger basin have been regilded, and reflect the light like so many hideous faucets. It is inconceivable that any man possessing the slightest atom of artistic taste could have expended so much labor in the midst of the general ruin. If the same amount of care had been bestowed upon the Bassin du Miroir the labor would not have been thrown away, and if the groups of children and flowers had been retouched with a coating of gilt the general effect would have been good, for the rose-marble is still unimpaired by time. But, in the Bassin de Latone, the only one at which the slightest attempt toward restoration has been made, the impression is shocking to the eye, and leads one to deplore that the work has been intrusted to any but artists capable of appreciating the works of their famous predecessors.

The statues have been merely washed — not restored. They are covered with black spots and are most unsightly. "La Nympha a la Coquille" has been removed and replaced with a statue of a woman nursing her infant, a modern production which is far from artistic. In the Avenue du Tapis Vert the same evidence of neglect is visible. The magnificent vases are either broken or defaced and covered with names and obscene inscriptions. The addresses of questionable characters in particular, with their professional announcements, abound everywhere and cover every available surface of the beautiful pieces of statuary and vases. It is remarkable that in such a place as this, so much frequented by strangers, so little care has been taken to guard against such vandalism. But it is well known that the men employed to look after the grounds are extremely negligent, and the visitors are allowed to do very much as they please, many of them breaking bits from the statues to carry away as souvenirs. The entire collection of marbles is sadly neglected, while in the shrubbery many of the groups are broken and covered with moss and weeds.

The Hall of the Emperor presents a shocking appearance, all the statues being covered with dust, and blackened beyond recognition. The statue of Marcus Aurelius has lost its head, and the bust of Otho is surmounted by a crown of fresh oak leaves, placed there by some facetious student. One is led to believe, in visiting Versailles, that the Government is utterly indifferent as to the manner in which the Government grant for the maintenance of the palaces has been spent. That it has been diverted elsewhere is evident, as is also the fact that the least work has been accomplished at the greatest possible outlay. The grass is uncut, and the entire promenade overgrown with weeds. The trees are untrimmed, and a general air of desolation reigns throughout the beautiful garden. The grand canal is choked with debris, and from it emanates an odor of the grave. It is almost hidden by heavy and dense miasmatic vapors, which are a constant menace to the health of residents of the vicinity. Any one having the misfortune to tumble into the canal would certainly be asphyxiated.

Since the appropriation in 1888, 400,000 francs are asserted to have been expended for restorations. In reality what has been the result? Comparatively nothing. Not one basin has been thoroughly repaired. Not a single statue but what has been displaced, and the palace itself is going to wreck and ruin. In the Grand Trianon the walls are splitting on every side with enormous cracks, which grow wider day by day. In the first month of this year it was found necessary to remove all the pictures and tapestries from the Louis XIV apartment, where dampness and mould had well-nigh destroyed everything. The ceiling shows brown spots, the result of recent rains, and the walls of the palace have become the home of the lizards. It will not be long before the beautiful Sèvres vases and priceless marbles scattered through the palace will be destroyed. Only a portion of the amount set aside for the Trianon has actually been expended, and this merely to convey the idea, to visitors at the Exposition, that Versailles had been properly restored and embellished.

The masterpieces of the Trianon, the exquisite basins of rose-marble, are altogether gone. In 1886 it would, with time and money, have still been possible to save these treasures; but now the damage is past all recovery, and the loss is irreparable. There is now some talk of getting up a national subscription under the patronage of the President for the purpose of preserving for France these masterpieces of the artists who have contributed to her greatness. — N. Y. Tribune.



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

HOUSES 469-471 BEACON ST., BOSTON, MASS. DESIGNED BY MR. C. S. MOONEY, BOSTON, MASS.

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

DESIGN BY M. SORTAIS FOR A MONUMENT TO JOAN OF ARC.

THIS design which was awarded the Second Grand Prize in the annual contest at the Ecole des Beaux-Arts for the Prix de Rome, is here reproduced from *La Construction Moderne* for the sake of showing how French designers would have been likely to treat such a problem as was offered by the invitation to design a monument to General Grant.

ACCEPTED DESIGN FOR THE GRANT MONUMENT, NEW YORK, N. Y. MR. JOHN H. DUNCAN, ARCHITECT, NEW YORK, N. Y.¹

MR. DUNCAN submitted with his drawings the annexed descriptive notes:

Gentlemen, — Since I have received your invitation to present a design for a National Memorial to General Grant, I have made a careful examination of the magnificent site selected by your Com-

¹The negatives kindly furnished through the instrumentality of Mr. Duncan were technically such that we are obliged to reproduce all the designs reversed, but as the designs are all symmetrical this reversal is not important. — Eds.

mittee for the Mausoleum, and have given particular attention to the conditions of the problem as presented by the location. In modern times no greater task nor greater honor could be given or desired than to construct a proper Mausoleum to the General who led Union forces to victory in the War of the Rebellion.

As I conceive it, the problem is to produce an edifice which shall be unmistakably a monumental tomb from every point of view it may be seen, while as to its accessories it shall contain a grand Memorial Hall and a depressed mortuary chamber with a double sarcophagus, where will repose the mortal remains of General Grant and his beloved wife.

In striving to solve this problem, I have determined that:

(1) There must be an unmistakable expression of repose and dignity in the architecture conforming with the character and purposes of the structure.

(2) The treatment must be that of a unit and not of a mass composed of parts. I have kept in mind and provided for certain portions of the main structure to be built from time to time, with the amount of money in hand, and provided that such parts as are finished shall give the appearance of a completed structure, as far as it is possible.

It is absolutely essential in work of this character to avoid all resemblance to a habitable dwelling, and therefore I have used the pyramidal form in preference to the dome, surmounting it with a group of statuary, afterwards to be determined on. All the openings for light and ventilation are either perforations of the stonework or filled with metal grilles, protected carefully from the elements, and provided with suitable arrangements for draining off any water which might drift in; all glass being avoided.

In the treatment of the exterior, I have kept closely to the general treatment and detail of the best Greek architectural precedent, feeling that one could not err in holding them in constant view, while modifying their treatment to the requirements of our own day and times.

Hence, in the lower portion I have chosen the Doric order on account of its simplicity, and above the Ionic. The great size of the memorial hall, which I have designed to be both impressive, instructive and useful, has led me to leave the lintel construction and adopt the vault and arch form of Roman work. My main object is to present in the present drawings the form of my proposed mausoleum, and therefore the equestrian statues of Grant's generals of the four principal armies, on the columns in front, the full relief panels on the sides for portraits of the several major-generals acting under him, the group on top, as well as the other groups and figures indicated, are simply suggestions showing sculpture at points where the edifice would best receive or requires them.

All such details are a subject of after-consideration, which, in my judgment, should be kept subordinate at present to the general design.

While my arrangement of plan recalls the Tomb of Napoleon in the Hôtel des Invalides, so far as the open crypt is concerned, I have placed it in an apse, leaving the entire portion of the memorial hall clear for any patriotic or civic gathering, such as the annual meeting of the Grand Army, the Army of the Tennessee, the Society of the Cincinnati, etc., while at the end of the hall I have constructed a rostrum for the various dignitaries, from which a complete view of the large memorial hall may be seen. A vista of the entire length is also obtained from the entrance, terminating in the apse and the guardian figure over the granite tomb.

The general dimension of my main structure is as follows:

A square base, 100 feet by 100 at the ground-line, exclusive of the steps, and the projection of the portico on front and apse at rear. The total height of the mausoleum would be about 160 feet from the base line, or nearly 290 from the water-level of the Hudson River. From the centre of the memorial-hall floor to dome is 100 feet. The supports of the dome are four arches, under three of which are galleries reached from the two circular stairways in front. From these, access is also gained to the inner and outer galleries above by stairways as indicated on drawings in the thickness of the walls. The outer gallery will be 130 feet above the ground-line, affording a complete view of the surrounding country for miles. Although the extreme top of the mausoleum may be reached by steps above this gallery, it will not be kept open for the general public.

The dome is supported on the interior by pendentives, which fill in the transition between the square formed by the vaults and the under side of the circular dome. These should be of ornamentation with figure-subjects, formed of marble-mosaic. At this point I would indicate the special victories of General Grant in the War for the Union.

Above these pendentives are thirteen openings into the inner gallery. In the panels above them I would place the seals of the original thirteen States, and directly over discs with the names, emblems, etc., of all the States which were re-united in consequence of General Grant's victories, while above them all rises the coffered dome.

The crypt I have made the subject of particular study. It is the feature of the building worthy of the deepest consideration. For material I selected white granite, being the stone least affected by climate. The crypt itself is large and roomy, reached by rear stairways and protected from intrusion. I have designed places in the crypt for the display of banners, relics, personal souvenirs, etc., of the dead General, President and Citizen.

Where mosaic could not be used in interior, I should prefer the cream-white Tuckahoe marble; but if this proves too expensive, Indiana limestone could be substituted. I have made careful studies and surveys of the grounds, the promontory on which the mausoleum will stand, the ground set apart for it, and the different drives and approaches, and the amount of money which has been annually expended under the direction of the Board of Park Commissions for the walls and steps of Riverside Park, south of One Hundred and Twentieth Street.

All of these I have treated in connection with my design, as will be seen in the section-view from east to west, showing the approaches and descent from the tomb to the river, arch over the railroad track, and a wide plaza on the river where boats may land. In another view, north and south, I have sketched this approach showing the effect of my design from the river. All of this addition would cost no more than warranted by former expenditures of the Park Board, and would no doubt be gladly acceded to by them at your request. If the general open driveway along the line of the river is carried out, as contemplated, this treatment would lend itself admirably to graded drives from street to upper terrace, and the approach be greatly dignified by such addition.

Appreciating the situation of the committee, I have made a special study of my general scheme, with reference to such portion of mausoleum proper as could be built complete in itself for the amount of money which the committee have in hand. This I have sketched separately and have obtained estimates which are sufficiently approximate to warrant me in saying it could be built within a year or eighteen months complete for \$150,000 or \$160,000. This would in no manner interfere with the completion of the general design, and no expense incurred that would be lost, and it would be a mausoleum complete in itself.

An inspection of my drawing will show how this would include apse and crypt with the stairways; the front would be left open for the inspection of visitors, after the manner so common in Italian tombs.

The whole mausoleum I have constructed on the basis of \$500,000. The time was so short that I was unable to obtain trustworthy estimates; but from my professional experience and quantities I have taken off, I believe the entire structure could be built within the limit. Bronze-work, statuary, frieze-work, etc., can never be accurately estimated, and at best is a matter of after-consideration, but I have included the portrait-statue.

The direction of my building, as shown on the block plan, is not exactly on a line with the river-front or drive. It is so arranged for the purpose of bringing it on a direct line from the point where the lower portion is first brought to the view from the Riverside Drive, this being the general approach.

THREE OTHER COMPETITIVE DESIGNS FOR THE SAME MONUMENT.

[Issued with the International and Imperial Editions only.]

MESSEURS. CARRERE & HASTINGS, of New York, divided their monument into three distinct parts, as follows:—

- (1) "The Tomb," over which rises a high tower, marking from near and far the spot where rest the remains of General Grant.
- (2) "The Memorial Hall or Museum," which assumes a secondary position in the composition by its low spreading dome, covering the requisite space within which to collect and exhibit to the public such trophies, books, pictures, statuary, and other subjects as relate to the history of the war and to General Grant's career.
- (3) "The Exedra or Peristyle" would serve to illustrate the history of the war, by making places for decorative charts and inscriptions, to familiarize all passers-by with the main events and the most glorious deeds in the great crisis of our national history. This would give niches and other places suitable to receive different donations in the form of allegorical statues or emblems of "Liberty," "Justice," "Peace," "Magnanimity," "Unity," and "Equality." In the centre of the foreground an equestrian statue of the General might be placed with other groups. Any of these might be given by the different divisions of the Grand Army of the Republic, or by other institutions, or even by individuals, who would like to pay some such special tribute to the general commemoration of the name we honor.

MR. JOHN ORD, of Philadelphia, thus described his design:—

The design speaks for itself, and requires no special description. It has been carefully studied from the most noted examples of sepulchral architecture of all nations, from the earliest times to the present day. It is not simply a monument, nor is it merely a tomb. It is a highly monumental mausoleum, simple, symmetrical, and self-contained, with sufficient mass to make it imposing.

It would look well if built of the commonest materials, and in the plainest manner; and at the same time it is susceptible of the greatest adornment that rich materials, artistic labor, and the highest architectural and sculptural skill can give it. Placed on the proposed site at Riverside Park it would be one of the monuments of the world. The building consists of a hall 80 feet square, with a semi-circular addition or apse on each of the four sides, making practically two halls crossing each other at right angles, each 120 feet long and 40 feet wide, the whole forming one grand memorial hall, in the centre of which, a sort of exposed crypt, is placed the double sarcophagus,

to contain the remains of General Grant and his wife. The floor of the crypt on which the sarcophagus rests is eight feet below the main floor of the building, and the space occupied by it is thirty-six feet in diameter, and it is protected by a massive balustrade. This feature of the design is based upon the arrangements in the Hôtel des Invalides in Paris, where the remains of the Emperor Napoleon the Great rest in silent but impressive dignity. The balance of the floor space of the main hall (in area a little over 5,000 square feet) is intended for the reception and care of memorials of the deceased Citizen, Soldier, and President. In the four corners of the square, stairs and elevators, though not shown on the plan, can be placed to give access to the upper balconies of the structure. The first of these is at a height of 72 feet, and the second 110 feet above the plateau on which the building rests. The plateau itself is 127 feet above high-water level. There is also a third balcony which can be made accessible at the height of 162 feet. The dimensions of the main hall are 120 feet wide and 50 feet high, which support the walls of the dome above; the total height of whose inner ceiling is 152 feet above the floor. The architectural proportions and effect of the hall will be unusually grand and impressive: in the form of a cross, each arm terminating in a circular end, domed over at a height of 50 feet above the floor, with the central dome rising 152 feet above the sarcophagus, and with the aid of all the fine arts to decorate it. I know of no similar building that will compare with it. On top of the main dome is a cupola in the style of a temple of Peace, on top of which is a winged figure of Victory, copied from that now in the Museum at Naples. The total width of the building externally is 126 feet, and the depth from front to rear 145 feet, which includes the portico; and the extreme height is 201 feet above the ground. The plan of location represents the site or lot brought to a dead level at 127 feet above high-water mark, enclosed by an ornamental retaining-wall. A broad path is made across the lot between the old and the new drives, and this necessitates a wide flight of steps in approaching the building from the new drive. The panels containing the sculptured bas-reliefs of the exterior, the stained-glass windows, the sarcophagus itself, mosaic floors, etc., might very properly be donated by posts or departments of the G. A. R. The question of cost is uncertain. I have designed it to be built for \$500,000, the sum named in your instructions; but, as before stated, it can be built for less, while more may very easily and very properly be added.

MR. CLINTON, of New York, sent in the following description of his design:—

The building consists of a circular crypt, above which is a rotunda lighted through the dome, surmounted by a lantern. A colonnade surrounds the rotunda. The stone coffins to contain the remains of General Grant, and eventually those of Mrs. Grant, are placed in the crypt, around the walls of which may be set, if so desired, not only memorial tablets for General Grant but also for his generals. The rotunda over it is to contain the sarcophagus, and provision is made in niches situated at the four cardinal points of the compass, to contain allegorical figures of the four great divisions—the North, South, East and West. Upon the interior wall of the drum of the dome, as shown, inscriptions giving accounts of the great battles of the war may be cut, and between the pilasters there are arched recesses, to contain appropriate sculpture. Ample light is given through the top of the dome.

Above the rotunda the Memorial Hall is placed. It is intended that it should be a museum, containing objects of interest and relics of the war. An open colonnade forming a great lantern surmounts the Memorial Hall. This gives light, provides an observatory, and forms a base for the heroic statue of Columbia or Victory. A frieze running around the exterior wall of the rotunda under the colonnade is designed to contain bas-reliefs emblematic of the separation and reunion of the States. The columns of the colonnade are 60 feet high.

The building is raised on a circular platform 17 feet high over a base 180 feet square. The height to the base of the figure of Columbia is 200 feet. The clear diameter of the rotunda is 50 feet, and that of the Memorial Hall above it the same. The lantern and balcony are reached by elevators and a stairway, and the surrounding country can be viewed from the balcony at an altitude of 125 feet. Sculpture may be added from time to time, to beautify the building and grounds, and I have suggested an equestrian statue of General Grant placed in an appropriate position.

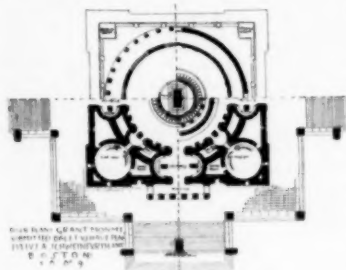
The material proposed is American white marble, with colored marbles from the various States of the Union for the interior, and the design is based upon an expenditure of \$500,000.

Means for lighting and ventilating the crypt will be provided.

The design is peculiarly adapted to being built in sections. The crypt alone would form a complete tomb, as well as a foundation for the monument. The rotunda might next be erected, even without its colonnade, and with it, it would form a building seeming complete, until the whole superstructure should be added to perfect it, and meet all requirements.

I have designed the building to be circular for the following reasons: It is the historical form for tombs. While it is the historical form for tombs, the treatment is original, and it suggests what it is intended to be—a tomb of a monumental character. There is no suggestion of an ecclesiastic or civic building about it. It insures absolute balance of symmetry. It presents the same appearance from every point of view. And for these reasons it is typical of

singleness of purpose and the symmetry of character of the one whose memory we honor.



DESIGN SUBMITTED IN THE FIRST COMPETITION FOR THE GRANT MONUMENT BY MR. J. A. SCHWEINFURTH, BOSTON, MASS.

As a correspondent recently called attention in our columns to this design, it was thought worth while to reproduce it at this juncture.

[Additional Illustrations in the International Edition.]

THE BOURSE DU COMMERCE, PARIS, FRANCE. M. BLONDEL, ARCHITECT.

[Copper-plate Engraving.]

It must be remembered that the problem presented to the architect was one of restoration or rather the embodying in a new building of the great rotunda and dome of the ancient Halle aux Blés, built by the architect Joseph Belanger, which is remarkable for the simplicity of its construction and for the fact that it was the first structure of the kind built wholly of iron and copper. A detailed account of the building will be found in the *American Architect* for March 22, 1890.

FOUNTAIN IN THE MARIA THERESA SQUARE, VIENNA, AUSTRIA. HERR E. HOFMANN VON ASPERNBURG, SCULPTOR.

[Gelatine Print.]

RUINS OF THE SPANISH CATHEDRAL, GHENT, BELGIUM.

[Gelatine Print.]

THESE interesting remains, which are known by the above title, appear to be generally overlooked by travellers as they are not mentioned in the guide-books under this or any other name. Enclosed by a blank wall there is nothing to indicate to the passer that within may be found one of the many interesting relics of Spanish domination that abound in Ghent more than in other Belgian towns.

THE PRESENTATION OF THE BRIDE.

This illustration is a companion to one published last week, and is another example of M. Dell'Acqua's skill in dramatic arrangement and in treating Venetian costumes.

CITY CROSS, CHICHESTER, ENG. MR. SYDNEY TUGWELL, ARCHITECT.

WILLEDEN CEMETERY, ENG. MR. J. M. BROOKS, ARCHITECT, LONDON, ENG.

This design was sent in competition. There being a narrow entrance it was proposed only to have gates, the lodge and waiting-room being at the end of the road, so as to command entrance. From this a cloister was proposed to be erected to the two chapels, and also bell tower. The hearse driving up deposited the body on a trolley, which was to be wheeled into the various roads and paths. By this more space for the graves could be obtained. It was proposed to build the chapels of red brick with stone dressings, the roofs to be covered with Broseley tiles.



THE TORONTO ARCHITECTURAL SKETCH-CLUB.

THE second annual meeting of this prosperous club was held on Monday October 6, when the following officers were elected: President, Mr. S. G. Curry; Vice-president, Mr. A. H. Gregg; Secretary, Mr. C. H. Acton Bond; Treasurer, Mr. A. C. Barrett; Directors—Messrs H. W. Matthews, Henry Simpson and W. R. Mead.

The prospects for a good season's work are most encouraging and with the general enthusiasm of the members good results may be looked for.

C. H. ACTON BOND, Secretary.

PHILADELPHIA CHAPTER, A. I. A.

At a meeting of the Philadelphia Chapter A. I. A., held October 14, the following officers were elected:

T. P. Chandler, Jr., President; George C. Mason, Jr., first Vice-

president; Lindley Johnson, second Vice-president; Amos J. Boyden, Secretary; William C. Prichett, Jr., Treasurer; Isaac Pursell, T. Roney Williamson, forming with the above officers, the Executive Committee; Frank Miles Day, Librarian; Frank E. Meade, Assistant Librarian; Frank Miles Day, Wilson Eyre, Jr., Walter Cope, Amos J. Boyden, John Stewardson, Education Committee.

Respectfully yours,

A. J. BOYDEN, Secretary.



REPEATED BUILDING FROM THE SAME PLANS.

ROCHESTER, N. Y.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs:—I wish to consult your legal department in regard to the following:

I prepared plans and elevations (no specifications) of a dwelling for a gentleman, at a stated price. I have just discovered that three houses have been built, and he refuses to pay for using plans on the last two. On corner of plan was written, Return to ———, Architect. Can I collect for use of plans for the last two houses?

Yours truly,

[You have no claim for compensation. An architect prepares plans for a client and sells the plans to the latter to use as he pleases: whether or not the owner shall duplicate the building is a mere matter of personal courtesy. If the architect desires to prevent the owner from duplicating the building, there must be a special stipulation to that effect in the original contract between them.]



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

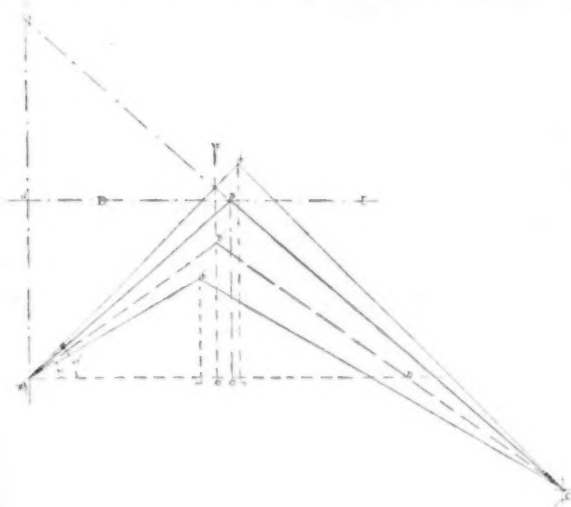
TO LAY-OFF A ROOF OF UNEQUAL EAVES-HEIGHT.

NEW YORK, October 11, 1890.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In answer to W. P. P. L.'s problem to architectural students, would beg leave to submit the following:

1st. To find graphical construction where the height of B is given. A and C are given points, DE the given height, draw Af making



$A d = d f$, draw $f'c$, its intersection of DE at B will be the required point.

2d. Is the horizontal distance $A O$ the same for different heights? The accompanying diagram shows at a glance that it is not.

If the distance $A o'$ is given it will determine the height or vice versa.

The graphical construction in the case is to lay off $o' b = A o'$, draw a line through $c b$ continued to B , the given point.

Respectfully yours,

LESTER CRAMER.

THE WATCH AS A COMPASS.

TORONTO, October 14, 1890.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Do not let Americans be in too great a hurry to discover the birthplace of the "American friend" or I fear they will

be making much of him "without sufficient cos." The paragraph you reproduce from *London Truth* has been copied into a number of papers but unhappily the theory will not hold water and had Mr. Stanley used his watch instead of his compass he would have gone round and round in a circle, like a traveller without a guide. By this supposed rule the south must be a moving point. Say it is four o'clock in the afternoon: point the hour-hand to the sun (say in midsummer) which would be a little to the north of west and II would be then west of south, *not south*. Say it is eight o'clock in the evening and the sun is almost down (being midsummer) and the figure X is north-west, *not south*. Say it is eight o'clock in the morning the sun is some distance above the horizon in the south-east, X would then be still east of south, *not south*. The only thing this rule is fit for is to find the sun, supposing you could not see it. I am inclined to think it is Ireland and not the United States that must "take the cake" as the birthplace of the inventor.

Yours truly,

R. W. GAMBIER-BOUSFIELD.



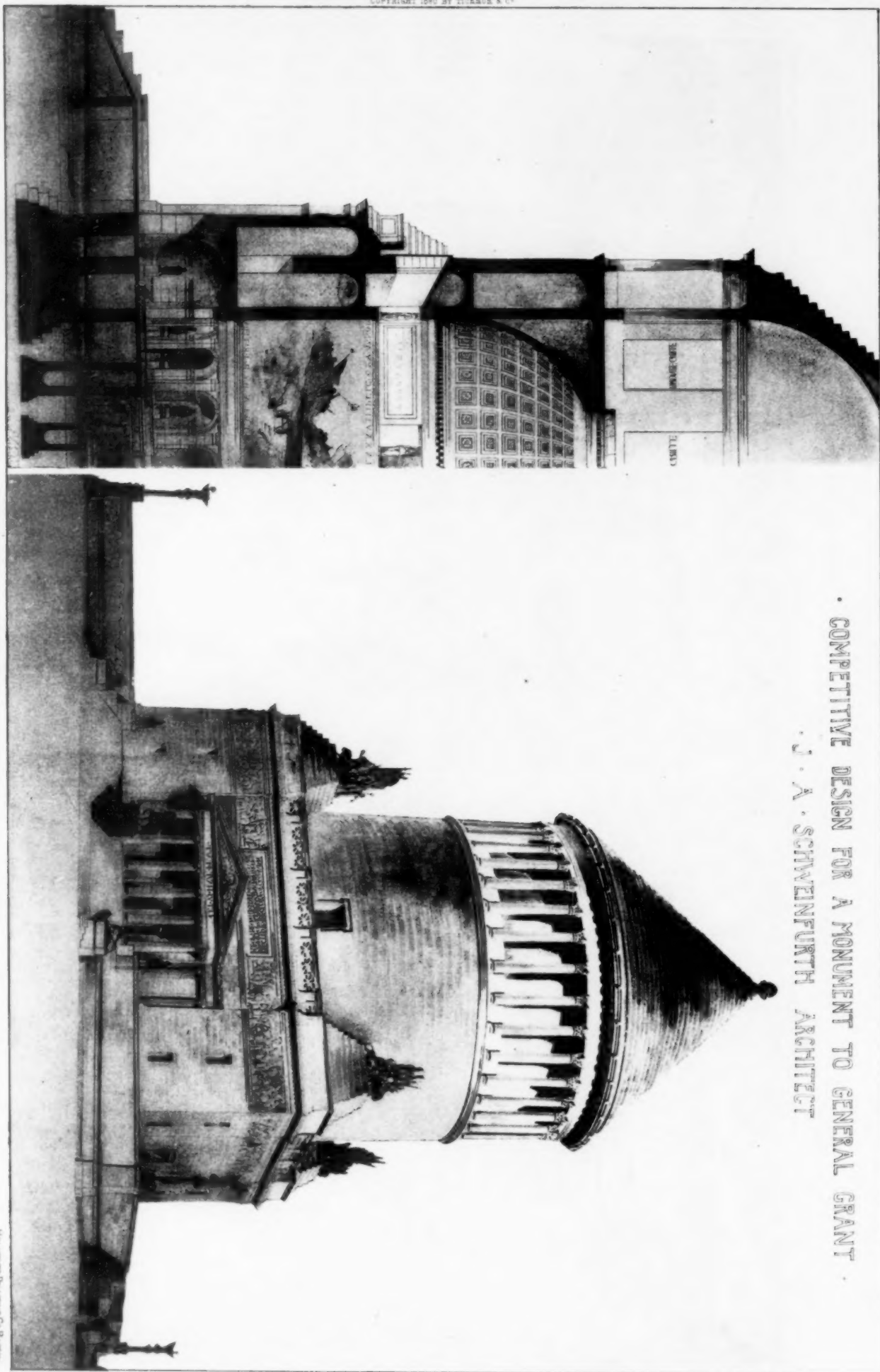
A FOREST GIANT.—Among a boom of logs at Leamy & Kyle's mill, at False Creek, Vancouver, is a tree cut into four 24-foot logs taken from one tree, which is one of the largest specimens of the Douglas fir that has ever been cut in this province, whose record for giants of the forest is world-wide. These four logs were respectively, 84 inches, 76 inches, 70 inches and 60 inches, and in none of them was there a knot or other defect. The total number of feet of lumber that can be cut out of this tree is 28,614. — *Victoria Colonist*.

THE SMALLEST CHURCH IN ENGLAND.—While in England, Rev. Dr. Lyman Abbot visited the smallest church in England, at Nast Dale Head. And the parson's wife gave him some facts about the church which Dr. Abbot labels "important if true," such as that the age of the church is unknown; that its endowment fund is two shillings and a bottle of wine and a loaf of bread for the communion, which carries back the age of the church, she opines, to the year 1000 at least; that the entire population of the parish is fifty-two, men, women and children, and the average attendance fifty-two; that the vicar's wife is organist and bell-ringer, and sweeps and dusts and performs in general all the Levitical functions of the temple, which is 42 x 16 feet in size; that the vicar's salary—stipend, they call it—is £65 (\$325), paid out of the missionary funds of the Established Church; that the previous vicars have been drinking men and no honor to their cloth; and that the total contributions of the worshippers in the parish amounted, for the three years of the present vicar's charge, to less than two shillings. — *N. Y. Tribune*.

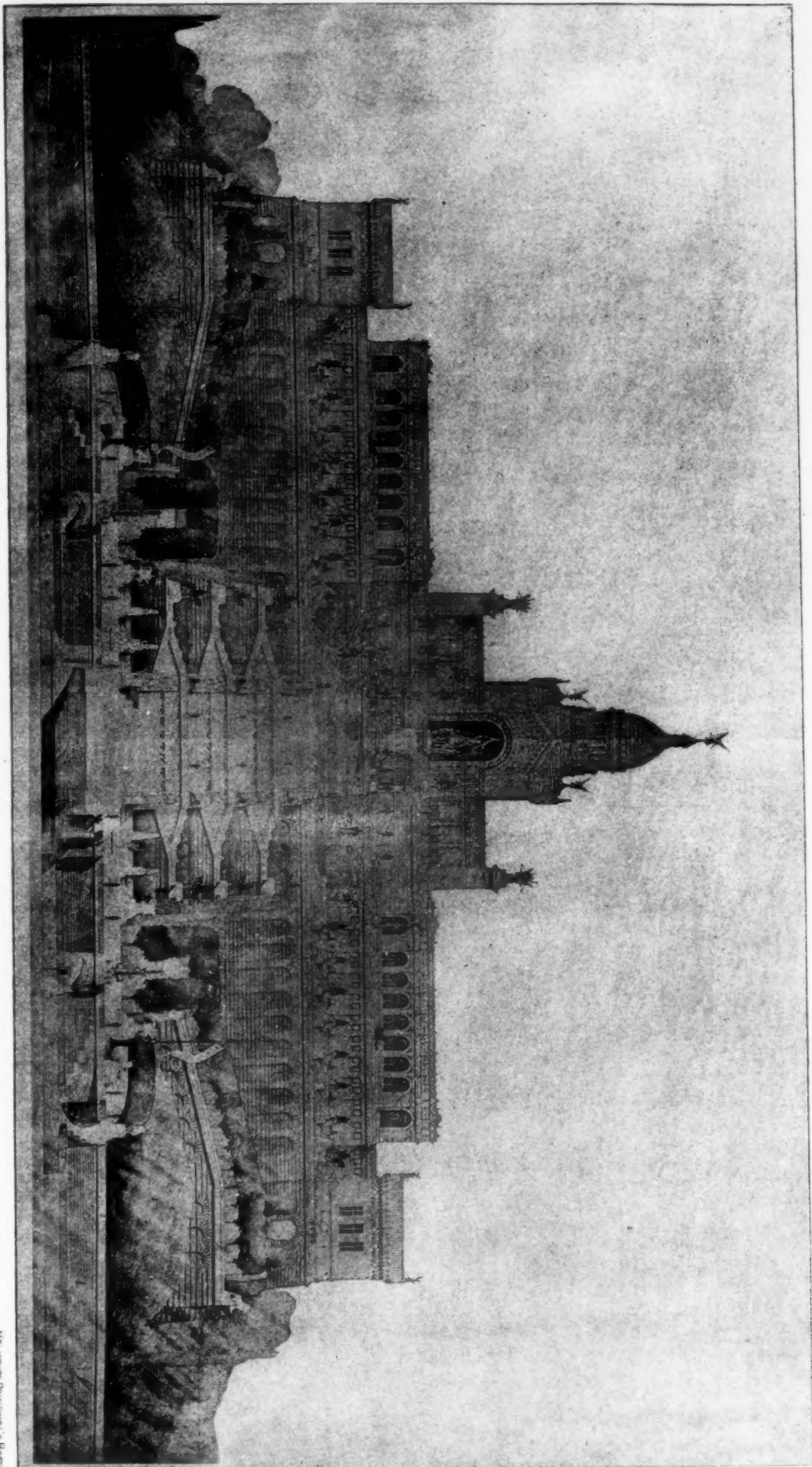
MEDIAEVAL FONTS.—As a general rule the style, mouldings and decorations of fonts precisely correspond with the details of ecclesiastical architecture of the same period. Thus Norman fonts commonly exhibit the square form and the low, heavy appearance which mark the capitals and other features of Norman buildings. The intersecting arch and varied surface sculpture, the grotesque imagery, and the shaft and cushion capital are alike observable in both. In Early English fonts the trefoil sunken arch, the crisp foliage, the detached shafts, with characteristic bases and capitals, the deep hollow mouldings, the splays and chamfers, are all very familiar to the observer of the style. In Decorated fonts we first find the richly-crocheted canopy, the pannelled, flowing tracery, the ball-flower, the diapered ground, the exuberance of niche and sculptured foliage, and the octagonal stem with slender engaged shafts, which now serve only to ornament and not to support. In Perpendicular fonts we become conscious of sameness and repetition of device. The earlier font the freer the fancy and the more indulgent the genius of the artist. To the Norman scarcely any object of ordinary observation and contemplation came amiss—men, animals, fishes, birds, plants, agricultural operations, hunting, hawking; the saint, the bishop, the priest, the warrior, the heraldic and conventional forms of creatures living and dead were worked up with surprising ingenuity and ever-varying forms of delineation. Unquestionably the designers of Norman fonts loved to expatiate in the religious mysticism of the age; they loved, too, to embody in speaking stone the favorite legends of local saints, and probably also historical incidences. While we see here the Serpent overcome, or the Salamander, the Baptism of the Saviour and descent of the Holy Dove, the Crucifixion, the Temptation, and other Scriptural subjects, the mystic Vesica Piscis, or the entwined and fretted arms of the floriated Cross, here we find a representation, to us perhaps unintelligible because the circumstances are unknown, yet evidently descriptive of some mediaeval miracle or some mighty display of the power of the church. The fonts of the thirteenth and fourteenth centuries are varied in ingenious devices and in ornamental detail; but they contain little beyond mere architectural ornaments. The late fonts exhibit a somewhat different kind of decoration. Effigies, no longer grotesque, but saintly and life-like, of holy personages; sejant lions, Evangelistic symbols, shields, the Seven Sacraments, the instruments of the Passion, with occasionally inscriptions or initial letters, constitute the chief sources of design. The enrichment of every part, and especially of the sides, generally in quatrefoiled circles, sometimes double-feathered, and the panneling of the stem in vertical tracery, very often with angels having outspread wings in the upper part, are peculiarities usually observable in this style. So constantly indeed do these features occur, that it appears evident, either that inventive genius was declining, or the subjects of design were felt to be exhausted. Grotesque sculpture is very rare in late fonts. At Barrowby, near Grantham, the stem is pierced, and contains within three monkeys, as in a cage. — *The Architect*.

TRADE SURVEYS.

THERE is great anxiety in business circles to get at the probable outcome of the new departure involved in recent Congressional legislation. It is as yet not clear whether the outcome will be good or ill. The departure is intended to give full play and effect to the high protective theory. Foreign manufacturers, who have heretofore depended largely on American markets, are the most concerned. They would willingly endure a temporary loss of their trans-Atlantic markets, but they have been advised by their representatives here that a mighty combination of interests is at work to make the departure a permanent one. The entire movement is something of a surprise to the business world on both sides of the Atlantic. The moving power is political. A great party seeks to prolong its life. A policy adopted ten years ago of gradually approaching the lowest possible rate of duties consistent with governmental necessities has suddenly been departed from. The question practical men are asking is: Will the artificial stimulus imparted prove to be a healthy and natural one? Promoters of and investors in new manufacturing and commercial enterprises dependent for their ultimate success upon higher duties know that the entire question and the entire policy has yet to be submitted to the highest court for approval or rejection; viz, that of popular opinion, and they know that that appeal will be made in the presidential campaign of 1892. The people are not theorists on economic questions. They will take the facts which will be developed between now and that date as the basis for their decision. Recent Congressional legislation puts the whole protective principle upon trial before the people. In order to make the experiment a fair one, those who are at the helm are anxious that there shall not be any drawbacks or obstacles, especially in the way of a lame financial system, and they are now, therefore, at work endeavoring to devise some system by which stringencies and depressions may be averted. They find the public mind in accord with them on this point. The latest crop of trade indications is full of encouragement. The extraordinary demand for money is a symptom of strength rather than weakness. Nearly all the money borrowed disappears into legitimate, productive channels, and very little goes into the bolstering up of shaky or unproductive enterprises. One potent cause of depressions in years past has been the disappearance of a great deal of credit into works and into channels where returns were very remote. One of the chief elements of strength in the present situation is that almost all investments are practically immediately productive. Another element of strength is that values are steady; that speculation is injuring legitimate enterprise very little, and that land for all manner of uses is cheap; that motive power is available almost everywhere at a low and probably declining cost; that cost of transportation is practically the same per mile per ton the country over, according to class; and that new markets are springing up in numberless localities within easy reach of sources of supply. There is nothing as yet to alarm investors and promoters. Perhaps the most conserving factor is the growth of what might be generally termed "trade organization," in which is included the organization of manufacturing, mining, railway and all other producing and exchanging interests. This spirit of organization is our safety. The business of the world has had its ups and downs for decades past mainly for want of it. Descending into details, it appears that, with a few exceptions, manufacturers are increasing output. Iron and steel makers are closely studying the wants of the country, and are decreasing or increasing production so as to avoid fluctuations. A study of the price-lists of one hundred or more of the leading articles of merchandise, especially the leading articles of raw material, shows very little fluctuation. There are, of course, a few notable exceptions to the rule, but exceptionable causes have produced them. The general tendency is to uniformity and to conditions which enable careful business men to avoid disaster. In one respect the country is running into debt, but in another it is piling up assets very rapidly that will prevent the necessity of any sudden liquidation. In other words, commercial conditions are becoming more and more stable, and the element of chance in trade is being reduced to a minimum. All these favorable and converging influences are laying the foundation for unexampled future prosperity. It may take a few years to lay these deep foundations, but they are being laid by builders who, perhaps, do not see the grandeur and the extent of the work they are doing. Railroad-builders are still fighting shy of new enterprises, but there is no doubt that a great deal of new work will be undertaken next year. Recent railroad earnings are favorable. Complaints are increasing of an insufficient supply of cars, and within the past week a few leading car-builders stated they had received inquiries as to prices for work and as to ability to execute orders within stated periods. The car-building industry will be one of the most prosperous for the next twelve months, according to present indication. Other interests engaged in supplying material to railroads will also be liberally supplied with work. Manufacturers show a willingness to accept winter work at present prices. Textile manufacturers are not quite so sure as to what the next twelve months will bring them. Heavy stocks of foreign goods have to be worked off. The carpet-men's agreement may not hold. The hosiery manufacturers do not feel sure that the new law will work to their advantage very soon. The Southern cotton-goods manufacturers are all making full time and satisfactory dividends. The miners of coal in all sections of the country are reporting the full increased fall demand. The production of coke has reached the highest limits in the history of its manufacture. The construction of new ovens is being hurried forward in all fields where coking coal can be found. Since the first of September, an unusually active demand has been maintained for all manner of equipments going into shops, large and small. The region of country west of the Mississippi River is developing in shop-capacity according to its population faster even than the South. The leading machinery-makers of the country have more orders and more work for shop machinery and equipment for erection west of the Mississippi River than they ever have had. The latest advices from leading architects in the West and Northwest confirm all that has been heretofore said concerning the prosecution of new building enterprises in nine or ten States. The lumber trade, according to the statements of its most reliable representatives, is in good shape—a result that is largely due to the spirit of organization existing, and the determination to not sacrifice stock in a struggle for business. Carriage and wagon makers have everywhere all capacity engaged. Copper-miners are making money. Enterprise is still directing its attention to the possibilities of the Southwest. All through the Gulf States new enterprises are springing up, and, if reports can be relied upon, more money is actually being expended in enterprises per month than last year. The rushing enterprise everywhere displayed is creating a demand, or, at least, making room for an increasing number of the so-called pauper labor of Europe. Immigration statistics show a marked increase of Poles, Huns, Italians and peasants from some other European countries. The connection between this fact and labor organization may not be very apparent on the surface, but the fact remains that the perheation of the spirit of labor organization throughout the working classes of the country is creating a demand, and will create a greater demand for a sort of labor that will serve as a concrete bed for our industrial system.



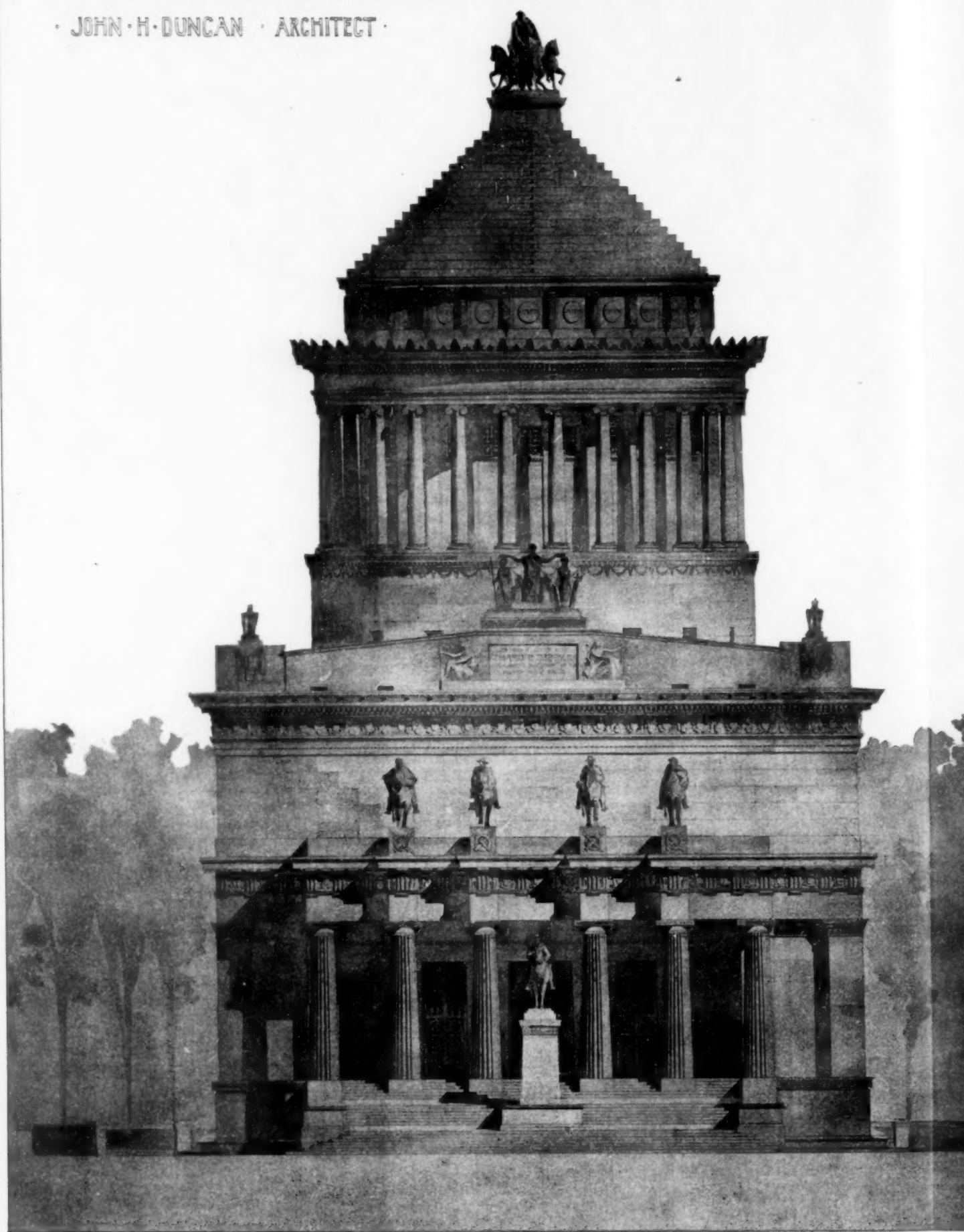
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• J. A. SCHWENFURTH ARCHT'CT •

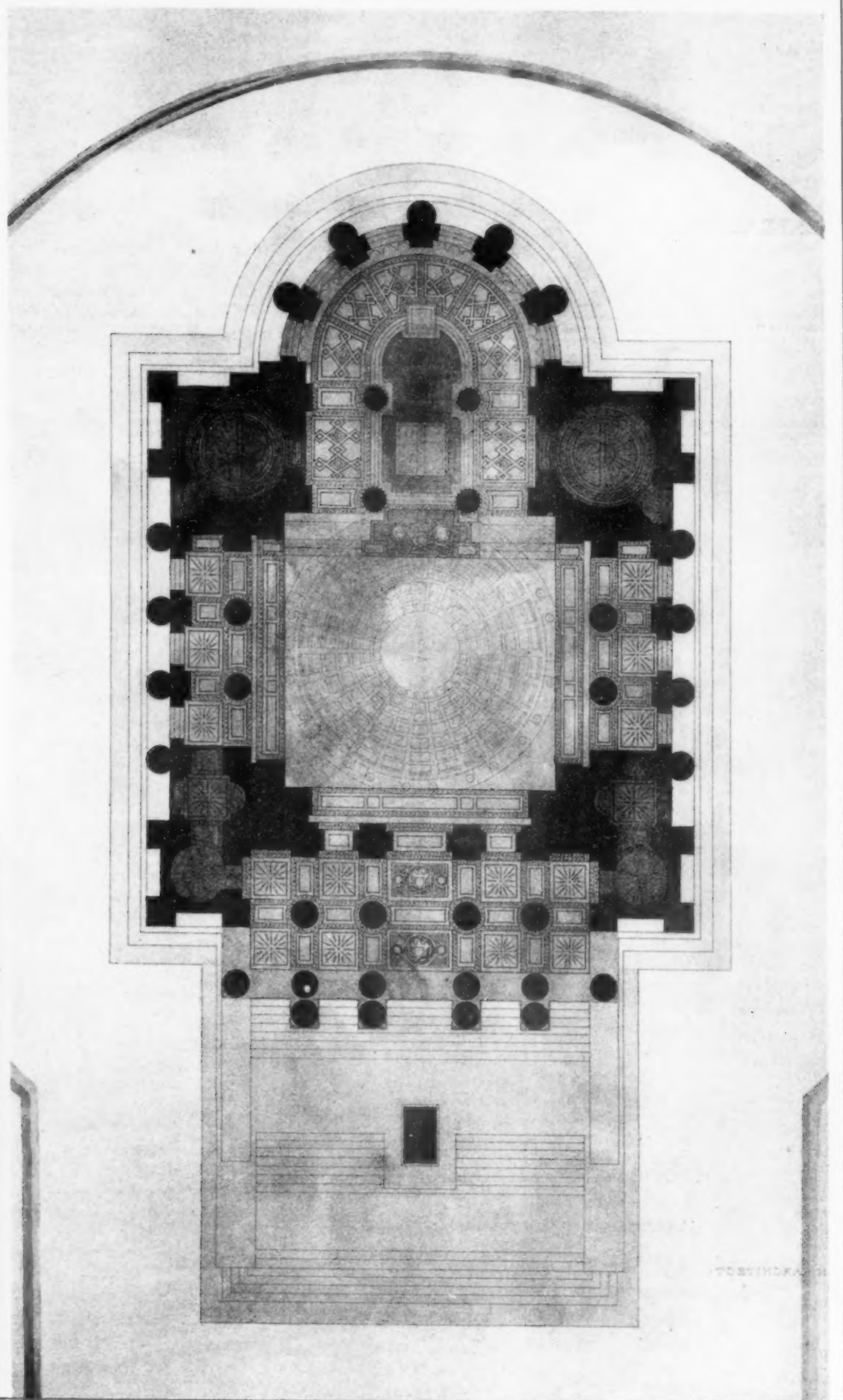


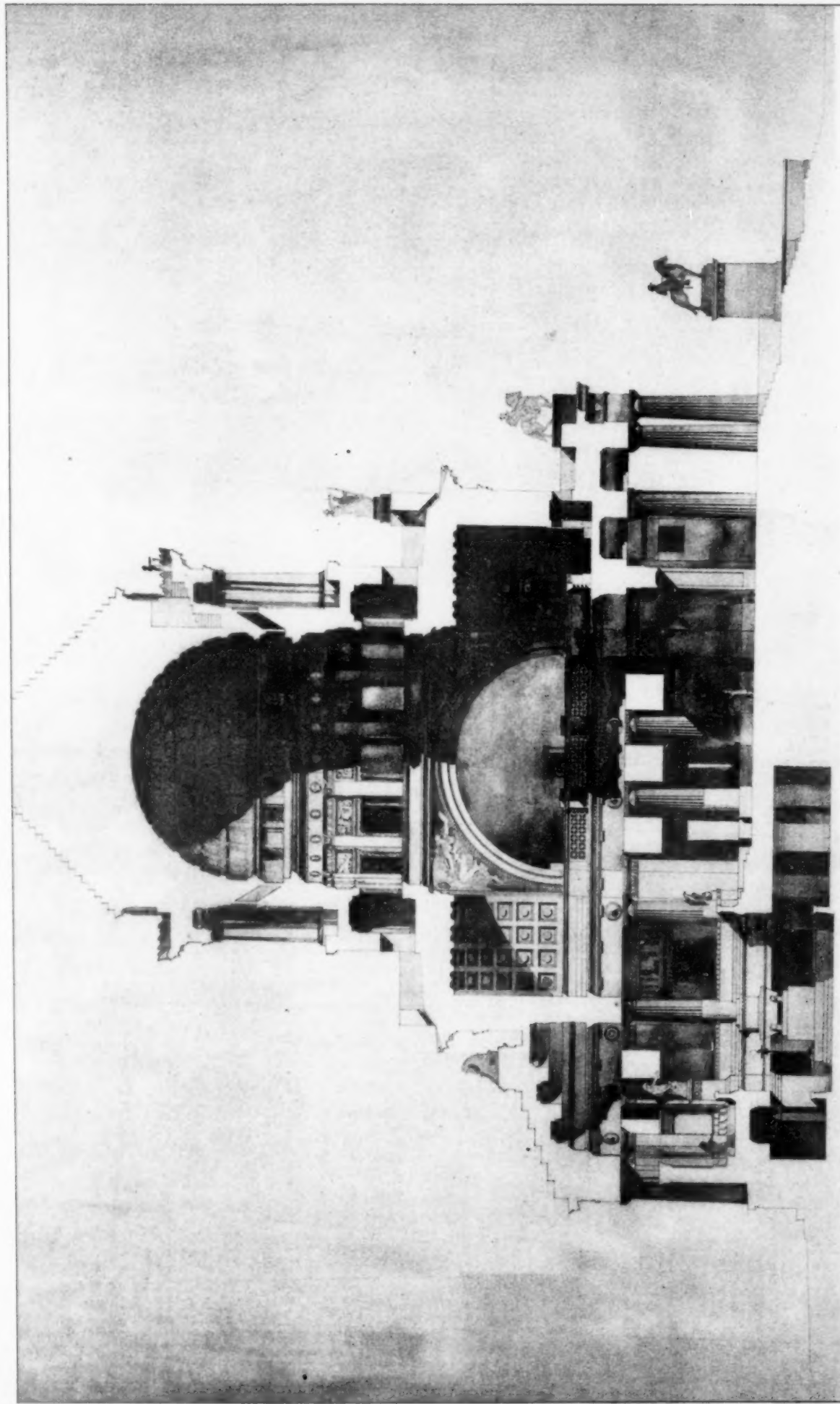
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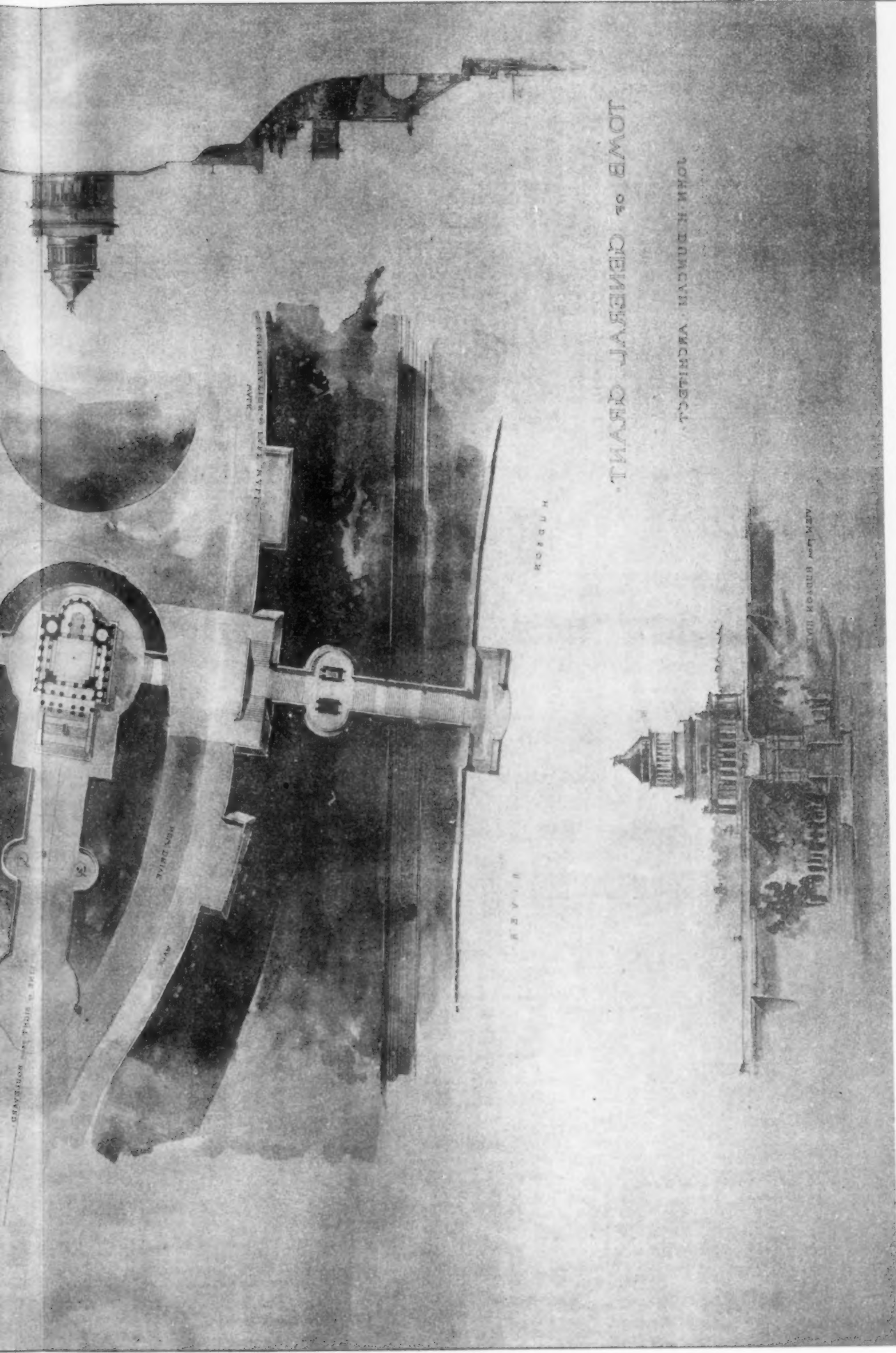
BY M. SORTAIS.

• COMPETITIVE DESIGN FOR A MONUMENT TO GENERAL GRANT •
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MONUMENT TO GENERAL GRANT.

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