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THOMAS WOOLNER, one of the most noted of English sculptors, has just died, after what must have been a short illness, as it is only a few months since he was reported as having been engaged in professional work. Woolner, according to the brief telegraphic biographies, was born in 1826, and educated at private schools. While yet a young boy, he showed so much talent as a sculptor that he was placed in the studio of William Behnes, where he remained six years, acquiring a high reputation both as a sculptor and a draughtsman. He seems to have been, besides an artist, a man of ideas, and took an active part in the establishment of the pre-Raphaelite organ known during its short life as the *Germ*. Fortunately, perhaps, for him, the opportunity which this periodical afforded for preaching in place of practice was soon taken away, and the rest of his life was devoted to active and successful artistic labor.

THE Edison Electric Illuminating Company of New York, and the New York Board of Fire Underwriters, have been engaged in a discussion which is of great importance to all persons who use incandescent electric lights. It seems that the Edison Company uses a grounded wire, for the purpose, as its officers claim, of providing a sort of safety-valve, to diminish the risk of fire. The Board of Fire Underwriters, or rather, we suppose, its electrical superintendent, Mr. Anderson, has come to the conclusion that the grounding of the wire increases the risk of fire, instead of diminishing it, and proposes to act on its belief. The first step was taken when various persons proposed to illuminate their houses or stores, on "Columbus Day," with Edison incandescent lamps. On the announcement of this plan, the Board of Underwriters served notice on the persons intending to illuminate their premises, that in no case would permission be given for the electric illumination of buildings by the Edison system, or any other in which a grounded wire was used. Moreover, although no formal notice has been given, it is reported that the Board intends to cancel policies of insurance on buildings and their contents where any system of electric lighting not approved by the Board is used; and, as the Edison system appears not to be approved by the Board, the inference which most people engaged in building operations would draw is that policies on buildings lighted by the Edison system would be cancelled. As the Edison Company has spent millions in extending its system through New York, and the property-owners have spent millions more in wiring their buildings, and providing fixtures, the step proposed would be a very serious one. It is quite possible that the whole affair may be a stock-jobbing scheme to depress the price of shares in the Edison Company; but, if it is more than this, it seems only fair that some attention should be paid to the claim of the Edison Company, that the question of danger should be determined by public tests in the presence of experts, before destroying the property of so many people by an action based upon the opinion, as it seems, of a single individual, who might be mistaken, or, perhaps unconsciously influenced by the machinations of persons interested in rival companies.

THE beautiful building of the American Fine Arts Society, at No. 215 West Fifty-seventh Street, New York, was informally opened last week to the Architectural League and its friends, on the occasion of the delivery of its quarters in the building to the League. The Art Students' League has already taken possession of its rooms, and holds regular classes there; and the other societies which are to share the building will soon be at home there. The Fine Arts Society, and the various associations which compose it, are to be congratulated on the approaching completion of their new habitation. From the first, the ideas which led to the formation of the Society, and have directed its work, have been most happy ones, and we may feel sure that the closer contact of the energetic associations of artists which will find a congenial home in the building will have an important influence on the development of American art.

IT will be remembered that we predicted, at the time of the Buffalo strike, that next year, the year of the Chicago Exposition, would be utilized by the professional mischief-makers for carrying out a vast scheme of plunder, assisted, very probably, by murder, the first step in which would be to seize the principal railroads of the country, switch trains full of passengers off on side-tracks, and leave them standing in the woods, unless, indeed, it should be necessary to "make a demonstration" by pitching them down an embankment, and, in general, to stop all transportation until the demands of the "labor" brigands were satisfied. It seems now, according to a Washington dispatch to the *Evening Post*, that the Government is in possession of information to the effect that the details of such a conspiracy have already been arranged among the labor tyrants, and that, as we supposed, the first attack will be made in the spring, on the great railways centering in Chicago. As the experience of last summer has shown that nothing but force will restrain the lawless audacity of the men who act as the tools of the crafty leaders, we trust that the force necessary to protect the lives and property of citizens will be provided. The warning is given long enough beforehand to enable the State and General Goverments to arm and equip all the men required for the purpose; and, even if a squad of soldiers should accompany every passenger train entering or leaving Chicago between May and November of next year, it would be far better for the States and the Republic to provide them than to submit again to the insolent defiance of the law which last year stained the road-bed of the Buffalo railways with the blood of innocent victims, and destroyed, out of pure wantonness, immense amounts of property belonging to persons who could ill afford to lose it. So far as we have heard, no trace has been found of the enthusiasts who have, within the past few years, been throwing passenger trains over embankments "in the interest of organized labor"; and, if we might offer a suggestion, it would be that, if immediate search could be made for these gentlemen, and their carcasses could be hung in chains, before the opening of the spring travel, from the telegraph poles along the lines of railway which have been the scene of their activity, the security and comfort of passengers using the roads during the season would be very much promoted.

THE London architects are suffering, in much the same way as those here, from the multiplicity of local sanitary regulations, often antiquated, or otherwise objectionable, to which they are compelled, against their own judgment, to conform, in practising in the towns. In this country, each large city has its own plumbing law, which is, as a rule, good, and is modified from time to time to conform to the progress of sanitary science; but the smaller towns are more commonly equipped with sanitary codes constructed by the local tinman, with the aid of a doctor, and, perhaps, a livery-stable keeper or an undertaker. Of the three, the tinman is probably the only one who has ever seen any plumbing done, or is familiar with any sanitary appliances beyond a kitchen sink, with a waste-pipe emptying through the wall on the "compost-heap," and even his practical knowledge is likely not to extend beyond the arts of making a wiped joint and burning out a pan-closet; yet these worthies consider themselves perfectly competent to lay down rules for the construction of every kind of drainage system. How well they succeed, the architects who have been compelled, on pain of fine and imprisonment for disobedience, to "ventilate" water-closets into cold flues, to put running traps between the house-pipes and the cesspool of a private house, with the inevitable result of flooding the cellar floor with sewage when the running trap fills with grease, as it is sure to do in two or three years; or to use drain-pipes three sizes too large for their work, at double the cost of those of proper dimensions, can best testify; but architects soon learn that regulations devised by people who know little or nothing of the subject to which the regulations apply are more fiercely enforced than any others, and they find it prudent to keep their criticisms to themselves.

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IN London, which is still, in matters of sanitary regulation, a huge cluster of villages, each parish has its own code, and architects must take pains to conform their specifications to the laws of this or that street, just as, in this country, as soon as they leave the large towns, they must submit themselves to the caprices of a variety of suburban magnates. The consequence is that the best-informed architects are often compelled, when the work comes to be executed, to abandon a carefully studied plan of drainage, and carry out in its place an inferior and antiquated arrangement, whose sole merit lies in the fact that it conforms to the local plumbing code, adopted, perhaps, in 1875. According to the *Builder*, there are some London vestries which will not allow any house-drain less than six inches in diameter to be put in, although it has been proved for twenty years that this is large enough for a whole street; while others prohibit the use of iron drain-pipes, which, it is needless to say, are required by law in nearly every large city in the United States. As a remedy for this evil, which, as sanitary science advances, is becoming serious, the *Builder* proposes that the different London vestries should unite on a uniform sanitary code, thinking that those which have some knowledge of sanitation, or have consulted some one who has, might, by a system of averaging, sensibly raise the standard of the regulations throughout the city. Unfortunately for the prospects of the success of such a scheme, there is no privilege so dear to ordinary men, and, particularly, to ordinary men in office, as that of regulating matters which they do not understand; and the intrusion of an expert into their deliberations, or even the suggestion that an expert should be consulted, is usually resented with fury; so that there is no probability that the London parish officials will ever, by themselves, unite on a code. With us, while jealousy of professional men, and of each other, is as characteristic of village Boards as in England, it is easier to find a central authority which can control them against their will, and it might be practicable, and would certainly be very useful, to have a general sanitary code, prepared by the State Board of Health, substituted, by legislative enactment, for the present village codes, leaving to the local boards of health only the responsibility of seeing that the general law was complied with.

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A CORRESPONDENT asked us, two or three weeks ago, for further information in regard to the German patented wood-concrete, xylolith. We have been unable to obtain the information desired. According to the German papers, the material has been patented in this country, and is to be introduced here by agents; but, so far as we can learn, no agent has yet presented it to the attention of architects, who would naturally be the first to be interested in it. Although the manufacture is protected by patents, and is to some extent secret, we presume that the material is a mixture of wood-fibre, or sawdust, with shellac, silicate of soda, and probably Portland cement and other substances.

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THE enterprising Egyptian who discovered the undoubted mummy of Cleopatra, just in time to offer it, for a round price, to the Directors of the Chicago Exposition, has been outdone by another individual, who proposes to furnish the remains of Christopher Columbus as "security" for a loan of one hundred thousand dollars, the time for repayment of which is left indefinite. The proposer of this transaction is said to be no less a personage than the President of San Domingo, and, in the ordinary mind, this circumstance excites an inquiry how he became possessed of the "remains" which he proposes to hypothecate. It is true that the body of Columbus once reposed in the Cathedral of San Domingo, but it was removed nearly a hundred years ago, in great state, to the Cathedral of Havana; and, even if it is customary for the Presidents of San Domingo to go rummaging about the cathedrals of their own country for the purpose of finding salable corpses, they certainly have no facilities afforded them for doing the same thing in Havana. As the United States officials to whom the proposition is said to have been made have no appropriation available for loans secured by pledge of personal property, however interesting the property may be, the negotiation with them seems likely to lapse; and perhaps the respected President of San Domingo may find it more prudent, in view of the limited duration of the season in which there will be a market for his treasure, to offer it in fee simple at public auction in Chicago. If he could be induced to do this, the Cleopatra man would probably join in the sale, and there might be other stock of the same kind to be disposed of. In fact, if a grand trade-sale, so to speak, of distinguished remains could be arranged as a feature of the Exposition, we are sure that it would be a highly attractive one. Madame Tussaud's collection would sink into insignificance beside the crowds of authentic corpses of demigods and heroes, ancient and modern, which the announcement would call together, and the somewhat retrospective character of the celebration of which the Exposition forms a part ought to increase materially the demand of the visitors for relics.

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THE question of the property of an architect in his designs was discussed at the recent Congress of French architects, and, with it, his right to sign his works. That he has such a right, all architects seem to agree, but, as to the practice of affixing such a signature, not much information could be obtained. It seems, however, to be the case in all countries that a few architects like to put their names or monograms on their buildings, and that no one objects to their doing so. In Sweden, there is a curious law, dating from 1786, which requires that, wherever work is done, either in building or altering a church, the new work shall have an inscription, giving the date, and the name of the king in whose reign the undertaking is carried out. Another Swedish law provides that all inscriptions on public buildings, monuments, statues, obelisks and medals shall be approved by the Academy of Antiquities; but this has not prevented the Swedish architect who communicated these facts to the Congress from signing his works with his own name. In this country, it is not unusual for public buildings to be furnished with tablets, giving the name of the architect, with those of the members of the building committee, or other functionaries concerned with the erection of the structure; but, except in this way, architects rarely sign their works. Mr. Jacob Wrey Mould used to sign his churches with his monogram, wrought into a pretty finial, or panel ornament; but we hardly know of any other architects' signatures in New York. This is certainly to be regretted. Any work that is worthy of its designer deserves to be signed by him, and gains in value by bearing his signature. No one would say that the signature of the artist to a picture was anything but an addition to its value; and most people are as much interested to know the name of the author of a building as of a picture.

## LOMBARD ARCHITECTURE.[1] — VI.

SAN ABBONDIO (Figs. 40, 41, 42), of the eleventh century, is a five-aisled basilica subdivided by arches borne on columns; it is covered with wood and enclosed at the extremities of the lateral aisles by a straight wall containing the apses. The choir, which is a prolongation of the nave, is vaulted. There is no transept. Two campaniles rise symmetrically at the entrance of the choir, at the ends of the side-aisles. A two-storied porch was applied to the portal; the ground floor opened in arches; the upper story communicated with an inner tribune, above the entrance in the first bay of the nave.[2]

The ressaults of the rampants of the façade, which is modelled on the division into aisles, the depth of the choir, the incorporation of the campaniles with the edifice, the enormous

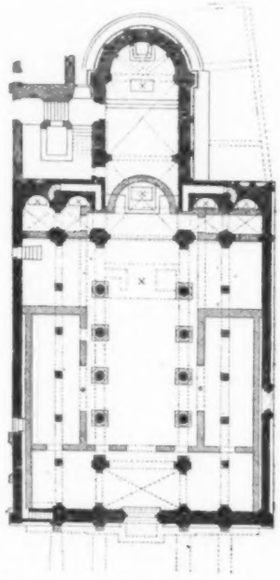

Fig. 40. Plan of San Abbondio, Como.

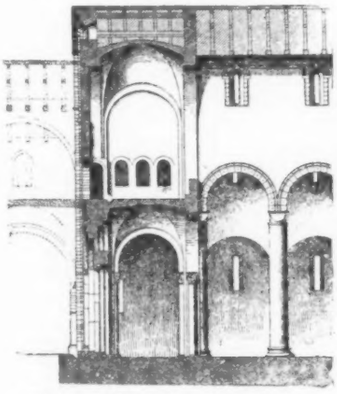

Fig. 41. Section of San Abbondio, Como.

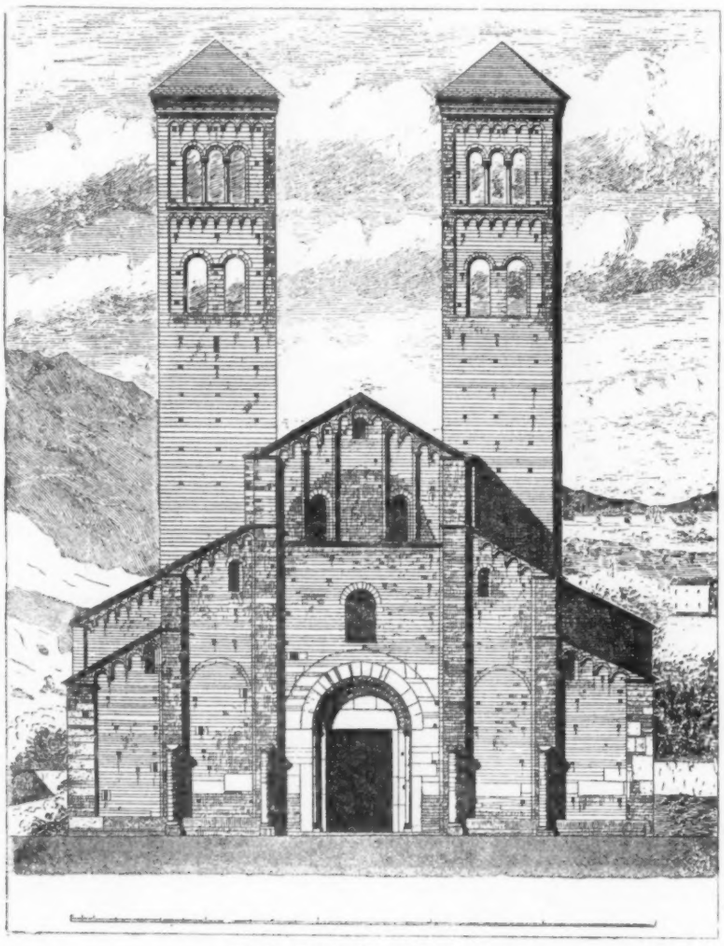

Fig. 42. Façade of San Abbondio, Como.

bases and the big cubical capitals of the columns in the nave, the two-storied porch and the interior tribune show, either in themselves or in their manner, the effects of German or Burgundian influence. The result is a pronouncedly mixed character, which adds much to the unusual interest which the edifice possesses on account of the originality of its composition and the remains of a primitive basilica (that of the Holy Apostles) discovered beneath its pavement. The most notable foreign feature is certainly the close union of the bell towers to the church, and their position at the entrance of the choir. This disposition comes wholly from non-Italian sources.

More original and more curious than San Abbondio is San Fidele, a twelfth-century church, the plan and section of which are given in Figures 43 and 44. The transept is especially remarkable. Each arm terminates in a demi-octagon and is encircled by a two-storied gallery prolonging the side-aisles. Let one fancy the central dome on a square plan suppressed, let him join together the half-octagons of the arms and the galleries around them, and he will have an edifice in the form of a rotunda, the characteristic feature of which will be a structural conformity to the type presented by the most ancient and the most celebrated of Rhenish churches, namely Notre Dame of Aix-la-Chapelle.

A central octagonal body; encircling galleries divided by transverse arches into alternately square and triangular sections, and giving the outer wall the form of a sixteen-sided polygon; pillars with four buttresses, the projections of which support the arches of the *pourtour* of the central octagon and the transverse arches of the side-aisles; in the upper gallery, rampant vaults bearing the roof directly; such are the essential dispositions, common to San Fidele of Como and the Palatine chapel of Charlemagne. The resemblance between these two edifices is so marked that there must have been a direct imitation of the Rhenish rotunda in the Como church. And, as Notre Dame is derived directly from San Vitale at Ravenna, it becomes evident that it is an edifice of the north of Gaul which, by a singular combination of circumstances, forms the connecting link between two Italian monuments, the Byzantine San Vitale and the Lombard San Fidele, built six centuries apart.

But if we find the Como church copied after a monument from beyond the Alps, the imitation is only partial. In other respects, San Fidele belongs wholly to Lombard art. No-

[1] From the French of F. Dedartein, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 877, page 38.

[2] See Bolto, "*La chiesa di Sant' Abondio e la basilica di sotto*," Milan, 1868.

where else in Northern Italy can we see more unmistakable evidence of the determination not to admit the encircling galleries about the tribune. At San Fidele these galleries run around the arms of the transept, consequently, nothing

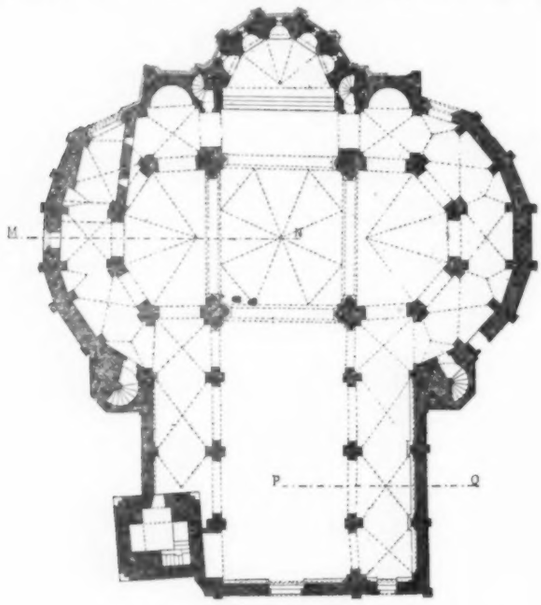


Fig. 43. Plan of S. Fidele, Como.

would have been more natural than to continue them around the tribune, especially since the tribune and the arms are all polygonal.[1] Thus would have been reproduced the fine disposition of Santa Maria im Capitol, at Cologne, an older monument than the Como church, which must have been well known to builders as familiar as were the authors of San Fidele with Notre Dame of Aix-la-Chapelle. But in order to adopt this arrangement it would have been necessary to swerve from a widespread custom in the valley of the Po, and this they were unwilling to do.

The great Church of San Giacomo, another Como monument of the twelfth century, a portion of whose nave — that indicated on the plan (Fig. 45) by wider spaced hatchings — is at present destroyed, shows very significant marks in the porch of a foreign influence. This porch, which is now mutilated and dilapidated, comprised two towers, between which opened three arches on columns beneath a larger arch, of the same width as the nave. It has nothing of the Lombard or the Italian about it. For kindred constructions we must cross the Alps, and travel to Burgundy and Alsace, where the porches of the Cathedral of Autun and of the abbey-church of Marmoutiers are very much like the one in question. It will, moreover, be observed that the plan of San Giacomo, which is the largest of the Como churches belonging to early mediæval times, is remarkably well arranged. As at San Abbondio and San Fidele, the secondary apses are set in the thickness of a right wall. They do not appear outside and are in reality large niches. This disposition is common in the province.

Other Como monuments are open to similar remarks. We will content ourselves with citing in addition to those already given, the cloister of Piona, at the northern end of the lake, opposite Gravedona. This little edifice, constructed in the middle of the thirteenth century, of white, black and red marbles, deserves especial notice on account of the character of its sculpture. The capitals (Fig. 46) and bases belong to the pure Pointed style of tramontane countries. The profile of the mouldings, the form and execution of the foliage, everything proclaims that the author was not an Italian, or at least that he had been trained out of Italy. We might even, from the vigor of the modelling and the breadth and fulness of the vegetable ornamentation, set it down, with almost perfect certainty, as a work of the Burgundian school.

Therefore, in the thirteenth-century cloister of Piona, as in the twelfth-century churches of San Fidele and San Giacomo, and in the eleventh-century church of San Abbondio, the imprint of a foreign art is clearly distinguishable. Sometimes it is Burgundian and sometimes Rhenish, as would be most natural, considering the geographical position of Lake Como and the close relations maintained between the dwellers along its shores and the Burgundians and Germans. Consequently the fact must be recognized that the Comacini were not, during this period, initiators in matters of art. For it cannot be

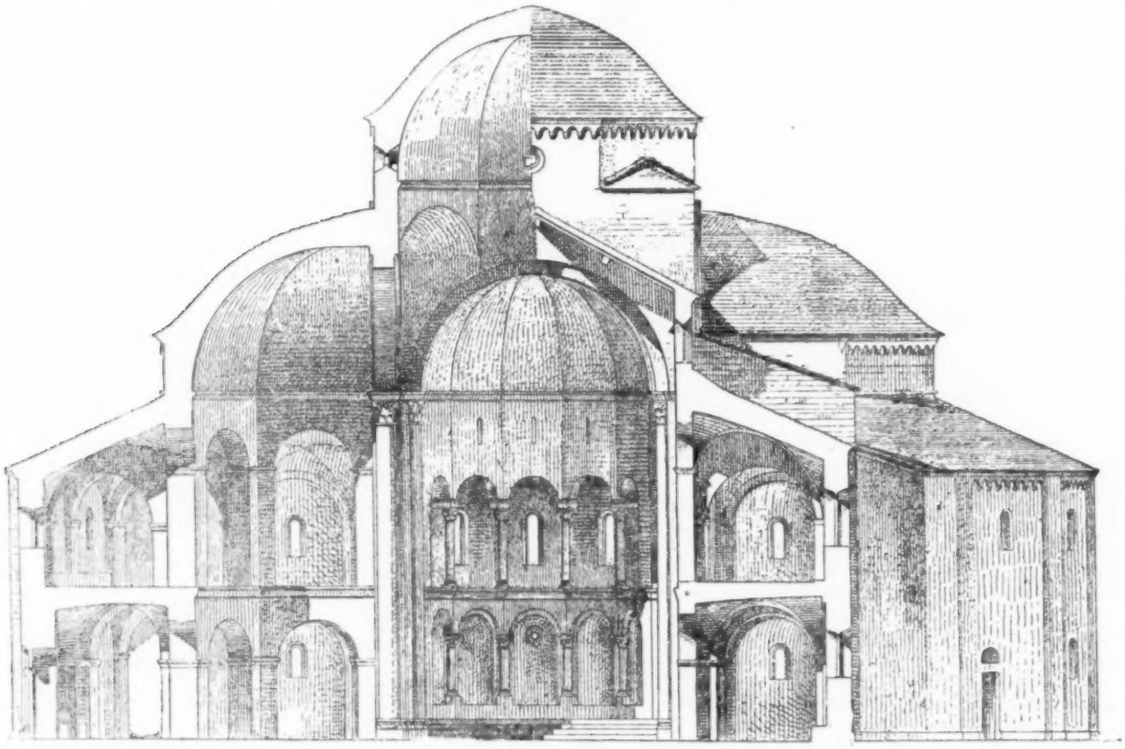

Fig. 44. Section of S. Fidele, Como.

[1] Figure 44 represents a restoration of the primitive dome and not the present very much stilted one which is of comparatively modern construction.

conceded that the architecture of the monuments reared by them at home was the common source of these different styles, instead of being derived from their union. Such a theory was in fact put forth in favor of the monuments of Romansch, Switzerland; as though art could ever find its cradle in mountainous countries which are necessarily backward in all that pertains to luxury; but no one has yet thought of applying it to the Como architecture of the Middle Ages.

The formation of this style is naturally explained by the emigrating propensities common to the Comacini. Picked artisans and excellent builders — all their provincial monuments bear witness to this — they brought to their cisalpine or transalpine neighbors energetic labor and a traditionally preserved technique of uncommon cleverness. But, on the other hand, they found in the great centres of population most favorable to their industry the abundant resources, the examples and the activity of ideas that were necessary to artistic progress; and these were lacking in their arid and mountainous country. They obtained or rather finished their artistic training abroad; and, returning home, they put into practice the lessons learned on both sides of the Alps.

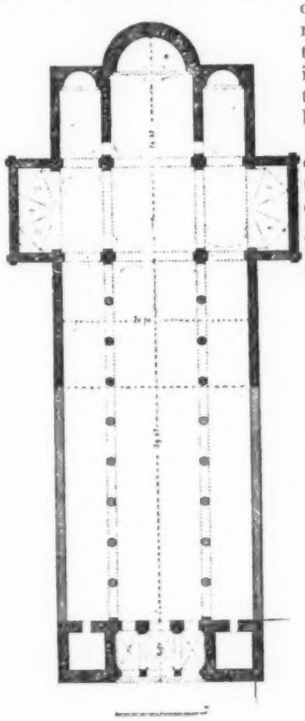

Fig. 45. Plan of S. Giacomo, Como.

By the events of the eleventh and twelfth centuries, or of the following centuries, one can doubtless judge pretty correctly of the influence which the Comacini of the time of Rothari may have exerted on the architecture of the Longobard period and on that of the ninth and tenth centuries. Paul Diacre relates, it is true, that at the time of the Longobard invasion, a Roman chief named Francion succeeded in maintaining his independence on the shores of Lake Como, but that later he was attacked by King Authari on an island of Lake Como, which he had made his fortress, and was forced to surrender, although he obtained honorable capitulation. From this fact it has been argued that the companions of Francion, who were also well treated, remained free, that they continued to live around Lake Como and that, having devoted themselves, in imitation of the other inhabitants, to the building arts, they acquired a powerful influence throughout the entire kingdom, on account of their superior culture and the freedom gratuitously bestowed upon them. This is certainly not impossible; but it does not suffice that a thing should be possible to have it accepted as a fact. We must be able to produce in its favor some grain of proof, but this is totally wanting here. The part attributed to Francion's companions belongs to romance and not to history.

Fig. 46. Capital from the Cloister of Piona.

The question of the Comacini is, however, of only secondary interest to the student of Lombard architecture. As we have seen, it was established in the ninth century, in central Lombardy, as a result of a combination of circumstances peculiarly favorable to the formation of a new style. Circumstances as propitious did not then exist in the other countries of western Europe; to this fact is due the priority over the other forms of Romanesque-Byzantine art. These developed in time as local conditions dictated, here in the tenth century, there in the eleventh or twelfth.

The principal vaulted churches of central Lombardy exhibit very clearly defined architectural characteristics and at the same time a remarkable unity of expression. The tribune, transept and naves, are well knit together, distributed as they are about the dome; the latter serves as a bond to them and as it surmounts the altar, it forms a vast baldachino. The barrel-vaults of the *chevet* arms and the groined vaults of the aisles are well adapted to their respective supports which are continuous in the *chevet* and isolated in the naves; they are likewise suited to the lighting requirements, which differ for simple parts, such as the arms, and a triple body like the aisles.

The ribs of the vaults, the cordons of the pillars and the exterior buttresses mark a visible framework, logically co-ordinated throughout. They constitute the essential element of the decoration which is dependent first of all upon the complete and detailed expression of the structure. The ornamentation is mainly sculptural; it covers in the interior, the sides of the capitals, and externally, the splays of the doors. A very good disposition for the crownings has been obtained by the use of arcades of divers dimensions and of varying depths, sometimes supported on consoles or mural bands and sometimes on colonnettes. These have been fitly employed and without exaggeration. Decoration by means of small arches was, moreover, perfectly adapted to the nature of the material in common use, namely, brick. In fact, it has its *raison d'être* and its origin evidently in the employment of small materials, and it was by extension that it was later introduced into freestone constructions.

Thus, Lombard architecture everywhere exhibits in its edifices, in their external cornices as in their vaults and pillars, a careful adaptation of forms to the necessities of the structure and to functional requirements. Its fundamental principle — the principle of mediæval art — a detailed expression of the construction, is found fully and logically applied; it has not even been disregarded for any decorative purposes. These are qualities of an original art and of a primitive architecture; they do not occur in like degree in a copied style, for imitation is almost impossible without more or less alteration in the significance of the forms.

Among the causes which contributed to the early development of Lombard art, we must count the superiority which Italy maintained in the building industries. The skill of the artists rendered the interference of the clergy superfluous; the latter, in fact, were not bidden to hold the compass and handle the chisel, and they assumed these prerogatives only when necessity demanded. The Romanesque-Byzantine art of Lombardy was, therefore, essentially popular; hence it could not but gain in independence and spontaneity.

The fact that this style antedated its congeners does not necessarily imply its intervention in their formation. There is no doubt that its productions exercised some influence beyond the Alps. This influence is marked in the Rhenish churches; it appears also in the French Romanesque. But the effects of diversity of local circumstances, bearing on the nature of materials, the ordinary processes of construction, the training of the artisans, and the character of existing monuments, were in general preponderant. It does not appear, in short, that the Lombard Romanesque types affected tramontane architecture at the start to a greater extent than the French or German Romanesque by degrees influenced the Cisalpine.

It was not an easy thing in the early Middle Ages, and especially before the year 1000, to copy a distant monument. Even with exceptional resources, the attempts were but imperfectly successful, as may be proved by comparing the rotunda of Aix-la-Chapelle with San Vitale at Ravenna. The want of correctness in the drawings and measurements, and the irregularities of forms, which are exceedingly marked in nearly all edifices antedating the twelfth century, show that the architects of the day designed but little and roughly. This difficulty of reproducing distant monuments accounts in part for the fact that the Romanesque-Byzantine art comprised such a large number of local schools.

Like every other style it was in time modified. Dispositions, constructional methods, processes of execution and sculptural characteristics all made gradual progress. The narrowing of the bays and the doubling of the large pillars effected in the twelfth century by the substitution of oblong for square sections in the nave, resulted in giving the edifices a more slender appearance. This was a considerable step in advance along

the path followed by mediæval art. All that remained to be done in order to reach the goal, was to boldly develop the organs of the edifice supporting the principal vaults, make the buttresses higher and more prominent, and transform the rampant walls into flying-buttresses.

However, it was not in Italy, but beyond the Alps, that these final perfectings, the germs of which lay in the Lombard style, were accomplished. Lombardy felt only the reflex effect from them. Here the use of metallic ties, which had come down from the first period of the Middle Ages, did away with the necessity of having recourse to flying-buttresses and to very prominent counterforts for buttressing the main vaults. The employment of the ties together with light vaults protected by a timber roof, made it possible in later mediæval times to erect churches with spacious bays, simple in structure as in disposition and broad of aspect, wherein a Roman revival can be detected in the *ensemble* forms, in anticipation of a more complete Renaissance.

Does this imply that a technical process determined the return to Roman traditions? Such a conclusion would apparently confound the effect with the cause. Art was sufficiently advanced, at the end of the twelfth century, to appropriate executional means with considerable flexibility in the search after an ideal. Simplicity and grandeur were aimed at; and the metallic tie was one of the available resources in the accomplishment of this object.

Moreover Lombard architecture remained faithful in many respects — in the disposition of the churches and of their dependencies — to the lead of primitive Christian art. Italy, owing to its artistic past, was more closely bound to Roman tradition than France or Germany. The northern district where the Lombard style had developed through the action of the Byzantine and through the effects of the Longobard conquest, was restricted to territories where Roman influence was dormant. It was perfectly natural that the Romanesque-Byzantine architecture should spring up in this region, which was the meeting point of its constituent elements; but in such a *milieu* where the primitive types were solidly established and continued to exist, architects could not follow exclusively either of them.

It is for this reason that no essential transformation was effected in the organism of edifices in Northern Italy during the late Middle Ages. The substitution of the Pointed forms for semicircular is not a radical change. The Lombard style, with slight exceptions, continued to be the definitive form of Mediæval architecture in this region; and its influence was perpetuated even to the end of the fifteenth century, as is shown by the exterior of the Certosa of Pavia and of the dome of Santa Maria della Grazie, at Milan. The French or German Gothic did not succeed in acclimating itself in Italy. The few edifices built, like the Cathedral of Milan, under the inspiration of this foreign art, exhibit a considerable alteration of the original features; the structure is more ample and more simple, the character is less stiff. There is, if not in the details of the forms, at least in the general aspect, a survival, as it were, of antique art, which links together, by these half exotic monuments the Renaissance and Roman art, across the long stretch of the Middle Ages. F. Dedartein.

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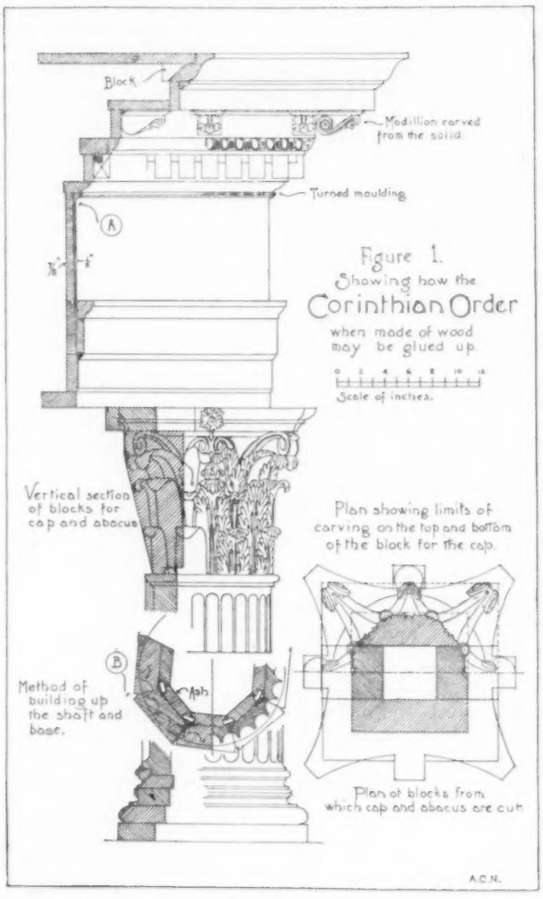
Burnt-in Photography on Glass. — It is not improbable that the art of glass-staining and decoration may be revolutionized by the invention of George G. Rockwood, the New York photographer. Transparent pictures on glass have long been made by photography, and are among the most beautiful and useful products of that really wonderful art; but in the strong light in which they necessarily are hung to develop their charm, they sooner or later fade, or cleave from the glass, and, "like the baseless fabric of a vision, leave not a track behind." For many years Mr. Rockwood has been desirous of securing pictures of this class in a permanent form, and at last has secured a pigment which can be "sensitized" and printed upon translucent or transparent glass, and burnt in. The pictures have all the softness and charm of the best style of photograph, yet are melted into the surface of the glass, and are absolutely permanent. The pictures are perfect in themselves; but when one imagines the combination of the beautiful colors imparted by skilled artists in the present art of glass decoration, the results will be invaluable. Mr. Rockwood has reproduced many classic subjects in colors for window purposes at a small fraction of the cost of hand-painting, and, of course, with photographic fidelity. Mr. Rockwood has applied for a patent both on the process and the product. — *Manufacturer and Builder.*

## INTERIOR WOODWORK.[1] — II.

### "GLUING UP."




The tendency of woods, particularly hard woods, to crack or "check" is increased when the pieces are of considerable thickness. The cracks occur in lines radiating from the heart of the log, and are due, it is said, to the resistance of the medullary rays which are not affected by seasoning, while the other parts contract as the wood drys, producing a strain which causes the radial cracks.

This might be expressed another way by saying that the heart-wood shrinks but little, while the woody fibre about it dries and contracts in proportion to its distance from the centre of the log. It is, then, obvious that the larger the section of log used, the greater proportion of sapwood, and consequently the more cracks. *Vice versa*, the smaller the section used from any log the more uniform the grain of the wood and the less the internal strains produced by seasoning. What has been said in regard to the occurrence of cracks may also be said relative to the warping or curling of woods. The greater the difference in proportion between the sap and heart wood the more the wood curves out of shape. The side of the board farthest from the heart becomes hollow, and the wider the board the deeper the hollow.

From this one would draw the conclusion that small pieces of wood should be used in preference to large where it is desirable to secure perfect work. Practice has already proved that such is the fact and a first-class cabinet-maker works accordingly. Solid blocks of wood of much size are entirely avoided, if possible, and recourse is had to "built-up," "staved-up," or "glued-up" work, as it is called. A block or plank made by gluing together in a proper manner a number of small pieces is used in place of the solid natural piece.

To the uninitiated, to say that a piece of work is glued together may sound a little as if an attempt had been made to utilize poor material, and bring to mind sundry questionable ornaments that have fallen off from his furniture; or certain mouldings that are loose. To him it may be said that there are right and wrong ways of gluing woodwork and that a good glue joint is as strong as the wood itself. It may, and often does, happen that work cannot be made from a number of small pieces; that a solid stick must be used. In such a case the workman usually bores out the centre, lengthwise, with as large a bit as practicable under the circumstances. This reduces the quantity of wood fibre and also allows a circulation of air over a greater area of surface thereby facilitating equal drying. Such is the practice with small newel-posts or carved blocks.

[1] Continued from No. 839, page 59.

When a post is of considerable size the method of building-up is employed and for purposes of illustration Figure 1, showing the Corinthian order, is given.

By examining the section of the shaft it will be seen that an octagonal post is first made by mitreing and gluing the necessary number of planks together in such a manner that the centre of the post is hollow. The joints may if thought necessary be strengthened at intervals throughout the length of the shaft by blocks glued on the inside. A column glued-up in this way can be turned and fluted as if a solid timber.

Attention is called to the position of the glue joint which it will be seen is a little to one side of the centre of the flute, and not on the arris. Practice has shown that when the joint is on the arris the thin edges necessarily resulting are likely to warp and the joint open. With the joint as shown there is no feather-edge and a firm butt-joint can be made with little possibility of its opening. With a little thought and attention as to how the column is to be lighted when in place the joints may be oftentimes arranged so as to occur in the shadow side of the flute where they will be almost invisible.

Not only is the column turned from a polygonal post made of planks glued together but, if the wood be an expensive one, the planks used are themselves glued-up with a backing of ash or some cheap wood.

The expert cabinet-maker when making a column of this kind, has a way of selecting ash that is not quite so well seasoned as the finish wood for which it forms a backing. As a result, it shrinks more than the wood on the outside of the column thus producing a slight strain which tends to close the joints more tightly. The principle of building-up is employed also in the capital and base. The base is made of octagonal rings glued one on top of the other until the correct size is obtained when it is turned into shape. The capital is so deeply carved in the example taken, that thick pieces of wood are required at the outset, but the hollow space in the centre is retained.

Four blocks joined together serve from which to cut the foliage, while four more furnish the material for the abacus. The shaft of the column, it will be noticed, is rebated into cap and base. After considering the construction of the column, notice how the entablature above is made. It seems almost as if wherever possible a joint was made; the whole being built of boards. This may appear as if the workman was endeavoring to save lumber, but a moment's thought will prove that what is saved in lumber is in most cases more than made up by the cost of labor and fitting. Yet to a certain extent there is a saving. For instance, in the frieze of the entablature under consideration, it would be extravagant to use solid mahogany, or rosewood when a veneer will do as well, and practically better. The congé at *A*, Figure 1 illustrates another saving of material. Were it cut from the same board as the frieze there would be a very large waste of lumber. But by making it a separate moulding little wood is required. Then, if it is glued to the same backing as the frieze below, a through joint is avoided. The dentils are cut from one long strip of wood and together with the blocks between them form a continuous length which is fastened in place like any moulding. The space between the dentils is simply a saw kerf the depth of the block. The cyma at the top of the cornice is cut from a thick piece of wood, moulded on the flat and stiffened at intervals of about every two feet by blocks glued to the back.

A class of work requiring especial care in its construction is that where broad flat surfaces are used either for wainscoting; or for doors without panels, or having panels of very great size. These are, of course, glued-up or they would shrink and warp to a very great degree. The safest and surest way to do such work is to build a core of some soft wood, usually white pine or chestnut, and veneer it on both sides. There are two ways of making this core and veneering it, each suited to a special purpose.

Considering the simplest first we may use for an example a door which it is desirable should be better than the common carpentry-work. The styles and rails of the pine core are made by sawing a sufficient quantity of seven-eighths clear pine board into strips as wide as the door is thick, less one-half inch. These strips are carefully glued together, face to face, until the width of the styles or rails wanted is obtained. The outer edge, that is the edge exposed to view when the door is finished, is covered with a seven-eighths strip of the finish wood, (Fig. 2.) The core thus made is covered with a veneer of hardwood one-quarter inch thick. The rails are tenoned into the styles, but attention is called to the half-inch tenon, called the haunch — the full width of the rail less the groove for the panel tongue — which is used in addition to the long tenon commonly employed. An isometric view, Figure 2, *D* makes this clear.

A hardwood strip the thickness of the panels is grooved into the inner edge of the rails and styles. Against this the panel mouldings are glued thus leaving the panel loose and free to move.

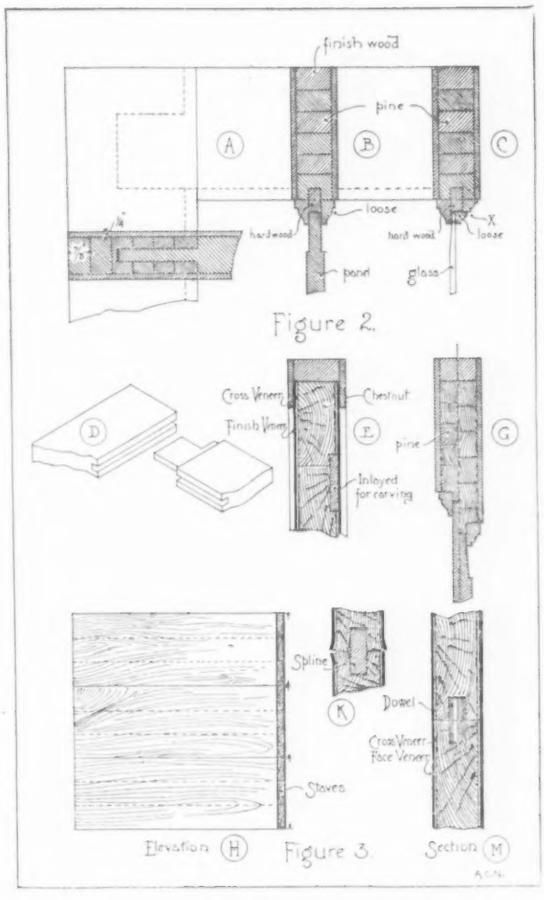
While speaking of this hardwood strip, it may be well to call the attention, particularly of draughtsmen, to one of the most common errors in drawings for doors having a glass panel. Such a section is shown correctly at *C*, Figure 2. The error generally made is that the loose moulding is made too small, not sufficiently large to cover the hardwood strip, which then shows at the joint *X*, requiring that it be made of the same wood as the finish.

*G* shows how a section through a door built-up as just mentioned might appear when glued together were one-half made by one contractor and the other half by another.

It has been described above how a door is "staved-up" and veneered with a single veneer, but no special care was necessary in placing the staves together since all were cut from the same plank and then placed flat on top of one another. There is no chance of arranging them in any other way than so that the grain is at right angles to the veneers. Had, however, a case occurred where the staves were necessarily thicker and placed on edge, as it were, more care in setting them together would be required. Such care is necessary in a wainscot, five or more feet high constructed to appear as if made of boards laid up horizontally, Figure 3, *H*.

Each of the apparent planks are made by gluing a number of pieces of pine three or four inches wide together, taking care that the grain of each is reversed. That is, the pieces are so placed that the heart-wood of every other piece is turned in the same direction. On the plank thus formed are glued four veneers, two on each side, in such a way that the grain crosses. The grain of the core and the finish veneer lie in parallel directions. The inner veneer, or cross veneer, is usually of oak.

These veneered pieces are fastened together as if they were natural planks by means of glue and dowels, Figure 3, *M*. Particular attention is called to the use of dowels instead of hardwood




strips set in grooves the whole length of the edge. The latter are detrimental to a first-class piece of work in a way illustrated by Figure 3, *K*, showing in an exaggerated form what sometimes happens. The groove for the hardwood strip leaves a thin tongue of wood on each side of the board. These tongues are liable to curl out, causing the joint to open, weakening the hold between the two boards. When dowels are used no such defect is likely to occur as the edges of the planks are not cut except at intervals where the dowels are placed, and then only by the holes large enough to receive them.

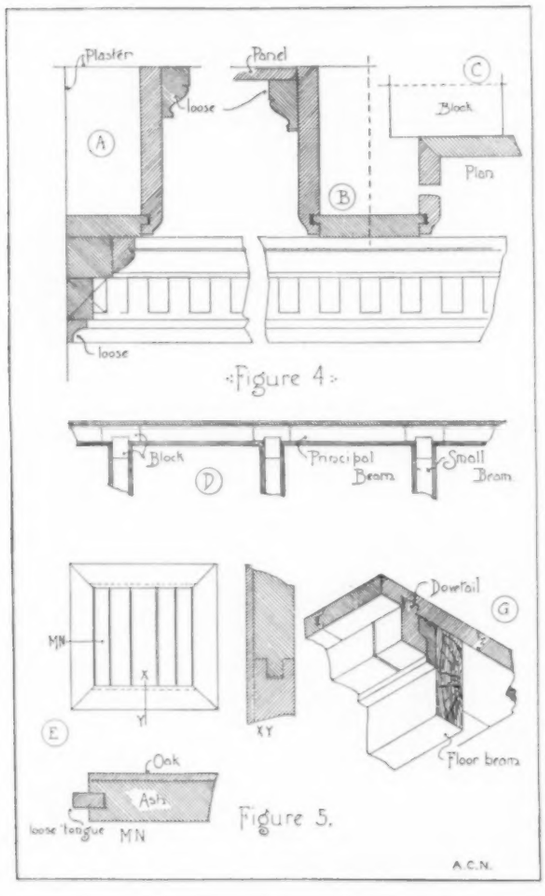
Attention has thus been called to the way a door style and a wainscot may be constructed. There is yet another class of work requiring the same care. That is, the flush door without a panel, or the door with a small rail and one large panel. The former is little more than a piece of work similar to the wainscoting just described. The latter is illustrated by Figure 2, *E*, where it will be noticed that, after all, there is no material difference from what is already familiar. The only thing new to be observed is that the rail, apparently, is but a strip glued round the edge after the door is veneered. The piece of finish wood on the edge of the door is also put in at the same time.

Doors of this kind are usually ornamented by a bit of carving below the surface. As the outside wood is a veneer only one-sixteenth thick on a body of pine, carving of this kind would necessarily

show the pine unless some means were taken to prevent, thus: the work is staved up and cross veneered in the usual way after which a block having sufficient thickness and area to receive the carving is set-in at the place to be carved. The whole is next veneered with the finish. Then when the wood is cut for carving it does not show where the tool passes through the veneer into the block below, both being the same wood. It is understood that the grain of both is parallel and the woods are identical in color.

In Figure 4 the sections of ceiling-beams, as constructed when built for ornament only and really supporting no actual weight, are represented. They are not, as they appear when finished, solid beams, but are a mere shell of thin stuff, tongued-and-grooved together. Around the room is usually placed a half beam or cornice, into which the principal beams are framed, and the smaller beams are in turn framed into the principals. The entire ceiling is often put together on the floor and raised in position against the plaster ceiling where it is fastened. As the beams are hollow some method of strengthening them at the points of junction for framing is needed. Consequently a pine block is set-in the full depth of the beam inside, and sufficiently long to have strength when mortised out to receive the end of the beam tenoned into it. The end of this latter is also strengthened by a similar block on which the tenon is cut.

The outside or show wood is mitred instead of butting where the joint is made. In addition to the blocks placed at the points where




the beams intersect, others are placed at intervals of about every two feet, thus giving stiffness to the whole structure. The moulding surrounding the panel between the beams is left loose and set after the beams are in place, whether the panel is plaster or wood. These panels, if of wood, have only to be raised in position and the loose moulding nailed in place. This is a case where the cabinet-maker uses nails. Attention is here again called to the way the dentils are made as previously described.

Flooring is not exactly a part of the cabinet-maker's work it having become a special branch of the business. Should he, however, undertake the making of a parquetry floor, the probabilities are that it would be glued-up somewhat as represented by Figure 5, *E*, showing the underside and section of one square for such a floor. A square of this kind is about twelve inches on each side and composed of a framework of ash filled-in with strips of ash grooved into it. On this is glued the finish wood, one-eighth of an inch thick, arranged in the pattern called for. A number of these squares are glued together with hardwood strips until a panel is formed as large as can be conveniently handled. These panels are afterwards similarly joined together as the floor is laid. Such nailing or fastening as is necessary is done in the groove for the strips and is entirely hidden when the floor is completed.

Another way is to fasten the flooring with screws driven directly through the panels in places where a small piece of the pattern has been purposely omitted when the squares are glued-up. When the panels are all laid these bits of the pattern are glued in place hiding the screw and it becomes impossible to tell where the floor is fastened.

Flooring should be laid of very dry material, at a time when the house is perfectly dry, and finished as soon as laid, that there may be but little chance of its absorbing moisture.

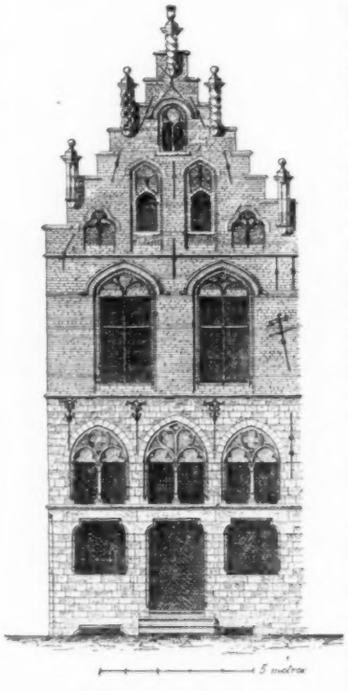
A floor perhaps not very common in this country though sometimes used, is one of solid oak plank laid without nailing. An isometric sketch of such a floor is seen in Figure 5, *G*, which almost explains itself. The planks are two or more inches thick by fourteen to eighteen inches wide. These are tongued and grooved together and fastened with glue. Each plank is dovetailed to strips at right angles to it, and these strips are in turn tongued under another strip fastened to and parallel with the floor beams. The dovetail strips are really a series of blocks, each as long as the planks are wide, set in such a way that when they are in place the ends are at the middle lines of adjoining planks. As each plank is laid it is crowded as hard as possible against the tongued pieces by means of levers, and owing to the wedge shape of the tongues the nearer the dovetail is to the beam the more closely is the plank held.

All around the edge of the floor is laid a finishing plank as a sort of border and any shrinkage that takes place shows itself there. But this can if necessary be easily replaced by a new piece entirely closing the joint when the floor has become adapted to the temperature of the building.

It is of course understood that no fastening of any kind, excepting the dovetails, are used for the flooring itself; but the border is fastened with screws or nails on the edge nearest the wainscoting.

Alvan C. Nye.

## THE QUALITIES OF WATER FOR DOMESTIC SUPPLY.[1]




The Boucherie, Ypres, Belgium.

Unfortunately no absolute criterion has been found which will always definitely determine the character of a water as good or bad. Neither can we expect, on account of the nature and complicity of the case, that such a criterion will ever be found. The determinations are all or nearly all relative and must be judged only in connection with the environments of the source of supply, the concomitant circumstances of the collection of the sample examined and the uses for which the water is intended. . . .

*Organic Matter.*— The organic impurities contained in water are the impurities which interest us most largely from a sanitary standpoint, for it is these impurities which most directly influence the health of the consumer.

This organic matter may exist, first, as organic life, second, as the products of organic life, or third, as the resulting products of decomposed organic matter. There can be no doubt but that undecomposed organic matter, if harmless in itself, may exist in small quantities in water without detrimental effects on the health of those drinking it. Decomposed organic matter when in appreciable quantities, whether of animal or vegetable origin gives rise to headache, diarrhœa and malarial fevers. The most important of the organic impurities are, however, the living organisms, which may consist of algæ, infusoria, etc., and bacteria. Algæ, etc., and allied organisms are found in all upland waters and are not, in small quantities, indicative of an impure water. When present in large quantities they give water an unpleasant odor and may originate diarrhœal complaints. They are readily filtered from the water and cannot usually exist in covered reservoirs. They need no special consideration here.

[1] Extracts from a paper read before the Illinois Society of Engineers and Surveyors by D. W. Mead, Rockford, January, 1892.

Bacteria are usually classed as saprophytic and pathogenic. The former are the more common kind which swarm in surface waters, in air and in food, and are the cause of fermentation and decay. They are supposed to be the direct cause of the diarrhœal and digestive troubles resulting from the use of water containing decaying organic matter. They have, however, not been demonstrated as producing any definite disease.

Pathogenic bacteria on the other hand have been conclusively demonstrated to be the direct cause of certain definite diseases and of that class of diseases which prove the greatest scourge to human life, namely, the zymotic diseases, such as small-pox, typhoid fever, scarlet fever, diphtheria, consumption, etc.

The greatest difference which seems to exist between saprophytic and pathogenic bacteria is that the former find their principal nidus for development in decaying organic matter, while the latter attack the living tissues of animals. Their development and general characteristics of growth are otherwise the same.

The yeast-plant (sacharomyces cerevisial) a saprophytic bacteria, is the best known of the bacteria and a description of its growth and development will serve as an illustration of its class and indirectly as an illustration of the pathogenic bacteria.

The pathogenic bacteria or disease germs, when once lodged in the human body break up the tissues into poisons or ptomaines, in a manner similar to that of the yeast-plant in the grape juice. These poisons produce in the individual the particular symptoms of its disease, just as the yeast poison or ptomain, alcohol, produces the symptoms of drunkenness by its intemperate use.

Pathogenic bacteria are not believed to grow and develop outside the animal body. They are however, known to exist for great lengths of time after leaving the body. And it is found that the condition under which saprophytic bacteria exist and develop, namely, in decaying organic matter, is, at least conducive to the existence of the disease germs. Hence, although in a particular water it may be impossible to discover or isolate a definite species of pathogenic bacteria, yet the presence of organic contamination, especially of animal origin, or of bacteria in greater numbers than should be expected in a normal water, is regarded as an important reason for its prompt rejection.

These organic poisons are so subtle and insidious as to be often unknown or unsuspected, and many a pale cheek and debilitated constitution and many desolate homes and mounds in our cemeteries might have been prevented by proper selection and protection of the sources of the water-supply, or even by the universal adoption of the simple, but most effective measure of boiling the water used for domestic purposes, unless its purity is beyond the slightest suspicion.[1]

The means at hand for the proper examination of water in order to determine its pollution in these regards may be classed as first, organic or sanitary analysis, and second, biological examination.

### ORGANIC OR SANITARY ANALYSIS.

Dr. Smart, in discussing sanitary analysis, says: "The presence of organic substances can easily be detected in most waters, for there are few which are organically pure; but there is no royal road to an estimation of the quantity nor to what is of much more importance, an appreciation of the quality. The examination must consist in instituting a series of experiments on the organic matter or the substances which accompany it in the water, and on those derived from it. These various witnesses are, as it were, interrogated, and from a consideration of their testimony an opinion is formed as to the quantity of the organic contamination, as to its origin in the animal or vegetable kingdom, as to its source, whether near or remote, in a word, as to the wholesomeness or unwholesomeness of the water which contains it."

The property of organic impurities to take up oxygen is utilized in sanitary analysis by determining the amount of oxygen that a given water will absorb. From this determination the relative amounts of organic matter contained in water may be judged. The following table will give an example of the application of this principle.

[1] The above remarks apply especially to wells sunk in populous communities, but they apply also to every surface and ground water-supply, where the proximity of dwellings or stables, swamps or forests, make the water-supply liable to receive either the organic poisons in a concentrated and virulent form, as sometimes occurs in the first two cases, or where a large amount of decaying organic matter is liable to find its way into the supply, as in the last two cases mentioned.

"A series of examinations of the water in Paris by Miquel, gave the following interesting results: The rain-water in a park just outside of the city, contained, on the average, four living bacteria to a cubic centimetre (that is, to about one-third of a teaspoonful). The rain-water in the city contained 17. The water of the Seine, just above Paris, contained 300 bacteria, while within the city, after receiving the contents of the sewers, there were 200,000 to one cubic centimetre. The river-water which had been used in floating laundries, which form such familiar features along the banks of the Seine, in Paris, was found to contain 26,000,000 living germs to one cubic centimetre.

"The river Spree, which runs through the city of Berlin, was found on one occasion to contain above the city 85,000 germs, while below it showed 10,180,000 to one centimetre. These figures show what bacterial contents of greatly polluted rivers may be.

"On the other hand, the river Rhone, at the point from which the Geneva water-supply is taken, has been found to contain only from 24 to 75 bacteria to one cubic centimetre.

"The Hudson River water above Albany was found to contain on two occasions a little over 2,000 bacteria to one centimetre.

"The Potomac River water at Washington has been found by Smith to contain, at various seasons of the year, all the way from 75 to 3,774 bacteria to a cubic centimetre.

"Unpolluted streams and lakes contain, as a rule, very much smaller numbers of germs than those which have been mentioned." (See T. Mitchell Prudden's "*Drinking-Water and Ice Supplies*," page 70.)

ALTON, ILL. (CITY WATER).

[PARTS PER 1,000,000.]

| Date, 1888. | Oxygen Consumed. | Physical Conditions. |
|---|---|---|
| July 20. | 13.12 | Muddy. |
| August 3. | 7.12 | Turbid. |
| September 13. | 6.32 | Nearly Clear. |
| September 21. | 5.92 | Clear. |
| October 19. | 3.68 | Opalescent. |
| November 2. | 4.40 | Nearly Clear. |

[Ill. State Board of Health: "*Water Supplies of Illinois*," page 30.]

From the above it will be seen how the amount of oxygen consumed varies with the physical condition on different dates, thus showing how it may be utilized in judging of the purity of a water. The following table contains further illustrations of the use of this principle.

OXYGEN CONSUMED.

[PARTS PER 1,000,000.]

| Locality. | Source of Water. | Oxygen Consumed. | Remarks. |
|---|---|---|---|
| Rockford, Ill. | Artesian Well, | 1.40 | Organically pure. |
| Virginia. | Mountain Spring, | .30 | Very pure. |
| Washington, D. C. | Deep Well, | .22 | " " |
| Bloomington, Ill. | Ground Water, | 2.72 | |
| Danville, Ill. | Small River, | 2.96 to 4.24 | |
| Aurora, Ill. | Filter Gallery, | 4.00 | |
| Cairo, Ill. | Ohio River, | 3.04 to 6.88 | |
| Cairo, Ill. | Ohio (filtered), | 2.96 | |
| Rock Island, Ill. | Mississippi River, | 4.80 to 7.20 | |
| Bridgeport, Ill. | Ill. and Mich. Canal, | 23.11 | (Average of thirty analyses.) |

Again I quote from Dr. Smart: "Where the water requires more than four parts of oxygen (per 1,000,000) for its organic matter, it may be considered bad. . . . No water has been met with containing this quantity which could not be condemned on other grounds. Where the results vary from 1.5 to 4 parts, the water is suspicious. . . .

"The evidence on which such water is guaranteed as wholesome should be very clear. A sample which requires less than 1.5 parts is a wholesome water, provided the organic matter consists of the non-nitrogenized products of vegetable life. If the nitrogen which accompanies it is small in quantity, this origin is probable. But if the nitrogen coexists in large quantities, there is probable contamination by animal matter." In the latter case the water must be condemned.

The presence of organic matter is also determined and its character and quantity estimated by the action of heat on the total solids found on evaporation. The loss of weight by heat is not in itself indicative of the presence of organic matter, as the same result might be due to loss of volatile salts. Loss of weight would indicate, however, the need of further investigation to determine the character of the volatilized matter. As an indication of the presence of organic matter, the blackening of the solid residue under the action of heat is the important phenomena, as it indicates the presence of organic carbon.

The most valuable results of organic or sanitary analysis consist of the determination of the amounts of certain resulting products of decomposed organic matter, the character of the organic matter being determined by the relative amounts of these products. The products so determined consist of albuminoid and free ammonia, organic nitrogen as nitrates or nitrites and chlorine albuminoid ammonia "represent the nitrogen which exists in organic combination, before decomposition has set in."

"The presence of a considerable amount of albuminoid ammonia with little free ammonia and chlorides, is generally indicative of vegetable organic matter." Professor Wanklyn says: "If a water yields 0.00 parts of albuminoid ammonia per million, it may be passed as organically pure, despite of much free ammonia and chlorides; and if indeed the albuminoid ammonia amounts to .02, or to less than .05 parts per million, the water belongs to the class of very pure water. When the albuminoid ammonia amounts to .05 the proportion of free ammonia becomes an element in the calculation; and I should be inclined to regard with some suspicion, a water yielding a considerable quality of free ammonia with more than .05 parts of albuminoid ammonia per million.

"Free ammonia, however, being absent, or very small, a water should not be condemned unless the albuminoid ammonia reaches something like 0.10 parts per million. Albuminoid ammonia above 0.10 per million begins to be a very suspicious sign, and over 0.15 it ought to condemn a water absolutely." These statements must not be regarded, however, as conclusive, for these results should be judged only with the results of other investigations.

*Free Ammonia.* — Free ammonia appears in a great number of waters organically pure and its presence in water is indicative of organic contamination only when the source of the water is taken into account and in the presence of other suspicious conditions. The free ammonia represents organic matter in one of the last phases of decomposition and in this way offers a rather imperfect criterion of past organic contamination.

*Nitrogen as nitrites and nitrates.* The further oxidation of the ammonia results in the conversion of its hydrogen into water and its nitrogen first into nitrous acid and then into nitric acid, this last form representing the complete oxidation or mineralization of the organic matter.

"Nitrous acid is a much more important substance than nitric as indicating present danger and a very small amount of it is sufficient

to remove a water into the suspicious class. . . . Pure water ought to be quite free from nitrites and ought to show only traces at most of nitrates — the limits being about 0.32 per million of nitric acid nitrates" ("*Parkes Hygiene*," Vol. 1, p. 101.)

"Ammonia, . . . is uniformly present when the decomposition is in progress, and as it is at the same time exceedingly evanescent, its presence is significant of dangerous proximity. Nitrous acid implies the same danger, as it is less prone to dissipation it may in some cases have come from a greater distance than the ammoniacal contamination. Nitric acid, on the contrary, indicates a certain degree of remoteness. It is a higher oxide and more stable compound than the nitrous acid; its organic origin is, therefore, more remote." (Dr. Smart, 1880, *Nat. Bd., of Health* p. 472.)

*Chlorine.* — Sodium chloride is a normal constituent of sewage, and its presence in water unless otherwise accounted for is regarded as indicative of contamination from such sources. Many deep and artesian wells, however, contain a large amount of sodium chloride in solution and almost all waters have a certain normal amount which is derived from the soil over and through which they flow. It is necessary before using the quantity of chlorine (sodium chlorine) as a measure of contamination to carefully determine the normal chlorine of a district. This is done by selecting waters at such points as may be known by careful examination to be remote from all possible sources of contamination, and determine the chlorine in such waters. This normal chlorine is not constant but will be found to vary considerably at different seasons.

From such examinations the normal amount of chlorine, which may be expected in any class of waters, and at any season can be determined and the variation from this normal amount will indicate the condition of the water under examination. It is usually regarded that the presence of more than 10 parts per 1,000,000 of chlorine, above the normal amount for a given locality and season is indicative of sewage contamination.

*Biological Examination.* — The bearing of biological examinations have been somewhat considered in connection with the general subject of organic impurities. They consist in the determination of the number and specie of the bacteria existing in the water under discussion. A limit of 300 bacteria per cubic centimetre is proposed by some observers, but it is doubtful if an examination can be considered as decisive even if the number should greatly exceed the proposed standard unless the presence of pathogenic bacteria can be demonstrated. The presence of bacteria is, however, indicative of the existence of organic matter on which they exist and the relative number is undoubtedly indicative of the amount of such organic matter contained in the water. Hence we may regard such examinations, while by no means conclusive, yet as furnishing evidence bearing on the probable purity of a water and of value in connection with other determinations.

*Samples of Water for Analysis.* In selecting samples of water for analysis great care should be taken in order that the sample selected shall represent the water free from accidental impurities, not inherent in the source of water itself. The liability of the water to vary from the sample with the various seasons should be considered, and if such variations are considerable examinations at various stages and under the varying conditions should be made; chemical and biological examinations should always be made in duplicate so that accidental results may be properly checked.

We may sum up the result of these examinations as follows: Water for domestic uses should be regarded with suspicion —

1. If being a surface water it contains much less than 2 cubic inches of oxygen gas per gallon:
2. If it absorbs more than 3 parts for upland water or 1.5 parts for other water to oxidize the organic matter contained in it.
3. If it contains more than 600 parts (35 grains per gallon) per 1,000,000 of mineral salts.
4. If it contains more than 16 degrees (Clarke's scale) of total hardness or more than 4 degrees of permanent hardness.
5. If it contains more than .1 parts per 1,000,000 of albuminoid ammonia without free ammonia and chlorine, or if it contains .05 parts of the albuminoid ammonia with the presence of much free ammonia and chlorine.
6. If even a trace of nitrites is found in the water.
7. If more than .32 parts per 1,000,000 of nitrates is found in the water.
8. If it contains more than 10 parts per 1,000,000 of chlorine above the normal amount.
9. If it contains traces of any mineral poison.
10. If it possesses a disagreeable smell or taste.
11. If its surroundings are such as to render it liable to animal organic contamination.
12. If it contains normally large amounts of vegetable matter.
13. If it contains more than 300 bacteria per cubic centimetre.
14. If it contains any pathogenic bacteria.
15. If it is normally turbid.

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The Spitzer Collection. — It is announced that the celebrated Spitzer collection is to be sold next April and May. The auction, which will be held in the hotel in which the collector lived, will be preceded by an exhibition, the proceeds of which ought to be reserved for the benefit of the future treasuries of museums. — *The Builder.*


THE DECORATION OF THE CITY FOR THE INAUGURAL CEREMONIES. — PREPARATIONS FOR THE HOUSING OF VISITORS IN 1893. — THE CHICAGO UNIVERSITY. — THE ELEVATED RAILWAYS. — CHICAGO'S SUBURBS. — THE ARCHITECTURAL WORLD'S CONGRESS IN 1893. — ACCIDENTS ON THE FAIR BUILDINGS.

THE chief interest in architectural circles this month will be the architectural convention, which will take place in this city at the same time as the Inaugural Ceremonies. Plans have been made to show especial respect to the members of the convention during the time of the dedicatory ceremonies, as representatives of a profession to which thus far the success of the enterprise owes so much. By the time of the publication of this letter Chicago will be in the full height of her excitement in connection with the ceremonies and trying with her entire energy to fitly celebrate the four hundredth anniversary of the discovery of the continent, of which it is her proud privilege to be a minute portion.

The proper decoration of the city has been a matter which has given rise to much discussion, and has necessitated considerable thought. The fear of a famine in drapery of national colors, and the almost certain prospect of a corner in them, has given rise to the advisability of choosing a municipal color, while a municipal symbol has also been suggested. Different suggestions have been made by different architects and World's Fair artists, till finally a prize of a hundred dollars was offered by one of our daily papers, the awarding of such prize to be made by a special committee, composed of artists connected with the Columbian Exposition. The successful design for the flag, shield and banner, consists of a terra-cotta ground, divided into three parts by a white band, typical of the Chicago River and the three "sides," into which this pellucid stream divides the city. The design is very pleasing and in the three forms works out equally well, but that anything white and pure should typify the Chicago River, that in fact the Chicago River should ever be typified, is, to say the least, a shock to most people. No longer believe there is "no balm in Gilead," no longer hesitate to have faith in the possibility of the existence of a white black-bird or any other apparently paradoxical thing, now that it has been proven that an artistic symbol can be suggested by this murky flood. The designer of the banner has also suggested that the pole be surmounted by a phœnix, as typical of Chicago's destruction by fire and resurrection from the ashes. This idea was also a feature of a design which received honorable mention. Mr. Walter Shirlaw, one of the committee, suggested "that it was not absolutely necessary that all flags and banners should be exactly alike in coloring. The design should be adhered to and only the two colors selected should be used, but it would be quite proper to use white ground with bands of other color. If part of the flags and banners on a building were made this way and the others *vice versa*, Mr. Roewad's idea would not be mistreated and the effect would be pleasing."

Three thousand dollars have been appropriated by the city for decorating purposes, the money to be controlled by the Commissioner of Public Works. Ten thousand dollars in three blocks of the down town-district alone has been subscribed towards the decorations and the streets promise to be gay with flags and drapery. What distinguishes these plans for decoration from previous efforts of a similar character is the artistic element which has entered into it. The committee on decoration, to begin with, is not only composed of artists, but artists of reputation like F. D. Millet and Walter Shirlaw. There has been a preconceived plan of decoration for the entire city, which will in a measure do away with the hit-or-miss manner of working, which often brought two conflicting and unpleasantly contrasted kinds of decoration side by side. The committee has furnished outlines for plans of decoration for certain classes of buildings, and suggestions will be gladly made on application. Besides this, a new step has been taken, at least for an American city of the present day, in choosing the municipal color and symbol. Of course the national colors will everywhere be prominent, but care has been taken in selecting the municipal color that it should not only harmonize with them, but in a general way with the buildings it was to decorate. Terra-cotta seems to be a happy choice, as being a tint calculated to produce harmony between the different conflicting colors. The symbol it is expected will not be used simply for this occasion, but it and the municipal color will take their place in decorations on future occasions. That this undertaking has been carried out as it has, is a very strong proof of the growing feeling and sympathy for art here in our midst, and it will be interesting to note the result of the effort in the actual decorations.

In the crowding of the streets, Chicago will have a feeble foretaste of what is coming next year. Street crowds, however, usually take care of themselves, but where the vast concourse of visitors next year are to be comfortably lodged is a question. Large rents are being offered already for small furnished houses and apartments to be used during the summer months of '93. The number of hotels

and apartment-houses for which permits have been issued in Hyde Park alone, in close proximity to the Fair, makes one feel there ought to be a few corners to put people into. Since the writing of last month's letter there has been published a partial list of the permits issued for this class of buildings in Hyde Park alone. The list is somewhat as follows, which will give some faint idea of the amount of building around the Fair grounds. Permits issued for twelve four-story flat buildings on Jackson Park Terrace at a cost of $170,000, four four-story stores and flat buildings to cost $50,000, and an eight-story apartment-house to cost $150,000, all in the vicinity of Sixty-second Street; the Sidney apartment-house to cost $150,000, on Michigan Avenue and Forty-eighth Street; at Fifty-first Street the Chicago Beach Hotel, a hotel structure to cost $400,000. The list continues with the Midway Plaisance Hotel, cost $200,000; four-story hotel, cost $65,000; six-story addition to existing hotel, cost $50,000; five four-story flat buildings, cost $100,000; four-story hotel, cost $200,000; four-story flat building, cost $83,000; five-story apartment building, cost $150,000; four four-story apartment buildings, cost $80,000; ten four-story flat buildings, cost $150,000; ten four-story flat buildings at a cost of $125,000. All these are in practically close proximity to each other and the Fair grounds. Still more could be mentioned, but when one remembers that there will be eight thousand exhibits at the Fair, and that probably these exhibits alone will bring at the least forty thousand people, the need for lodging-places seems quite apparent. It is stated on the very good authority of one of the members of the Illinois State Exhibition Board, that including watchmen, firemen, etc., the attachés of the Fair will number a hundred thousand.

Many structures will undoubtedly be erected on much of the vacant land in close proximity to the grounds to meet this need. These lots have been held by their owners at high prices, but now that the time has passed for the purchase of real estate as a site for the erection of really good buildings, these owners, that they may not entirely miss agood investment and from lack of sufficient capital, will construct the very cheapest kind of structures that the fire ordinance of that part of the town will permit. This class of buildings will, of course, be of no advantage to the neighborhood in which they are erected, after the Fair, and it seems a pity that the city should not have issued permits for temporary buildings, placing the owners under bonds to tear them down after a certain date. How much even all the better-built hotels and apartment-houses will do for the southern suburbs after the Fair is a question which will be answered in time.

An element which cannot fail to be of lasting good to the community is that of the new Chicago University. This institution, whose buildings have been mentioned before in these letters, was formally opened this month, and the quiet prairies around it have been made to echo by the practising of a college yell for a ready-made university. There is in the older colleges always the maturer and more practised voices, which hide the bantam-like utterances of the newly initiated cock. This is a humorous touch in its opening days, and a feature that was not expected would point so meaningly to the lack of a past in the history of the college. The institution opened, however, with a creditable number of students and already new permits have been taken out for four new buildings. The Walker Museum is the most important, while the other three are represented by dormitories, Snell, Kelley and Beecher Halls. The museum will be three stories high, with dimensions of over seventy by a hundred feet. The dormitories will be four stories and basement and will be about forty by eighty feet. The same general style of architecture will be seen in these structures as is already used in those recently completed. They will be of dressed Bedford stone with red tile roofs. The museum will be of fireproof construction. The dormitories will have dining-rooms on the first floor, with a parlor on each of the upper floors, the rest being devoted to study and sleeping rooms. The cost of the museum will be $150,000, while the dormitories will be $50,000 each.

A fact which would point to a large amount of prosperity in the country, and consequently would indicate to a certain extent the probability of a continuation of the activity in building circles which has been experienced this last year, is the very noticeable increase in the number of students at the western colleges this fall. Ann Arbor opens with three thousand students in all the different schools, while the Northwestern University, in her literary department alone, numbers seven hundred, while her other departments must treble and quadruple the number.

The new Chicago University in its locality is brought much nearer to the centre of the town by means of the Elevated Road, which now sends its trains off every few minutes. The arrangement of the stations is particularly successful. They are situated directly beneath the tracks. Space is in this way most materially economized and a great benefit gained in not having to go up and down outside steps, which in wet or slippery weather is far from pleasant or for many people safe. The stairs lead directly from the platform in under the tracks, each flight meeting the other in the centre, and running down side by side, one for out-going passengers, the other for incoming. The ticket-offices are also entirely under cover. On the exterior the stations are of Roman pressed brick and terra-cotta, while the interiors are finished in natural wood. The road is rapidly extending its line and pushing its right of way, so that the track that a short time ago only extended to Thirty-ninth Street, now extends to Fifty-ninth. One noticeable feature in the management of the road is the prohibiting of smoking in all the cars, no one car even being reserved for that purpose. In view of the trouble which other elevated roads have had from this practice, this seems a wise stand to take at the beginning.

The great drawback now to the general use of the road is that it hardly lands its passengers far enough down town. This difficulty will in time be overcome either by its own individual line or else by some system of terminal elevated road, such as is now being seriously talked of. This enterprise can best be described in the words of one actively interested in it. "This company is formed in connection with the plans for the completion of the Lake Street Elevated Railway, primarily, but it is also and equally the intention of providing a common terminal for the joint use of all the elevated railroads centering in the city district, and it is intended to be in harmony with the plans of each of those companies. It is, of course, obvious that each of the elevated railways must bring its passengers into the district bounded by the river on the north and west and Harrison Street on the south, and must have sufficient and accessible terminal facilities in the district, not only for the interests of the companies themselves but for those of the public, and it is equally obvious that each of the several roads cannot have sufficient terminal trackage without unduly obstructing the streets. It is, therefore, with the intention of providing ample terminals for all, with the minimum of obstruction and the maximum of public convenience, that the terminal company is now formed and that its road will be built.

"It is a fact that the elevated system of railways will prove a great relief to the streets and will take from the surface of them many thousands of people at that time and place, where and when they are ready to have this congested district, without obliging them, as at present, to further obstruct the streets in their endeavor to reach some line of transportation on the outer portion of said district before being removed and thus relieving the congestion. Already more people are transported into and out of the city district of Chicago than of any other equal area in the world, and this traffic is constantly growing, without the possibility of any further increase in the surface facilities for handling traffic.

"There are at present no facilities by which passengers from either of the three great divisions of the city may pass to another without entering and obstructing the streets of the congested district, whereas by the elevated system such a passenger would be transported throughout his journey without stepping upon the streets at all, as he would be transferred from one elevated line to the other by simply stepping onto the platform of the loop."

Improvements in the system of transportation to all the suburbs are beginning to be noticeable and are a natural outcome of the growth of the suburban towns. This growth of the towns is equally the result of the very sudden growth which the city itself has taken, from a rather small and provincial place, to a cosmopolitan city, crowded and especially in summer uncomfortable.

The summer homes around Chicago and especially those on the high North Shore are beginning to have considerable beauty, and will before long be a feature, if not exactly of the city, at least closely connected with it, the same as the homes on the Hudson are connected with New York.

In the first strictly suburban towns to the north of the city, the class of houses is generally that of the much shingled variety, many of them lacking repose in the patchy use of different wooden material, while, again, many are very agreeable in outline and generally pleasing in character.

Evanston still clings, in many of her larger houses, to the somewhat cumbersome Romanesque style, while farther north the tendency seems to be toward the Colonial, very good specimens of which are found along the high northern banks of the Lake, or, more strictly speaking, in the towns stretching along them.

Lake Forest, which is the last actual suburban town in the line of shore villages, is making extensive improvements in her academy buildings. Three new buildings will be added to the grounds: a recitation-hall, a new dormitory and a "cottage" for the smaller boys, where they can live under the care of a professor's family. The buildings are of generous proportions, but are at present not far enough along towards completion to enable one to judge of them from an architectural standpoint.

Evanston is to have two new libraries; one, in fact, is nearing completion, and is a combination of town-hall and public-library. It is a very pleasing structure, in fifteenth-century style, of light-colored pressed-brick, with slate roof. The other library is connected with the Northwestern University, and is to be known as the Orrington Lunt Library. The foundations for this structure will be put in this fall. The building is planned, as regards library usage, according to the most approved methods of our widely known librarian, Dr. Poole. In its exterior the design is Classic.

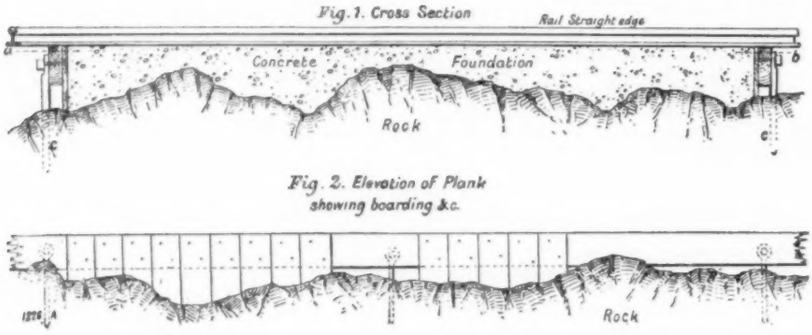
One of the topics now under discussion here in the profession is the architectural World's Congress to be held in Chicago in 1893. That some of the congresses to be held here may prove interesting there is no doubt, but what is to be accomplished by this especial architectural one is yet to be shown. If, as according to invitation, the guests arrive from all parts of the world with their own peculiar dialect still sticking to their tongues, papers and discussions are out of the question. Of course, the Fair buildings would be shown to our distinguished guests, but it hardly seems necessary to form a congress for that purpose when they would see them anyway. If a "congress" can mean simply headquarters, a club-house where men of the profession can meet each other socially, there would seem to be some good reason for carrying out the undertaking. We are

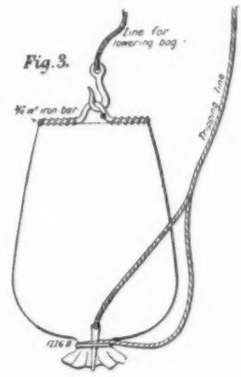
awaiting an announcement of a more definite programme. Then we shall probably know how much profit there will be in accepting this invitation, which has been sent to several thousand architects from "Greenland's icy mountains to India's coral strand."

A rumor has been current, and generally believed, that the loss of life on the Fair buildings has been something enormous, the list of killed, according to some "authorities," even reaching as high as eight hundred. It was a relief to notice by the official report recently published in one of our papers that such accounts are ridiculous exaggerations, and, to correct the impression left by such rumors, the report is subjoined. The statement of Auditor William K. Ackerman, giving report of accidents from July 20, 1891, to August 31, 1892, is as follows:

"Six hundred and forty-eight accidents have occurred to date, resulting as follows: instantly killed, 14; fatally injured, 2; seriously injured, 25; slightly injured, 607."

## SUBAQUEOUS FOUNDATIONS.




MR. WM. SHIELD, M. Inst. C. E., resident engineer of the Harbor of Refuge Works at Peterhead, N. B., has recently devised a method of putting in and levelling foundations under water, which seems likely to overcome one of the chief difficulties with which harbor engineers have to cope. We understand that the system is being employed very successfully by the inventor in the foundations of the Peterhead South Breakwater, where it passes over some very irregular rocky ground.

The method may be described as follows: Let *a b* (Fig. 1) represent the level at which it is required to found the lowermost course of blocks at any convenient depth below low water. Careful longitudinal sections are taken along the lines of the inner and outer faces of the foundations, as at *c*, *c*, or, if it be a wide one, upon intermediate lines also, and these are plotted, full size, upon a floor. Planks are then cut and made up, by nailing on boarding, where required to correspond with the irregularities of the bottom, as represented in Figure 2. These are weighted with iron to the extent necessary to make them sink, and they are fixed by means of bolts, from two feet to three feet in length, let into the rock, as shown, and secured by iron wedges. Wedges are used in preference to making the bolts in the form of lewises, in order that they may the more easily be withdrawn for use in the succeeding lengths of foundation.

The planks are fixed by divers, and in moderate depths their level is determined by means of an ordinary field level and staff, the latter being provided with a ten-foot or fifteen-foot lengthening piece if necessary. A diver holds the foot of the staff upon the top of the plank, which is raised or lowered according to signal. It is thus fixed at its correct level with perfect ease and accuracy. If found to be more convenient, the divers may themselves adjust the plank by means of an ordinary spirit level. This having been done, coach screws are inserted through the eye ends of the bolts for the purpose of holding the planks in place.

Before lowering the planks for fixing, the surfaces which will be in contact with the concrete are covered with jute sacking, a flap of the same material, from fifteen inches to eighteen inches wide, being left so as to extend under the concrete and prevent its escape. A length of about twenty feet of foundation is usually dealt with at one time; but this, of course, is merely a matter of convenience which may be regulated as circumstances require.

Where the mass of concrete required to level up a foundation is large, it may be composed of, say, four or four and one-half parts of good clean sand and gravel to one part of Portland cement, the top being finished off with a layer, about six inches in thickness, of rich concrete composed of one and one-half or two parts of fine gravel and sand to one of Portland cement. Where the thickness of the concrete is small, only the richer compound should be used. The concrete is lowered to the divers in bags specially designed by Mr. Shield for the purpose. These are illustrated by Figure 3 above.

The mouth of the bag is closed by one turn of a line which is provided with loops through which a hardwood tapered pin passes. This is attached to the tripping line, as shown in the engraving. The folds of the bag hold the pin in position, but a slight pull is sufficient to withdraw it and release the contents of the bag. The bags are made slightly tapered, say three inches on a side, so as to facilitate the discharge of the concrete. They should be lowered, mouth downwards, until they almost touch the bottom. The divers then place them over the site where the concrete is required, and on giving the signal "all right," the tripping pin is withdrawn and the contents of the bag deposited.

The loss of cement by this system is so small that the water is scarcely discolored. The bags used at Peterhead contain two and one-fourth cubic feet each, but bags of any convenient size may be adopted. A straight-edge (a light section Vignole's rail makes a good one) rests upon the upper edges of the side planks, and spans the distance between them.

The divers commence the foundation at one end and work backwards, so as not to disturb the newly-deposited concrete. The concrete is merely pressed down by the flat hand to the required level, and gently struck off by the straight-edge. In this way a perfect surface is formed, which, at a depth of five feet or six feet below low water, is undisturbed by small waves.

In the course of a few hours the concrete has set sufficiently hard to resist a moderate sea, and after three days it was hard enough to bed blocks upon. These are lowered and bedded "dry" in the usual way, and are afterwards caulked round the beds and joints and grouted through a tube with cement grout, composed of two parts of Portland cement to one of Medina, which sets exceedingly hard.

Mr. Shield considers it essential to success that the concrete used in forming foundations, as described, should be thoroughly well mixed; enough water being used to form it into a not too stiff slimy paste, which should be put into place as soon after mixing as possible.

The system is applicable to the levelling of bagwork or rubble foundations as well as rock; but in the case of rubble foundations it is necessary to cover the entire area with jute sacking in order to prevent the concrete finding its way down amongst the stones. Where rock is very irregular or "side-lying," it may be benched out by means of small charges of gelatine dynamite. Those used at Peterhead for this purpose are limited to half an ounce each, in order that the rock may not be broken up to a greater extent than is required.

It seems likely this system will supersede that of levelling-up foundations by means of quarry chippings and small sealing bags, which, in some cases, has proved very unsatisfactory, and given rise to serious failures. — *Engineering.*

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Moving Wellington's Monument in St. Paul's. — The re-erection of the Wellington Monument on the north side of the nave of St. Paul's Cathedral is progressing steadily. The beauty of Alfred Stevens's greatest work, when it is finally uncovered, will be a surprise to many of the inhabitants of the metropolis, for it was not properly seen in the cramped space of the Consistory Court. It appears that about 300*l.* are still wanting to defray the cost of the removal. It would have been natural to suppose that there would be some eagerness displayed by the wealthy members of the Army to coöperate with the President of the Royal Academy in doing justice to the national memorial of Wellington, but as yet there are few signs of coöperation. It is understood that the work of the completion of the monument according to the design of Stevens, that is, by the addition of an equestrian figure of the Duke, which will be an affair of some cost — at present it is truncated — is postponed until the delicate operation of removal and re-erection on the site in the nave originally desired by Stevens is completed and the expense is defrayed. — *The Architect.*

STATUE OF

COLUMBUS

FOR THE MONUMENT AT COLUMBUS, OHIO.

Alphons Pelzer, Sculptor.

10 FEET HIGH

EXECUTED IN SHEET COPPER BY

W. H. MULLINS,

ARCHITECTURAL SHEET METAL WORK, SALEM, OHIO.

# THE ILLUSTRATIONS

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

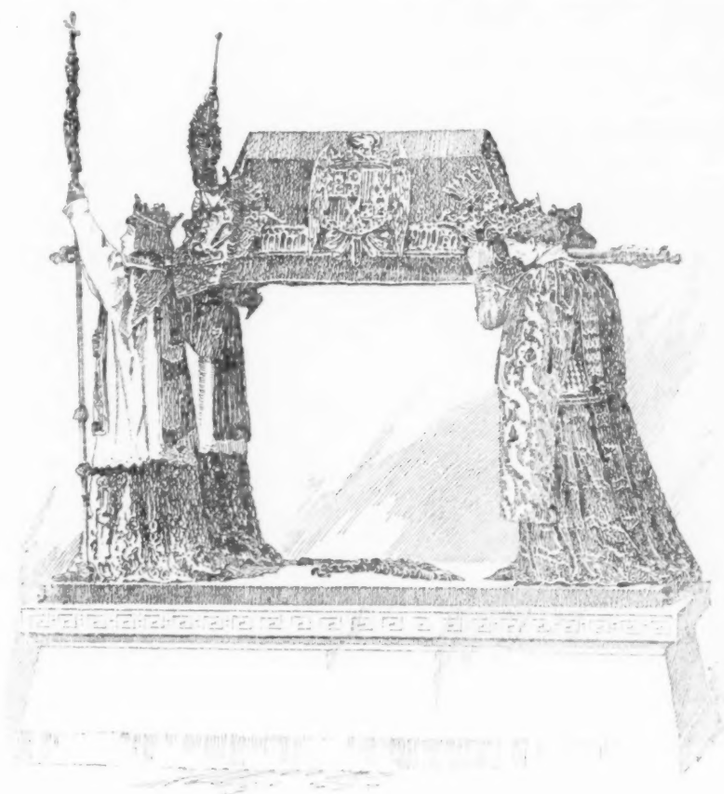
THE FINE ARTS GALLERY, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. CHARLES B. ATWOOD, ARCHITECT.

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

MONUMENT COMMEMORATIVE OF THE FOUR HUNDREDTH ANNIVERSARY OF THE DISCOVERY OF AMERICA, TO BE ERECTED IN HAVANA, CUBA. DESIGNED BY ANTONIO SUSILLO, SCULPTOR.

WE condense the following account of this work, and of the funerary monument illustrated on this page, from articles by Don Juan de Dios de la Rada y Delgado, in *El Centenario; Revista Ilustrada*, from which source we have likewise drawn the accompanying illustrations.

In accordance with the act of June 18, 1890, creating a permanent fund of $100,000 to defray the cost of a funerary monument in Havana, and the erection in the same city of another, commemorative of the discovery of America, there was opened a competition among Spanish artists for both of these. Several different designs having been presented, the Academy of San Fernando, which had been designated as the judge by the minister of the colonies, awarded the prize for the former to D. Arturo Mélida and for the latter to D. Antonio Susillo.



Funerary Monument of Columbus in the Cathedral at Havana, Cuba. Designed by Arturo Melida, Architect.

The principal part of the monument designed by Susillo is a terrestrial globe, surrounded by a wide band, on which are inscribed the words *Non plus ultra*. The lion of Spain, with one stroke of his paw obliterates the first three letters which represent the denial of the possible, showing by this allegory, that there was a beyond, as was proved by the discovery of America. The globe rests upon a truncated pyramid, in turn held up by a quadrangular base, flanked by four salients which support as many statues, typifying valor, study, history and naval art, to which last figure a youth delivers the then recently discovered compass. Upon each of the four faces of the base is a bas-relief, all epitomizing the glorious story. In the first is seen the cell of the Father Superior of La Rábida in which Columbus explains his project to the Franciscan who sits in a wide armchair, so as better to see the courses pointed out by Columbus on a chart. Leaning upon the table is the physician, Garci Fernandez. At the left of the spectator a group of Franciscans discuss the importance of the discovery; in another portion of the relief a monk seeks for a book among those in a cupboard, while the little Diego, unconscious of the importance of the occasion, amuses himself with a little boat to which he endeavors to fasten a sail.

The second relief represents the moment when Columbus prepares to embark from Palos, and shows the hero kneeling before his protector and friend and receiving his blessing, the happy presage of the success of so arduous an undertaking.

After a long and hazardous voyage Columbus reaches the island of San Salvador, or Guanahani. In the centre of this relief, the third of the series, Columbus, unfurling the ensign of admiral, takes possession of the discovered continent in the name of the monarchs of Castile. Kneeling at his feet, those who a few days before desired, with natural impatience, to return to their fatherland, bless the Supreme God and shed tears before him whom, with reason, they consider a superior being. Indians among the trees regard with looks of doubt those sons of the sea, so unknown to them. In the distance appear the caravels which brought the Castilians to such distant shores; tropical trees complete the composition. In the last of these reliefs, the Catholic sovereigns, surrounded by their court, receive with every mark of honor the intrepid mariner, who, inclining before them, places at their feet the proofs of the discovered world, among these appearing beautiful birds of rare plumage. Indians, kneeling at the foot of the throne, gaze without much appreciation upon the splendors of the Castilian court; pages and knights complete the picture.

On the face of the pyramid opposite to that on which the lion tears away the word *Non*, the eagle of St. John the Evangelist, of whom the Catholic sovereigns were such devotees, with its wings extended and its head crowned with a nimbus, displays on a wide scroll the heraldic shield of the arms of Spain. On another of the faces of the pyramid is seen a medallion containing the heads of Ferdinand and Isabella; and on the corresponding face another medallion of equal size shows a maritime trophy, the pennant of the caravel "*Santa Maria*" flowing above a sail. The upper part of the monument is a wave-beaten boat placed upon the globe. This boat carries Columbus, led by Faith, thus indicating that the New World was discovered beneath the ægis of the cross. The monument has a total height of 16 metres; the upper group, 7 metres; the lion and the eagle, 3.80 metres each; the bas-reliefs, each 3 metres long; and the four sitting statues at the angles, 3 metres each. Such, briefly described, is this truly monumental work, in which the celebrated Andalusian sculptor has shown himself a worthy successor to Roldán and Montañés.

The sepulchral monument of Christopher Columbus for the cathedral at Havana, was designed by the architect Arturo Mélida.

In order that our readers may better understand and appreciate the intention of the artist, we reproduce here the brief but interesting memoir which accompanied his design.

"This is not the time," said Mélida, "to discuss the genuineness of the ashes, which, as the remains of the discoverer of America, are preserved in the Cathedral of Havana. If they should not be his, if of the illustrious Genoese there should remain only a memory, it would still be the duty of our country to erect in the last portion which still belongs to us of the continent he gave us, something which may serve as an altar before which to worship his memory. . . .

"The base has been inspired by the Aztec temples, as a symbol of the American soil upon which the monument is erected. Upon it, four heralds, representing the four kingdoms then composing the Spanish monarchy, sustain the coffer destined to preserve the remains of Columbus. In front Castile and Leon, holding trophies and in an attitude of legitimate pride in their triumph; in the second place, Aragon and Navarre, who, if they took no part in the glory, have come to share the grief.

"The heraldic designs which ornament the garments of the four *kings-at-arms*, show very clearly what each represents, and it needs only mention of the naval trophy which Castile holds to show that to her belonged the port from which the expedition sailed. Leon holds aloft the symbol of the reconquest begun in Covadonga and finished in Granada.

"Upon the plinth the chains laid upon Columbus by the envy of some of his contemporaries lie hidden under the laurels which to-day Spain places upon his tomb together with the palm of the martyr. It is more worthy of us to recognize this nobly and frankly than to await reference to it by strangers. If the coloring of the monument should appear bizarre, if any partisan of classic art should

demand a uniform tint, especially in the sculpture, I, who am above all an architect, taking every means to assist me in obtaining artistic effect, would point to Pompeo Leoni, and in presence of the magnificent monuments of Philip II and of the Emperor Charles V in San Lorenzo in the Escorial, the most severe criticism could only bow, acknowledging that these sepulchral monuments are of greater dramatic effect, so to speak, than any artist has ever conceived.

"Drawing my inspiration from these models, seeking for the character of the fifteenth century, I have designed the figures which perform the office of supporters, in bronze of different colors, with colored alabaster for the faces. A doubt as to whether the pupils of the eyes should be painted, tormented me for some time. The bust of Seneca, an undoubted classic model, tranquillized my mind.

"There remains but a single observation to be made and that relative to practical use. One of the coats-of-arms of the Catholic sovereigns which ornament the pall and which are to be of bronze, being similar to the doors of a ciborium, will serve as a door of the dimensions of one foot and six inches by nine inches and give access to the coffer which will preserve the remains of Columbus."

To such well considered ideas it would seem we need add nothing. But we do not deem it foreign to the purpose to add a few words from the report of the Academy, to show how this body appreciated and understood the thought of the artist. The deed of Columbus, says Mélida in his memoir, is unique in history and will forever remain so. Thus it is that Columbus as a discoverer has no peer, and it is pardonable to procure for him a cenotaph that shall resemble none of those of the great men of any age. Columbus offered the enterprise which gave him immortality to four nations; four times he crossed the sea to bring it to a conclusion; four burials were given to his mortal remains, voyaging when dead as he voyaged when alive. Later when the vicissitudes of war and of politics caused us to lose Hispañola, even if we were forced to abandon the mother-colony, its riches, its cities, its monuments, and above all its children, for no consideration in the world were we willing to despoil ourselves of the remains of the great navigator which, through a strange and seemingly providential coincidence, were transported to the island of Cuba in the Spanish vessel, "*The Discoverer*" and deposited with the most profound respect and with ceremonies worthy of so great a memory in the Cathedral of Havana.

With this last solemn translation can be associated the ingenious thought of the artist Mélida, whose four kings-at-arms seem to symbolize also the four voyages of the life and the four voyages of the death of Columbus.

SKETCHES BY THE *American Architect* TRAVELLING-SCHOLAR FOR 1891, MR. ALBERT KAHN, DETROIT, MICH.: TWO SHEETS.

[Issued with the International and Imperial Editions only.]

SKETCHES BY THE *American Architect* TRAVELLING-SCHOLAR FOR 1892, MR. W. MARBURY MACCAFFERTY, BROOKLYN, N. Y.: ONE SHEET.

[Issued with the International and Imperial Editions only.]

SUB-POLICE STATION, CHESTNUT HILL, PHILADELPHIA, PA. MR. JOHN T. WINDRIM, ARCHITECT, PHILADELPHIA, PA.

ROBERT GOULD SHAW GRAMMAR SCHOOL, WEST ROXBURY, BOSTON, MASS. MR. E. M. WHEELWRIGHT, CITY ARCHITECT, BOSTON, MASS.

CORN EXCHANGE BANK BUILDING, CORNER OF BEAVER AND SOUTH WILLIAM STREETS, NEW YORK, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

STATUE OF COLUMBUS FOR THE MONUMENT AT COLUMBUS, OHIO. ALPHONS PELZER, SCULPTOR.

(Gelatine Print, Trade Supplement.)

In the ever-increasing list of those whom the world honors with monumental tributes, Columbus has a leading place. The statues and monuments reared to his glory in both the Old and the New World are many, comprising among them the costly and elaborate structures at Genoa, Madrid and Barcelona, on one side of the Atlantic, and those in the City of Mexico, in Valparaiso and Lima, and in other parts of South and Central America and the West Indies, on the other. In the United States, several monuments have been erected, notably the one modelled by Miller, in St. Louis and that so recently unveiled in New York, by the Italian sculptor Russo. Philadelphia has a statue of Columbus in her Fairmount Park, on the steps of the Capitol Persico's unfortunate figure of the great discoverer still holds aloft the globe, as it has done for fifty years past, and there are various such memorials in progress for other cities — several for Chicago, one for Boston, another for New York, and so on.

The one we illustrate, which is for the city of Columbus, Ohio — and there is a special fitness in raising there a monument to the immortal navigator, its namesake — is a work of much merit and one that would hold its own in comparison with most if not all of those mentioned. The figure has both dignity and repose, the face is a fine one, and the attitude expressive of an important side of the character of the hero, who is here conceived more as the man of mind than of action. Much care has been lavished upon the details of the rich and becoming dress, but it is not so done as to engross the spectator's attention at the expense of the face, which well dominates the whole composition. Altogether, the capital city of the great western state may congratulate herself upon this acquisition.

The figure, which is ten feet high, was executed in sheet copper from Mr. Pelzer's model, by W. H. Mullins of Salem, Ohio. The plates of which it is formed vary in thickness from two to four pounds to the square foot and the joints connecting them are countersunk and riveted, this being done with such care and skill that it is very difficult to detect them. The copper-work is supported on a strong framework of steel and iron inside the figure, making the whole construction both light and strong.

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**[Additional Illustrations in the International Edition.]**

MANUFACTURES AND LIBERAL ARTS BUILDING, FROM THE SOUTH-WEST, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MR. GEORGE B. POST, ARCHITECT.

[Gelatine Print.]

THE FISHERIES BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MR. HENRY IVES COBB, ARCHITECT.

[Gelatine Print.]

MAIN ENTRANCE OF THE HORTICULTURAL BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. W. L. B. JENNEY & W. B. MUNDIE, ARCHITECTS.

[Gelatine Print.]

COLOGNE.

GRANTULLY CASTLE, PERTHSHIRE, SCOTLAND: ADDITIONS, ETC. MR. THOMAS LEADBETTER, ARCHITECT, EDINBURGH, SCOTLAND.

It seems to be admitted on all hands that in drawing his famous picture of Tullyveolan, the stronghold of the Baron of Bradwardine, Sir Walter Scott, in his novel of "*Waverley*," took Grantully Castle as one, if not his only, model.

The "Old Castle" is said to have been built in 1560, and to have been added to in 1626. Its extent will be seen from the plan which will be published shortly, and it was upon this example of the primitive accommodation of an old Scotch castle that Mr. Leadbetter was called upon to work in the spring of 1891, in order to provide the necessary accommodation for a modern country house, while at the same time retaining the spirit of design of the old building, and keeping the modern additions as subservient as possible to the original building.

The sketch now published gives a view of the castle from the northeast, looking across the castle court-yard, which is a fine grass-grown enclosure, hemmed in by the remains of a stone wall and fortified gateway, and on the east by a magnificent yew hedge, beyond which the garden lies, protected by a moat, now partly filled-up and almost dry. The old gateway, which is too narrow to admit a carriage, will be allowed to remain; its flanking but now ruinous turrets will be protected from further decay, but not otherwise interfered with, and a new approach will be formed through the park to the east and south of the castle, and crossing the moat by a stone bridge at the southeast corner of the building, will reach the front-door.

In order to give prominence to the old building the entrance has been retained, as seen in the sketch, and it will be used as the principal one. The old doorway is protected behind the outer door by a fine example of wrought-iron work, in the shape of a ponderous grated iron gate. The bars are about one and three-fourths inches square and are interlaced alternately, an extremely difficult thing to do in welding-iron. Just inside this strong protecting gate the guard-room is placed, and in the floor of this apartment there is a grated opening, giving access to the vaulted dungeon below. A stone turnpike stair leads to the old hall of the castle, which will now become the entrance-hall. This room is twenty-four feet, three inches by twenty-one feet, three inches, and will be panelled in wainscot to the ceiling, in correspondence with the old pine panelling now taken out, which at one time had been covered by costly tapestries long since removed. The drawing-room and library are divided by folding-doors. These rooms, when thrown together, will measure fifty-six feet by seventeen feet, and will reproduce the size and proportions of the drawing-room in Murthly Castle. The walls of both rooms will also be wainscoted to the ceiling. A new staircase, constructed of solid oak steps round a stone newel, will give easy access to the various floors, and there is likewise a new service stair in the north wing.

The illustration now published was hung in this year's Royal Academy Exhibition, and we hope shortly to publish a sketch of the castle from the southwest, which gives a better idea of the additions now in progress.

TRINITY GROUND, MILE END ROAD, LONDON, ENGLAND.

# COMPARATIVE MUNICIPAL BUILDING LAWS.—XVI.

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

## Hearths and Fireplaces.

**Boston**:—*a.* All hearths shall be supported by trimmer arches of brick or stone,

*b.* Or be of single stones at least 6″ thick, built into chimney and supported by iron beams, one end of which shall be securely built into masonry of chimney or adjoining wall.

*c.* Or which shall otherwise rest on incombustible support.

*d.* Brick jambs of fireplace, range or grate opening shall each be at least 8″ wide, and the backs of such openings shall be at least 8″ thick.

*e.* All hearths and trimmer arches shall be at least 12″ longer on each side than width of opening, and at least 18″ wide in front of chimney breast.

*f.* Brickwork over fireplaces and grate openings shall be supported by proper iron bars or brick or stone arches.

**Baltimore**:—*g.* All arches over fireplaces shall be built of good, hard brick, laid with close joints and well keyed.

*h.* Fire-backs of all fireplaces shall not be less than 8″ thick.

*i.* All hearths shall be supported by arches of brick, iron or concrete.

**Brooklyn**:—All hearths shall be supported by arches of brick or stone.

*j.* All discharging or arched pieces used in chimney shall recede from any flue at least 6″.

**Charleston**:—(*j.*)

**Chicago**:—*k.* All hearths of ordinary fireplaces shall rest on trimmer arches, and the header kept at least 18″ from chimney-breast.

*l.* Backs of all fireplaces shall be at least 8″ thick.

*m.* All stove-pipe holes to have proper thimbles and stoppers.

**Cincinnati**:—*n.* In the construction of fireplaces, no jamb or back shall be less than 9″ thick.

*o.* A brick arch or sufficient iron bar shall support breast over opening.

*p.* Hearths of open fireplaces shall be of incombustible substance,

*q.* And shall rest upon brick trimmer arches or other fireproof material.

*r.* Such arches or material shall be at least 18″ wide opposite chimney-breast.

**Cleveland**:—(*n*); (*o*); (*p*); (*q*); (*r*).

**Denver**:—(*a*); (*b*); (*c*), to at least 2′ above such opening; (*d*); (*e*).

**Detroit**:—*s.* All open fireplaces or grates shall have hearth laid upon brick trimmer arches or upon iron girders.

**District of Columbia**:—*t.* No flue or fireplace shall be built in any party or division wall unless back of flue or fireplace is 9″ thick.

"Hearths, fireplaces or grates shall be laid upon brick trimmer arches turned full length of chimney-breast, the centering of which must be struck by brick-layers on completion of arch, or upon bars of iron supporting trimmer arch."

**Kansas City**:—(*a*); (*d*), to at least 2′ above such opening. (*e*); (*f*).

**Louisville**:—*u.* No brick structure to contain fire permitted on wooden floor.

**Memphis**:—*v.* Arches over openings of fireplaces shall be built of good, hard brick or stone, laid with close joints and well keyed.

*w.* All hearths shall be supported by trimmer arches of stone or brick or burnt clay at least 16″ in width, measured from face of chimney-breast.

*x.* Firebacks of all chimneys shall not be less than 8″ thick of solid masonry.

**Milwaukee**:—(*k*); (*l*); (*m*).

**Minneapolis**:—*y.* Hearths of fireplaces or grates shall be laid upon brick or stone arches, or upon bars of iron supporting a bed of brickwork. (*h*).

**Nashville**:—(*a*). The practice of putting in wooden boxes is abolished. "In no case will ceiling joist or wooden back, etc., be allowed."

**Newark**:—(*a*).
**New Orleans**:—(*j*).
**New York**:—(*w*); (*x*).

**Omaha**:—(*a*); (*b*); (*d*), for 2′ above such opening.
**Philadelphia**:—
**Pittsburgh**:—
**Providence**:—Hearths of fireplaces or grates shall be laid on incombustible supports. Wood centering supporting trimmer arch shall be removed before plastering underneath.

(*h*), and, when such brickwork adjoins a wood or stud partition, shall have at least two 4″ walls, with at least 2″ air-space between. Open fireplaces, cooking-ranges and like shall have fireproof foundations and fireproof hearth extending not less than 16″ from grate or ash-pit. (*u*).

**St. Louis**:—(*y*) or of concrete at least 3″ thick.

**San Francisco**:—When fireplaces are built on floor, they must be set on iron plate, or supported by wrought-iron stirrups and cross-bars, or iron plates of sufficient strength.

**Wilmington**:—(*u*).

## Flues.

**Boston**:—*a.* The inside of all brick flues shall have struck joints.

*b.* Flues of ranges and boilers, and other similar flues, shall have the outside exposed to the ceiling, or be plastered directly upon the brick.

*c.* Every chimney flue in which soft coal or wood is burned shall be carried to a height sufficient to protect neighboring buildings from fire and smoke.

**Baltimore**:—(*a*) And smoothly plastered with mortar on outside below roof, at all concealed points, but no parging mortar shall be used on inside of any flue 13″ or over.

No flue shall contain less than sixty-four square inches of space.

**Brooklyn**:—(*a*).

All furnace flues should be lined with iron or vitrified earthen pipe.

**Charleston**:—

**Chicago**:—*d.* All fire flues shall be smoothly plastered or have struck joists. *Ordinary flues in business buildings*, minimum thickness of walls, 4″, minimum width of jambs 8″.

*e. Flues from 250 to 500 square inches area*, minimum thickness of walls, 8″; thickness of walls around and for 15′ above inlet, 12″; height above roof 8′, or 5′ above highest part of roof within 50′ of it.

*f. Flues from 500 to 800 square inches area*, minimum thickness of wall opposite inlet and 10′ above same, 16″, top above roof 10′, or *y*, top 7′ above highest part of roof within 50′ of it; minimum thickness of wall lower 36′, 12″.

*h. Flues from 800 to 1,800 square inches area*, minimum thickness of walls lower 45′, 12″; there shall be a 4″ lining with 4″ air-space between from 4′ below inlet to 8′ above inlet, with openings from air-space to flue at top and bottom of lining; top 12′ above roof or 10′ above any roof within 50′ of it.

Flues with 12″ walls to height mentioned, may be continued with walls not less than 8″.

*i. Flues with area of more than 1,800 square inches*, chimney shall be disconnected from any main building, shall be at least 10′ above highest building within 60′ of it; not less than 80′ high.

*j. Flues with walls less than 8″ thick* shall be plastered on brick or covered with metallic lath or cloth before plastering.

*k.* (Above provisions (*d*, *e*, *f*, *g*, *h* and *j*) apply only to chimneys part of or situated in building.)

*l.* Flues in Party-Walls shall not extend beyond centre of wall.

*m.* Joint flues in Party-Walls shall be separated by a 4″ "width" of brickwork their entire length.

*n.* Cupolas of foundries shall extend at least 4′ above highest point of any roof with 40′ of each cupola.

**Cincinnati**:—(*e*); (*f*); *o*, minimum thickness for 30′ above the 16″ wall, 12″; top to be 7′ above highest part of roof within 50′ of it.

**Cleveland**:—(*e*); (*f*); (*o*).

**Denver**:—*p.* All brick flues shall be thoroughly slushed and flush-jointed, smoothly plastered inside with mortar from bottom to top below roof, securely built into brickwork from which they hung; *q* built of merchantable bricks.

*r.* No nail shall be driven into masonry of flue.

*s.* Shells of flues, shall be of brick 8″ thick, or equivalent, to a height of at least 25′ above *t* ranges, boilers, furnaces or ovens.

**Detroit**:—*u.* No flue of chimney shall be less than 8″ inside.

*v.* Flues shall be smoothly plastered or have struck joints.

*w.* Flues shall be separated by at least 4″ brickwork entire length.

Every flue at base shall have opening for removing soot, and such openings shall be provided with metal stoppers or drawers.

**District of Columbia**:—Brickwork for all flues must be laid with solid joints, smoothly plastered inside with good parging mortar, or the joints struck flush on inside, and on outside plastered between ceiling joists and rafters. Terra-cotta pipes used for smoke flues must be encased with brickwork. (*r*).

Flues for boilers and smelting furnaces shall be built of brick or metal and of size and height determined by the Inspector.

**Kansas City**:—(*p*). Built of good hard brick. (*r*).

(*b*). No woodwork placed upon outside.

Withes between flues bonded to shell with headers every sixth course.

(*s*). Above boiler or oven.

**Louisville**:—*Flues with area greater than 250 square inches* shall be constructed so as to guard against fire. Inlet, funnel and lining constructed in most approved manner.

*Flues with areas from 500 to 1,800 square inches* shall be built 12′ above roof and at least 10′ above any roof within 50′.

*Flues exceeding 117 square inches area*, shall be lined with fire-clay flue lining or plastered with fire-clay mortar. Tops of such flues shall be not less than 5′ above highest part of roof within 50′. (*c*); (*i*); (*u*).

**Memphis**:—*x.* All flues in *stone or brick buildings* shall have joints struck smooth on inside and *no parging mortar shall be used on inside. Section 20, paragraph 1.*

*y.* Fire flues to be built of brick not less than 4″ thick, laid in good lime mortar, lined with terra-cotta flue lining, "or well pargetted with strong mortar plastered on the inside not less than ½″ thick." *Section 49, paragraph 2.*

*z.* All flues shall be properly cleaned, rubbish removed and left smooth on inside.

*aa.* Smoke flues of furnaces heated to high temperature shall have double walls with air-space between, the inside 4′ to be fire-brick, or fire-clay slabs or blocks laid in fire mortar to height of 15′ from bottom.

*bb.* Cupola chimneys of foundries shall extend at least 10′ above highest point of any roof within radius of 50′.

*cc.* Flues and shafts of furnaces, boilers, bakers' ovens, large cooking-ranges, laundry-stoves and similar uses, shall have walls at least 8″ thick, unless there is a cast-iron or fire-clay pipe built inside with 1″ air-space about it, when stone or brick may be 4″ less.

**Milwaukee**:—(*d*); (*e*); (*f*); (*g*); (*h*); (*i*); (*k*); (*l*); (*m*); (*v*).

Chimneys with walls less than 8″ shall be plastered on the brick.

**Minneapolis**:—Brick flues shall have full joints, be smoothly plastered inside with mortar from top to bottom and outside below roofing.

*dd.* Brick flues not starting from foundations shall be securely built into brickwork of wall from which hung.

*ee.* Flues shall not be less than 8″ by 8″.

*ff.* Flues in Party-Walls shall be kept 2″ from party line of said wall, except (*m*).

Flues for boilers, furnaces and ovens (horse-power not exceeding 15) shall have 8″ walls for 25′ above boiler, furnace or oven, or walls not less than 12″ thick to that height if power is greater.

**Nashville**:—(*ee*).

Heavy coat of plastering put on walls of flues before woodwork is placed against them.

*Flues in stone or brick walls*, (*v*).

Flues shall be left clear of rubbish.

*Flues larger than 200 square inches* and flues of furnaces, boilers and ovens shall have 8″ walls.

Flues for furnaces and steam-boilers shall have inside lining 4″ of fire-brick laid in fire-clay for 15′ above where fire enters.

**Newark**:—All flues pointed smooth inside.

**New Orleans**:—All chimney flues lined with terra-cotta lining from top to bottom.

**New York**:—(*x*); (*z*); (*bb*), and be covered with heavy wire netting. Joints of all flues shall be struck perfectly smooth on inside. (*ee*); (*aa*).

**Omaha**:—(*p*). Built of hard burnt brick. (*r*); (*s*).

No furring placed against flue. Joints of all flues struck perfectly smooth on inside.

Flues for steam-boilers lined with fire-brick at least 8′ above breeching.

**Philadelphia**:—Flues shall be constructed so that fire will not communicate to adjoining woodwork, nor shall flue be built in any Party or Division Wall unless it is more than 9″ thick.

**Pittsburgh**:—Every chimney shaft well and smoothly plastered inside.

**Providence**:—Brick flues shall have joints filled and struck, smoothly plastered outside below roof; plastering put on after chimney is built to full height.

*Brick chimneys* shall have outer walls at least 4″ thick. Outside walls of flues not over 100 square inches area, for ranges, furnaces, boilers and ovens, shall be at least 6″, or if of greater area at least 8″ of brickwork.

*Iron and clay pipe* if used, must be enclosed in a brick flue, or in outer pipe of non-combustible material with 1″ air-space between. All joints filled with fire-clay or incombustible cement. (*dd*).

(*b*). And no woodwork placed against it below ceiling.

**St. Louis**:—(*d*); (*e*); (*f*); (*g*); (*h*), but for 12″ and 8″ read 13″ and 9″) (*j*); (*k*); (*l*); (*m*); (*i*).

All chimneys or fire flues shall be smoothly pargetted inside or have struck joints.

**San Francisco**:—(*ee*).

For two story building (with two inlets) minimum size of flue, 8″ by 12″.
" three " " " " " 8″ " 16″.
" bakery oven " " " " 12″ " 12″.

For factories, flues proportioned to size of grate surface.

*Furnace and baker oven flues* shall have brick walls 8″ thick, or be built of fire-clay or iron pipe set in fire-clay mortar, *provided* such pipe is surrounded with 4″ of brickwork, with 1″ air-space between.

*Boiler flues* shall be lined with 4″ fire-brick laid in fire-clay to height of 15′ or to top of second story floor joists.

Every flue shall be pargetted with good parging mortar or the joints struck smooth inside and out.

No wedges of wood or iron or nails shall be driven into any wall within 8″ of a flue or fireplace.

**Wilmington**:—Minimum size of brick or stone flues, 9″ square inside. (*m*); (*v*).

Flues smoothly plastered inside with good pargetting mortar and on outside from bottom of ceiling joists to top of rafter. Garret side plastered with good mortar by bricklayers.

No salmon or soft brick used in gas flues above bottom of ceiling joists.

Compiled by HENRY A. PHILLIPS.

# COMMUNICATIONS

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

## UNAUTHORIZED DUPLICATION OF AN ARCHITECT'S DESIGN.

MILFORD, MASS., October 11, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

*Dear Sirs,* — A man employed an architect to make plans and specifications for a house. A clause was in the specifications that neither the plans and specifications nor the design was to be used again without the architect's consent.

Before the final completion of the house a gentleman began to visit it frequently and in conversation with the architect, said that he intended to use that design with a few slight changes to reduce expense. He asked owner if he were willing he should use design, the owner told him that he was and that he could fix that with architect.

He afterwards borrowed plans and specifications of owner, they both being marked to be returned to architect, and kept them and built two houses by them. Will you tell me if architect is entitled to a commission and what per cent. C. A. R.

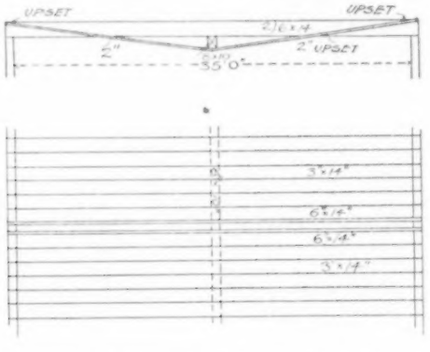
[THERE has been a rule laid down, we believe, that the architect was entitled to one per cent on the cost of duplicates of buildings designed by him. It would, however, be of little use to try to prove such a custom, which is not much known, even among architects, before a jury: the proper course is to claim damages for unauthorized use of the plans; and, on this statement of the case, we think that a jury would award a substantial sum as damages, as men who would be quite insensible to customs of percentage could easily appreciate the injury done by the appropriation of an architect's design by a man who has not a shadow of a right to the use of it. — EDS. AMERICAN ARCHITECT.]

## THE USE OF INVERTED TRUSSES.

October 3, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

*Dear Sirs,* — In a school-house recently erected, there are several rooms 35′ wide and something over 40′ in length. The joists are 3 x 14 spruce, with a longitudinal 8 x 10 girder under centre. This




girder is supported by inverted trusses — two in the length of each room formed of a pair of 6 x 14 straining beams and one 2″ upset iron rod, as shown in sketch which represents as much of the floor as depends on each truss.

There is plenty of × bridging.

Supposing the washers and nuts, and the saddles between girder and truss rods to be all right, I calculated the strains and estimated that the arrangement was good for about 80 pounds per foot — included in this would be weight of plastered ceiling and finished floor. The strain in the iron rods being about 12,300 pounds per square inch.

I have never felt inclined to use inverted trusses and should be glad to have you say if you consider this arrangement good practice that I may know if my prejudice against them is unjust or no.

Yours respectfully, G. E. F.

[PERSONALLY, we share G. E. F's dislike to belly-truss girders. They may be good engineering, but they are it seems to us, poor architecture. However, they are very commonly used, and, presuming G. E. F's calculating to be correct, without verifying them, they seem to be here correctly used. We should not allow a fibre-strain of more than 12,000 pounds per square inch, nor would a floor capable of sustaining only eighty pounds per square foot, including the weight of the floor itself, be permitted in a school-house under our city building-laws; but it is probably sufficiently strong to carry all the weight which will ever come upon it. The bridging adds absolutely nothing to the strength of the entire floor. Its sole use is to assist heavily loaded individual beams by transferring a part of the strain upon them to the neighboring beams. — EDS. AMERICAN ARCHITECT.]

# NOTES AND CLIPPINGS

THE PANTHEON, PARIS. — When it was determined to rebuild the ancient and greatly decayed church of St. Geneviéve in Paris, several architects presented designs for the new edifice, among which those by Soufflot obtained the preference. In 1757 the works commenced, but they proceeded so slowly that the ceremony of laying the first stone by Louis XV, did not take place till September 6, 1764. In this work Soufflot entirely changed the system which had till then prevailed in all the modern churches of Paris, and although he could not attempt to rival the magnitude of St. Peter's at Rome or St. Paul's, London, his aim seems to have been to produce greatness of effect of a different kind, together with decided difference of character. Avoiding two orders, as in the latter building, and the attached columns and heavy attic of the former, he has employed a single order of insulated columns sixty feet high as a prostyle, occupying the entire width of the façade at that extremity of the cross, and has, moreover, confined the order to that feature of the building, the entablature alone being continued along the other elevations, which else present little more than an unbroken surface of solid wall, a circumstance that gives severity to the whole. The portico itself is, therefore, a feature which strikingly distinguishes this from both the Italian and the English church. Like St. Paul's, Soufflot's edifice has a Corinthian peristyle of thirty columns encircling the tambour of the dome, with the difference that all the columns are insulated, whereas in the other instance eight of them are attached to four *massifs*, or piers. Another marked distinction in regard to the effect of the dome in the exterior composition generally is that the plan of the building being a Greek cross it comes in the centre, consequently is not thrown so far back from the front as in the other two instances. In the interior, again, Soufflot's design differs from them still more: it has colonnades, comparatively shallow as to depth, instead of aisles separated from the naves by massive piers and arches, neither has it any windows, except in the tambour of the dome and the arches in the vaultings of the roof, so that the light is admitted entirely from above. In consequence, however, of settlements and fractures taking place, it was afterwards found necessary to deviate from the original plan, filling up the spaces between the columns at the four angles beneath the dome, so as to convert them into solid piers. Wood in his "*Letters of an Architect*" says: — "It is certainly a beautiful edifice; the general proportions are good, and there is much grace and elegance in the outline, but there are also many defects." Soufflot did not live to see his great work completed, for he died August 29, 1781.

AMEN, TO THIS. — Precisely the same spirit reigns in all labor disputes. All over Europe the workmen are preaching altruism as the only gospel, demanding that society shall relieve its "disinherited" brethren from suffering, and pleading, in the name of the common rights of all mankind, that even crime, if committed to enforce equality in fraternity, must, in a good world, be condoned. Innocent men hurrah for Ravachol because that foul assasin died "for labor." The moment, however, wages are threatened, the "brothers" wake to fratricide. Dynamite is employed against masters, revolvers or clubs against competitors. There is not a city in Europe where hunger is held to be an excuse for a "blackleg," or a factory where the non-unionists who entered Homestead to work are not considered traitors worthy of death. The sole object is cash, just as it was with the robber-barons of the Middle Ages; and for cash, workmen whose creed is fraternity rival them in cruelty and violence, or even in places like the Far West, where it is fairly safe, massacre undersellers wholesale. Fraternity is the law, but half the workmen of Europe regard the underbidder as Cain regarded Abel, and, if they could, would in the name of the gospel of social peace and love, wage civil war against capitalists with all its ancient horrors. As for foreigners, they are, in the name of international amity, to be expelled at once, even though, as in the case of the unhappy Belgian miners recently driven by mobs out of France, they speak the same language, wear the same clothes, and are, in fact, indistinguishable save by a nationality which no Socialist recognizes as a disqualification, and by a willingness, rather than starve, to accept a lower rate of wages. Their sufferings make no more difference to those who expel them than the sufferings of his victims make to the successful thief. — *London Spectator.*

REMOVING THE CROSS FROM THE PANTHEON. — It seems that the cross on the top of the Panthéon in Paris, which has been so great an eyesore to the radicals of that uneasy city for so long a season, is to come down at last. In the budget of public works appears the sum of 20,000 francs which is to be devoted to the removal of this objectionable symbol. Whether the radicals will be contented then or not remains to be seen. The absurdity of their conduct is better appreciated when it is remembered that the Panthéon itself is built in the form of a Greek cross, and that its walls are covered with paintings designed to glorify the Roman Catholic faith in the persons of St. Louis and St. Geneviève. What can be gained by the removal of the cross, while the whole building is permitted to remain in triumphant justification of its existence, it is difficult to imagine. It is just possible that none of the enlightened patriots whose idea of freedom is to ride roughshod over everybody else have been inside the Panthéon, or know that there are more forms of crosses than one. — *New York Evening Post.*

THE GROSSE HORLOGE AT ROUEN. — The great clock of Rouen has lately been restored, the dial-plates have been decorated with a polychrome ornamentation similar to what they had in 1529, with allegorical cars and personages in gold and colors. This curious restoration of sixteenth-century work has been carefully done by M. Sauvageot. The strengthening of the arch and the rebuilding of a little house at the foot of the tower, known as the "Loggia," are now being carried on. The work was begun in 1890. — *The Builder.*

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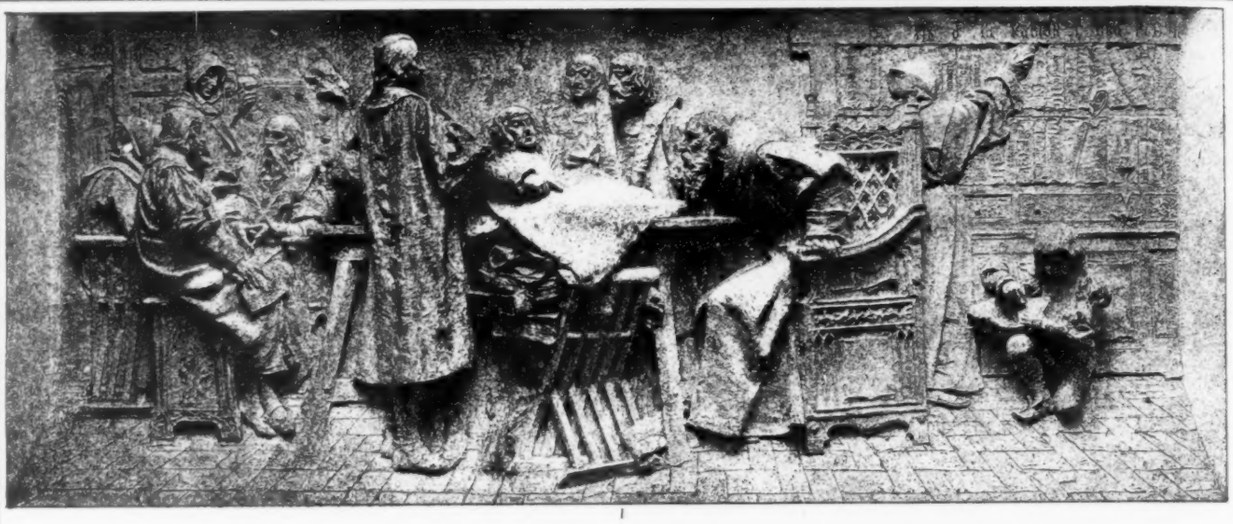

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· GENERAL · VIEW · AND · DETAILS · OF · THE · MONUMENT · COMM

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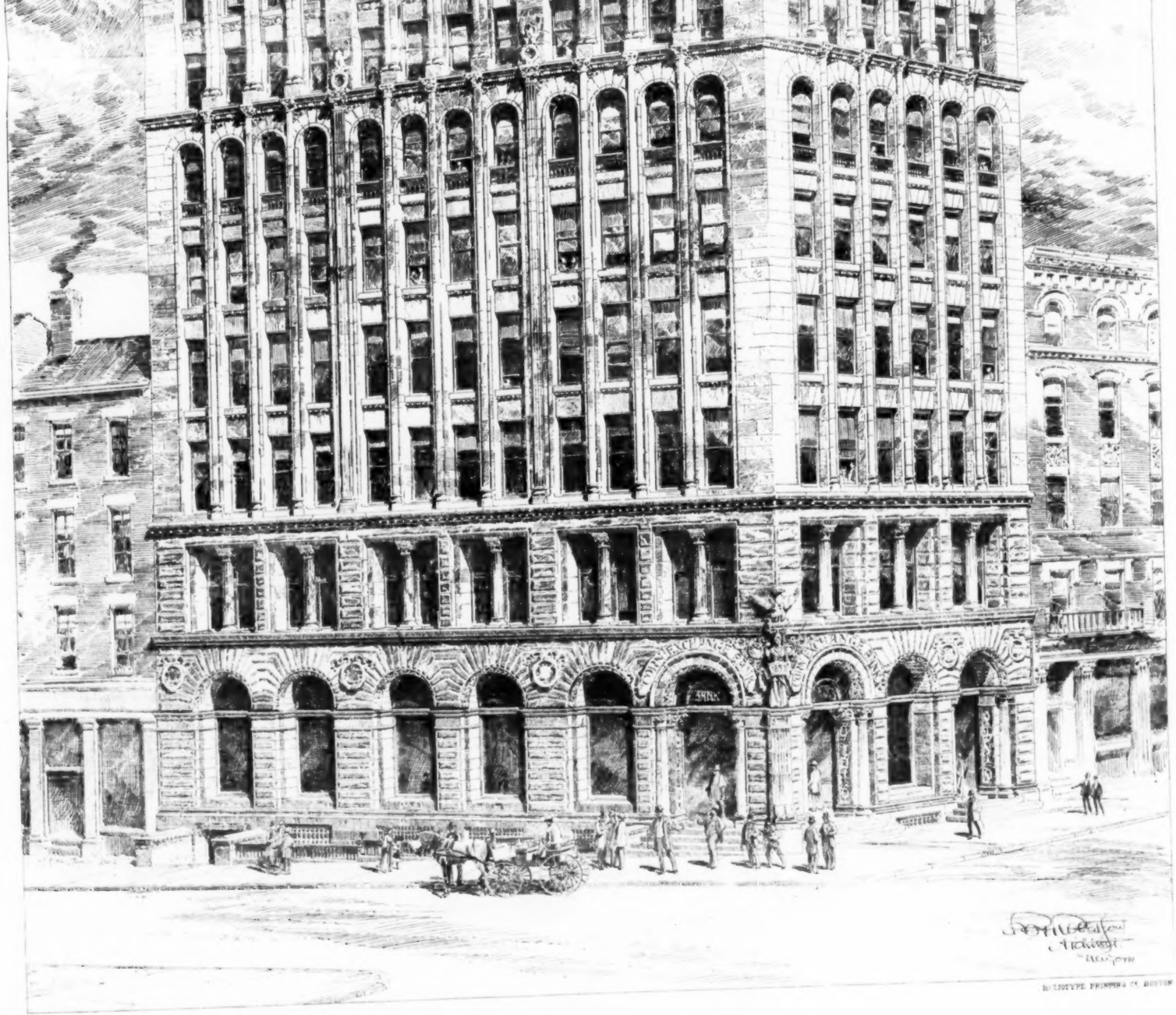

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