

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. LX.

Copyright, 1898, by the AMERICAN ARCHITECT AND BUILDING NEWS COMPANY, Boston, Mass.

No. 1165.

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

APRIL 23, 1898.



SUMMARY:—

Who shall design the New Greenhouse in Central Park, New York?—The Undesirability of any Buildings in that Park.—“Sculptors’ Declarations” on their imported Works.—Who is a Sculptor and who is not?—The American Explorations at Corinth.—Death of Edward D. Conolly, Builder.—Employers’ Liability for Personal Injuries: Cases involving the Application of the Law.—Mishap overtakes a Manhole Thief.—The Lumière Process of Photographing in natural Colors.—A Novel Wheel for the Paris Exposition.—More Earthquakes in California.	25
THE MEDIEVAL CAMPANILI OF ROME.—II.	27
REPAIR OF THE CASA GRANDE RUIN, ARIZONA.	28
BUILDING LAW: DAMAGES FOR DELAY IN BUILDING-CONTRACTS.	29
SOCIETIES.	30

ILLUSTRATIONS:—

The West Porch: Trinity Church, Boston, Mass.—Detail of Northwest Angle of the Same Porch.—Randolph Hall, Cambridge, Mass.—Rear View and Plans of the Same.—The Casa Grande, Arizona.	30
Garden Entrance to the Palais des Beaux-Arts, Paris: Exposition for 1889.—Nave Piers, Waltham Abbey.	
Additional: Southwest View of West Porch of Trinity Church, Boston, Mass.—The Grand Lyric Hall, Dublin, Ireland.—Details of the Same.—Bishop Lloyd’s House, Chester, Eng.—God’s Providence House, Chester, Eng.	30

COMMUNICATIONS:—

Perspective and Descriptive Geometry.—The Case Library Competition.	30
NOTES AND CLIPPINGS.	32

THE perennial question of adding to the number of buildings in the Central Park is being agitated again in New York.

This time, it is proposed to build a huge greenhouse, or conservatory, covering about an acre of ground, and costing fifty thousand dollars. Plans were made by Messrs. Carrère & Hastings for such a structure, some time ago, at the desire of the Park Commission then in office; but the present Commission regards these plans as unsuitable, and new ones have been prepared by Mr. Rose, the gardener of the Park. Naturally, the artistic bodies which look out so sharply for the public aesthetics in New York think that if any building of the sort is to be placed in the Park it should be designed by a skilful architect; but we are glad to see that they object to the addition of any more buildings, of any sort, to the motley collection which already crowds and disfigures the Park. The Park Commissioners observe that there are already in the Park a number of old greenhouses and frames, spread out over an area of three acres or so, and that the new house would occupy less space, and give more and better accommodation; but, while this explanation should certainly lead to the removal of the unsightly old houses, it affords no sufficient justification for the erection of a new one.

EVERY year of the growth of New York demonstrates with more emphasis the necessity for keeping the Park clear of buildings, in order that its rural beauty may produce its proper effect upon the minds of persons weary of the sight of brick walls and pavements. So long as the upper end of the Central Park differed little in aspect from the territory surrounding it, a building or two in it did not detract very much from its character; but the city is now almost solidly built up, entirely around the Park and far beyond, and every building within its limits has an air of encroachment and intrusion which is extremely disagreeable. Of course, the little shelters and music-stands are necessary, and, as they now exist, are unobjectionable; but it is much to be regretted that the Metropolitan Museum, or the Museum of Natural History, were ever admitted within the Park boundaries, and even Mr. Vaux’s stone “belvedere,” or whatever it may be called, was an unfortunate mistake. It is understood, we believe, that as soon as the necessary buildings for its accommodation can be erected in Bronx Park, the collection of animals is to be removed from the Central Park; and, although we are told that there are some valuable historical and other reminiscences connected with the hideous administration building, we are not without hope of seeing, some time, this also cleared away, and the space restored to nature.

THE Arts and Crafts people, as well as the reviewers and lecturers who inform us periodically that stonecutters and bricklayers are the only true sculptors and architects, should turn their ears, if we may be allowed to use that expression, in the direction of the Treasury Department of the United States, from which an order has just been issued, dispensing with the “sculptor’s declaration,” attached to the invoice of pieces of statuary, and purporting to identify the object as “a work of art,” and requiring appraisers and customs officers to pay no special attention to such documents, other than would be accorded to any other piece of evidence, but to assume for themselves the decision in regard to the artistic character of objects of sculpture submitted to them, remembering to “discriminate with great care between such stone or metal figures as have been manufactured for commercial purposes by artisans, and such statuary as is cut, carved or otherwise wrought by hand from a solid block or mass of marble, stone, alabaster or metal.”

ALTHOUGH the United States officials, compelled to find some standard by which they could discriminate between “works of art” and “manufactured articles,” which were separately classified in the Tariff Act, and subject to different rates of duty, adopted the distinction given them by noted experts, we must confess that it does not particularly approve itself to our mind. We do not believe that dirty hands and clodhopper wits are needed to produce works of art, but we do not believe that a genteel education and a clean shirt are a bit more potent in that direction; while, as a person’s artistic faculty is quite likely to be inversely proportional to his conceit, there is an advantage, other things being equal, in encouraging the modest man, rather than the other kind. Now, a good many of these modest men, awed by the arrogance of those who conceive themselves to be their superiors, go through life without claiming to be anything more than artisans, and their talent is lost to mankind. There is, so far as we can see, no reason why a poor wood-carver of Brienz should not put into a figure of a St. Bernard dog as much truth and feeling as a polite English, or Italian or American sculptor puts into a statue of “The Coryphée alarmed,” or “Bacchus with the Weapons of Cupid”; yet one, according to the Custom-house regulations, is an artisan, while the other is an artist; and one, if he is sensitive, is discouraged, and prevented from developing his talent, by this foolish and unjust distinction. Of course, we do not pretend that the Treasury officials ought to change their rules, which simply express a distinction which they certainly did not invent, for the sake of encouraging modest art; but we may say that, in general, we should not grieve much to see a little rebuke administered to the attempts of the so-called “professional” artists to discredit other people, whose technical skill, through long practice, is often far superior to their own, and whose standing, as “artisans,” need not prevent them from attaining the highest limit of artistic development.

PROFESSOR WHEELER writes that the American explorations at Corinth were resumed March 23d, with a force of eighty men, a temporary track, and twelve dump-cars, which will greatly facilitate the work of excavation. In 1896, as will be remembered, trial trenches were cut in various places over the site of the ancient city, in the hope of discovering some recognizable feature, which would serve as a guide for subsequent excavations. Just before the close of the season, ruins were met with in one of the trenches, which plainly belonged to the theatre; and this has served as a starting-point for the remaining work. It being certain that the agora was not far distant from the theatre, excavations were made last year in what seemed the most promising direction, and the pavement of a wide, handsome street was exposed. On each side of the street seemed to be ruins of important buildings, but there was not time last year to examine these, and they will form the principal subject of this season’s investigations.

MR. EDWARD D. CONOLLY, a prominent contractor and builder, of New York, died at his home in that city a few days ago. Mr. Conolly’s most important work was the building of St. Patrick’s Cathedral, with the rectory and the archbishop’s house adjoining; but he erected also

many houses and other structures in and about New York. He was one of the founders of the Mason Builders' Association of New York, and a member of the Catholic Club.

IT is always dangerous to place reliance on the reports of cases involving liability of employers or others for personal injuries, for the reason that the important questions, such as those of the contributory negligence of the person injured, or the insufficient care of the other party, are matters for the jury, which will draw almost any inference that it chooses from the testimony. Nevertheless, some information can be derived from decisions of courts on the subject, and this week's papers happen to record some interesting ones. In the case of *Van Orden vs. Acken*, the Appellate Division of the New York Supreme Court reversed the decision of a lower court, holding an employer liable for injury caused by the fall of a brick through an opening in the floor, and said that it was not shown that the fall of a brick, or fragment of other material, during the construction of a large building, was so unusual a thing that negligence could be inferred from the fact of the fall alone; nor did the evidence show any omission on the part of the defendant to provide the usual and proper safeguards; on the contrary, it was shown that safeguards were provided; that the plaintiff knew the condition of the building, and chose to take a position near the opening; and on this showing the decision of the lower court was reversed.

IN another case, *Hannagan vs. Smith*, a hod-carrier was employed to put hods on an elevator. The place where he had to work appeared to him insecure, and he told the foreman so, and the foreman told him to go ahead, and the floor should be planked over and made all right. The plaintiff, therefore, went to work, but the foreman did nothing to make the floor safe, and, two days later, it gave way, and the plaintiff was injured. The court below held that the plaintiff knew that the place was dangerous, as he had himself pointed out the danger to the foreman, and that if, knowing this, he continued to work, in the face of danger, he could not be said to have been himself free from contributory negligence, and could not recover; and the Appellate Division affirmed this decision. In a third case, the *Otis Brothers & Company* corporation was sued for negligently causing the death of *George Lipp*. It appeared that a man named *Jurgensen*, employed by the *Otis Company*, was at work on the pipes and valves of the elevator machinery in a new building. He turned steam into the exhaust-pipe, without looking to see whether the drip-valve from the exhaust-pipe was open. He knew, or should have known, that a little steam had been escaping into the exhaust through the previous night, and he knew, or should have known, that if the drip-valve was shut, the exhaust-pipe would probably be partly filled with water condensed from the escaping steam, and that to turn live steam into the pipe without clearing it by opening the drip-valve would thus result in driving a stream of hot water out of the upper orifice of the exhaust-pipe, above the roof, endangering persons who happened to be near. *Lipp* was, at that moment, fitting stone in a balustrade at the top of the building, and was struck by the stream of hot water, and so injured that he died; and the court, both in the first trial, and on appeal, held that the *Otis Company*, by the negligence of its servant, was answerable for his death. One of the judges of the Appellate Division gave a dissenting opinion, not upon the question of law, but simply on the ground that the evidence did not support the finding of the jury, that *Jurgensen* turned on the steam without examining the drip-valve.

A THIEF was overtaken by justice in New York the other day in what must have seemed to him a miraculous fashion. A policeman was standing, late one night, on Eighth Avenue, near a manhole of the Metropolitan Railway, when he saw the manhole cover fly into the air, followed by a flash of light, a report, and a dark object. When the dark object came down again, it proved to be a man. He gathered himself up, and ran away, and the policeman followed, and captured him, together with a saw and a lot of wire. As the aeronaut would give no account of his adventures, he was taken to the station-house, and locked up on a charge of stealing wire from the conduits. As a large amount of wire and lead pipe has been taken from the underground trolley conduits, it is supposed that the prisoner had been at work for a long time. On the night of his capture, the electric current was turned for the first time into the trolley-wires, and some short-circuit, perhaps caused by his operations, probably ignited

gas in the conduits, propelling the sinner into the hands of retribution.

A NEW process for producing photographs in natural colors, which has been put in operation by the Messrs. Lumière, of Lyons, is simple enough to invite the attention of amateurs. Most of these know something of the Ives process, by which three negatives are taken of the same object, using three different colored screens, or "ray-filters," by means of which each negative represents a certain color only in the object. Usually, a plate for printing, in gelatine or half-tone, is then made from each negative, and the appropriate colors printed, one above another, from each plate. In the Lumière process, three negatives are taken, using screens of orange, green and violet, but the prints are made on a gelatine film, prepared in a novel way. A ten-per-cent solution of glue, or of gelatine soluble in cold water, is mixed with five per cent of bichromate of ammonia, and from five to ten per cent of bromide of silver, and the whole made into an emulsion, which is thinly spread on glass. A print is taken on this surface from one of the three negatives, the gelatine not rendered insoluble by the action of light washed away with cold water, and the plate dyed with a color corresponding to the negative used. The bromide of silver still remains in the film, but may be removed with hyposulphite of soda. A thin coat of collodion may then be spread over the film, followed by a second layer of the bichromated gelatine, on which an impression is taken from a second negative; and the process is repeated with the third negative. This completes the scale of colors, and the picture may remain on the glass, or be transferred to paper. The action of the bromide of silver consists simply in modifying the effect of light on the bichromated gelatine, so as to produce half-tints and gradation; and various precipitates insoluble in water, but soluble in other mediums, may be used instead of it.

WHERE is to be at the Paris Exposition of 1900 a wheel, somewhat similar to the Ferris Wheel at Chicago, but larger, to be used, like the Ferris wheel, for lifting passengers to a height of more than three hundred feet from the ground, to a point from which they can enjoy the view over the city. So far, the idea is not particularly novel, but the construction of the wheel presents innovations of a startling kind. In comparison with the Ferris wheel, the Paris structure is a very light affair, consisting of a rim, of lattice construction, the alternate verticals of which are extended outward, so as to form posts, forty swinging cars being suspended from the ends of these posts, so far out as to swing free of the transverse members of the latticed rim. This, in itself, must give very much the effect of a balloon ascension to a ride on the wheel, but a still more remarkable peculiarity of design is to be found in the fact that, as the affair is described and shown in *La Semaine des Constructeurs*, the rim is connected with the axle, which consists of a heavy forging, solely by wire ropes. It is evident that, as the whole weight of the wheel and its load hangs always suspended by the ropes which happen at the moment to be below the line of the axle, the affair cannot fall, provided the ropes are strong enough to carry the burden, and the latticed rim is properly braced to withstand the strains which would be produced in it by the shifting of the loads; but a factor of great, and, so far, undetermined, importance is to be found in the inevitable stretching of the radial ropes. Obviously, a very small stretching of these ropes will permit the deformation of the rim, introducing new and energetic strains into the lattice structure, at the same time that it will allow its lateral displacement, through the effort of the wind or otherwise, still further varying and increasing the strains on certain portions of the structure; and, although the wrapping of the ropes around the axle, consequent upon their stretching, would not prevent the rotation of the wheel, which is propelled by ropes passing around the rim, it would produce important additional strains, both on the ropes and the structure.

EARTHQUAKES continue in California, to the alarm of the inhabitants of the Pacific coast. In a shock at Mendocino, a week or so ago, many chimneys were thrown down, houses were cracked and monuments in the cemetery were thrown down or shaken out of place, while seams, a hundred feet long in at least one case, appeared in the ground. Careful measurements at the nearest observatory showed a horizontal movement of the ground of a quarter of an inch amplitude, but the motion was probably much greater in the districts particularly affected.

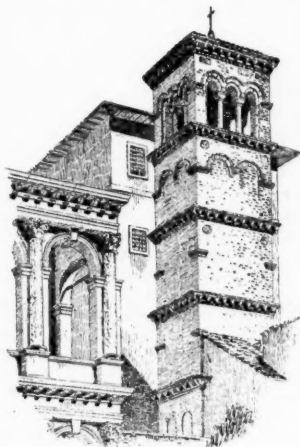
THE MEDIEVAL CAMPANILI OF ROME.¹—II.

Fig. 7. S. Marco.

SO far as this outline of the events occurring in Rome up to the time of the Norman arrival guides us, it is evident that the campanili can only have been erected during those intervals of peace I have mentioned, or at a period some time subsequent to the siege, when Rome had sufficiently recovered from its ruin and poverty; but only an examination of the details of these buildings, as apart from the statements of historians, will enable us to form an opinion as to the probability of their erection previous to the end of the tenth century, or the possibility of this having taken place after the middle of the twelfth century.

In referring to the buildings of the time of Leo III (705-815), Gregorovius²:—

"A certain littleness is therefore everywhere perceptible in buildings of the period. The brick decoration of the friezes below the roofs, the composition of the usually small towers, with arched windows divided by columns, the ornamentation of the tower facades with round plates of various colored marbles—all give evidence of a lowered standard of design. Such appears to me the character of all the churches belonging to the Carolingian period: St. Maria in Cosmedin, Francesca Romana, Nereo and Achilles, the tower of St. Cecilia, St. Maria in Domnica."

The quotation I have already given from Professor Willis aptly described the general form of the towers, and this quotation from Gregorovius as well describes their details and decoration.

If we examine the cornices we shall find that, although there is great variety in the detail, in their form and general aspect they differ in no respect from those of later imperial times. They are simple in the extreme—two, three, or four courses of bricks, one perhaps a horizontal zigzag supported on rounded marble corbels with the brick courses repeated below. Such cornices remain intact round the Baths of Diocletian to this day, and they must have been numerous enough in Rome, in the early mediæval times, to supply those corbels used in the campanili, most of which were undoubtedly taken from ancient buildings.³ The architraves are similar to the cornices, of two or three courses of bricks, generally with a zigzag course; but the archivolt, in their section, approach even more nearly to the Roman type, executed in brick instead of in stone. They are slightly recessed to form two orders, and have, in the place of the usual moulding, a projecting course of one or two thin tiles carried round the arch.

The columns and capitals which support the arches of the arcades appear to be a departure from the older style of building, although the shafts by themselves appear to be of the ordinary type, with the usual entasis. Many of them are fluted, as at St. Maria in Cosmedin, or scored, as at St. John Lateran. Others may have been worked for the positions they now occupy, as in St. Pudenziana, St. Salvatore della Corte, and other towers. But the capitals which they all carry, and on which the arches directly rest, are of a novel and peculiar character, without a parallel in earlier Roman work; and are neither more nor less than a lintel resting directly on the shaft, the length of which was made equal to the thickness of the wall; and it thus forms a bracket capital resting on a mid-wall shaft.

The necessity for some such expedient is obvious as soon as the use of the mid-wall shaft was adopted; but there being no precedent for such a feature in earlier work, a rude imitation of an architrave was devised and set directly on the shaft. The first use of this form cannot now be deter-

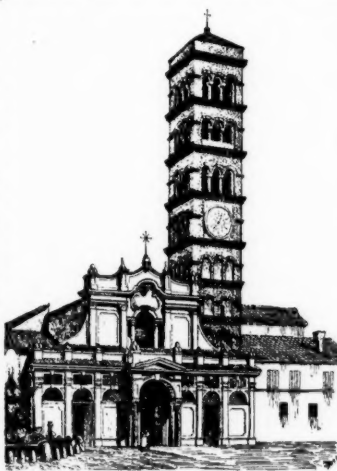


Fig. 8. Sta. Maria in Cosmedin.

mined, but the germs of the arrangement appear in the arcades of the golden gateway of Diocletian's palace at Spalato, where the architraves, supported by detached shafts, form a corbelling to carry the arches above.⁴ According to Hübsch, similar capitals are to be

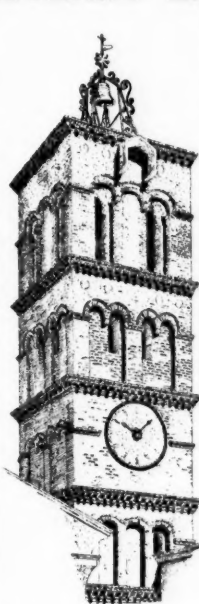


Fig. 9. Sta. Maria in Trastevere.

seen at St. Apollinare in Classe, at Ravenna, dating about the middle of the sixth century; but these appear to be even more shaped and finished than the Roman examples. But, whatever their origin, their use seems to have been abandoned in Rome before the end of the eleventh century, for we find that in the tower of SS. Quattro Coronati, which was rebuilt by Paschal II, about 1117, that is, after its destruction by Guiscard, both the bracket and shaft have disappeared, and in place of them is found a pier, oblong on plan, with concave sides carrying a capital moulded of the same plan as the pier.⁵ In the cloisters of St. Paul beyond the walls, and in those by Vasilectus at St. John Lateran, erected, in all probability, between 1150 and 1200, the shafts are coupled longways on plan to the width of the walls, with perfect capitals, and with the moulded abaci forming the springing of the arches. It seems incredible that these most beautiful and finished arcades should be contemporary with the comparatively coarse and rude constructions of the normal campanili. . . .

The proportion of the stages into which the campanili are divided varies considerably. The stages, above the lowest one, generally form a cube, the height of the story, including its cornice, being equal to the width; such are St. Pudenziana and St. Michele. Sometimes they are less in height, as St. Silvestro in Capite and St. Prassede; or higher, as in St. Eusebio. In the cases of St. Maria in Trastevere and St. Francesca Romana the top stage is higher than those immediately below it. The dimensions of these towers vary very much in height, but not in width, which may be taken to average about 15 feet, the widest being St. Cecilia and St. Maria in Trastevere, and the smallest St. Maria in Capella, which is only 8 feet square. One of the loftiest of the towers, St. Maria in Cosmedin, which has eight stages, is 112 feet high, and St. Maria in Montecelli, which is five stages high, about 80 feet.

The disposition of the openings of the arcades, although the details differ, may be divided into two groups, omitting two or three of the smaller towers in Trastevere. The first group has, on the highest stage, two pairs of openings, each pair with a central shaft, and with a pier separating them. Of the campanili thus arranged there are nine, of which St. Francesca Romana is an example. The second group has the openings arranged as a triplet, with two shafts, and of these there are nineteen, of which St. Pudenziana is a good example. The stages below the upper one frequently repeat its arrangement, but the arches become less in number and cease to be coupled before the lowest stage is reached.

Before describing the decoration of these campanili, I should like to point out the great difference they present, in their general design, to the towers erected in other parts of Italy. We may take as a fair and well-known example of a dated north Italian tower the one to the left of the front of St. Ambrogio at Milan. This was built, according to Cattaneo,⁶ in 1129. Here, as in all north Italian towers of this period, all the lines are vertical, formed of flat pilasters repeated four times on each face, insignificant corbel-tables of small arches, no window openings or arcades, and no cornices anywhere to break the vertical lines; save that it is square on plan, nothing more unlike the Roman examples could be imagined. Again, at St. Satiro,⁷ in the same city, is a campanile which has the same vertical pilasters, the same corbel-tables, and absence of all cornices, but with this difference, that there are double openings in the two upper

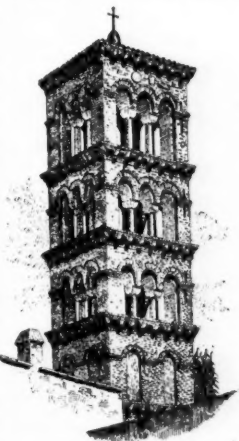


Fig. 10. S. Michele in Borgo.

⁴ Adam; also Fergusson's *Handbook*, vol. i, p. 379, fig. 247.

⁵ The brackets to be seen in German Romanesque architecture are not to be confounded with the Roman examples, as the former have a complete capital to the shaft of the ordinary character of the style, and the corbel or bracket capital is superimposed upon this. One of the best examples of this treatment is to be seen in the gallery surrounding the upper church of Schwarz-Rheindorf (1149-1151).

⁶ Cattaneo, p. 228.

⁷ Ibid., p. 236.

¹ Continued from No. 1164, page 20.

² Ibid., vol. iii, p. 25.

³ Lockyer's description of the cornices of St. Maria in Cosmedin is: "Cornices composed of nine courses of bricks one inch thick, with small marble consoles three inches high and four inches broad introduced between the fourth and seventh courses. The mortar joints are generally as wide as the brick courses."

and a single one in the intermediate stage; altogether of a much less Classic type than the Roman examples, but approximating more closely to them than does the later tower of St. Ambrogio. The date assigned by Cattaneo to St. Satiro is 879.



Fig. 11. S. Pudenziana.

In the south of Italy another type of tower, as different from the Roman as is the north Italian, was being built during the twelfth and thirteenth centuries. Square on plan, with, at most, only string-courses to break the vertical lines, with large openings grouped under one enclosing arch, and having the highest stage smaller in area, finished with a spire or dome. Such are the campanili of the Duomo of Bari, the tower at Gaeta (1276-1290),¹ the Duomo at Ravello, and the Duomo of Amalfi (1276),² which last is surmounted by a dome with circular turrets at the angles.

I have thus particularly referred to these towers, which may seem to be quite outside the limits of this paper, on account of the assertion made in reference to the Roman campanili, that "they date from the middle of the twelfth to the beginning of the fourteenth century"; that is to say, that before the Romans began to erect their semi-classic towers, in the provinces with which Rome was intimately

connected, other towers were being built which had lost all trace of their Classic origin.

To return to the decorations of the Roman campanili. These were of three kinds—niches, plaques of porphyry, and roundels of majolica.

Of the niches constructed on the external faces of the campanili, there seem to be only four now remaining: two on that of St. Francesca Romana, and one each on St. Croce and SS. Giovanni e Paolo. These are all of the same character, consisting of a brick arch resting on marble corbels, supported by columns which again stand on corbels below, and the whole generally finished with a brick pediment above. The object for which they were formed is not at first sight apparent. There is no corbel between the columns on which a statue could have been placed, but the backs seem to have been plastered, and may have been prepared to receive a picture. If this were the case, it would be an additional proof of the early character of these towers; for after the rupture which took place between Gregory II and the Emperor Leo the Iconoclast, in 726, large numbers of sacred pictures found their way to Rome from Byzantium; they may have been set up in such niches for the contemplation of the religious. On the north face of the north transept of St. Maria in Trastevere there is a marble niche apparently of an earlier date than these, carried on moulded corbels, with columns receding spirally, carved capitals and moulded architraves and pediment, with the same lack of arrangement for a statue, and which may have been designed for the same purpose. There is also a sort of niche on the face of the tower of this church, not of brick, but of thin slabs of marble, which still retains some traces of painting beneath.

The marble decorations are of various kinds, and unevenly distributed among the towers; it may be that in many cases they have been destroyed, more than one-half having none. These are in the form of thin plaques of red and green porphyry, square, oblong and circular, and sometimes, but rarely, in the form of crosses. Where they are square or oblong they are very capriciously placed, but with the circles and crosses more regard is paid to symmetry. They are generally fixed flat on the surface of the wall, but the crosses on St. Francesca Romana are framed in a border of thin projecting tiles. Sometimes the roundels are also enclosed in a surrounding brick frame, also bordered with an edging of raised tiles. This occurs at St. Croce, and, with some variations in treatment, at St. Maria Maggiore.

The majolica decoration is very interesting, but opens up too large a question to deal properly with here. It occurs only on four towers:

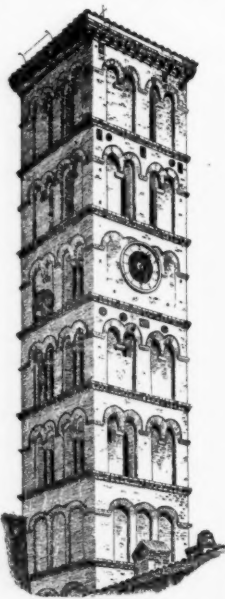


Fig. 12. S. Silvestro in Capite.

SS. Giovanni e Paolo and St. Francesca Romana, in one form, and St. Croce and St. Maria Maggiore, in another form. These latter two have merely plain green glazed plaques, and seem of a comparatively late date, but the others are of a different class altogether. These plaques are highly glazed, of various colors, and all bear designs still clearly visible. One at SS. Giovanni e Paolo seems to have been painted for the position it still occupies, for it bears, worked in with its design, the sword and crown of the martyrs. . . .

The state in which these campanili are now remaining can only be described as one of dilapidation; St. Maria in Cosmedin and St. Cecilia are well out of the upright; all are tied together with iron ties, St. Eusebio being bound round the outside with an elaborate system of them; and St. Michele in Borgo has been rent by an earthquake. All have suffered severely by the building-up of their openings to strengthen the fabrics, with the result that many of the columns are embedded, so that they can only be traced by the projection of their bracket capitals. Among those which have suffered most in this respect, are St. Lorenzo beyond the walls, St. Giovanni a Porta Latina, St. Croce and St. Maria in Trastevere. St. Sisto Vecchio, SS. Quirico e Giulitta, and the Madonna del Divina Amore have had their projecting corbels cut off, and their sides plastered over; while the fine tower of St. Crisogono has had its marble corbels reduced to more Classic proportions, and the whole modernized, so far as plaster and whitewash can do it, to match the equally ill-treated church to which it belongs.

I have included in my list of the campanili the twin towers of St. John Lateran, although a date as late as 1500 is sometimes assigned to them; I am inclined, however, to think that this is in a great part due to the many restorations they have undergone, in the last of which they were covered with rusticated plastering. But as plaster does not last forever, its decay has disclosed in patches the old brickwork behind, particularly round the arches; and this, together with the evident antiquity of the marble columns, makes me think that the commonly received dates are incorrect. As to the fact of the unusual arrangement of there being two towers, both ancient, it is supposed that there were two to St. Peter's; and if this was the case, two would not be out of place to the Mother Church of the world—the Lateran Basilica. . . .

In concluding this paper, I can only say that whether the accounts of these buildings I have laid before you establish or not that theory of their date which I have suggested, it may help to call attention to the unsatisfactory condition of their history; and it may assist to determine whether these most picturesque campanili are a natural growth from the debased Roman style which preceded them, or whether they are only an architectural "freak" of the Middle Ages, unconnected with and unsuggested by any other style, at any period, practised in Italy.

REPAIR OF THE CASA GRANDE RUIN, ARIZONA.

THE Casa Grande of Arizona has occupied and will continue to occupy a very important place in the literature of American archaeology. Its bibliography covers several closely-printed pages, and the end is not yet in sight; in fact, no book on American archaeology, and hardly any on Arizona, is considered complete without a more or less extended description of this ruin.

Casa Grande is the sole surviving remnant of a class of buildings once widely distributed in the valley of the Gila River, in southern Arizona, and represents the highest achievement of the aboriginal house-builders within the limits of what is now the United States. Further than this, it has a clear historical record of over two hundred years, and even in that remote period, nearly a hundred years before the Declaration of Independence, when a Jesuit missionary said mass within its roofless walls, the appearance of the building was not very different from what it is now. In the length of its historical record the Casa Grande is unique among southwestern ruins.

Few persons are aware that the ruin has still another claim to distinction, in that a considerable sum of money was appropriated by Congress for its repair and preservation,—the only instance of such action. It is the only example of aboriginal architecture for the preservation of which public money has been expended, and a precedent has thereby been established which, it is to be hoped, will be followed in years to come. The sum of \$2,000 was appropriated, and after several unsuccessful attempts to inaugurate the work the matter was turned over to the writer, who, after a thorough examination of the ruin, prepared plans and executed contracts for the work. Although this work was done some years ago the compilers of books on American archaeology are still describing the Casa Grande as it was, perhaps because no account of the work has been printed except in an official report of very limited circulation.

The name Casa Grande has been applied to the remains of a single house about 40' x 60' on the ground, occupying the southwestern corner of an extensive group of remains about a mile-and-a-half south of the Gila River, in southern Arizona, and on the road from the town of Florence to the nearest railway-station, known as Casa Grande Station, on the Southern Pacific Railway. With the exception of two small fragments in the immediate vicinity once connected with it, the Casa Grande comprises all the standing walls of a group which measures about 1,800' x 1,500'. All the other houses, several of which were much larger than the Casa Grande, are now marked only by smoothly rounded mounds of debris.

The ground-plan shows an arrangement of five rectangular rooms,

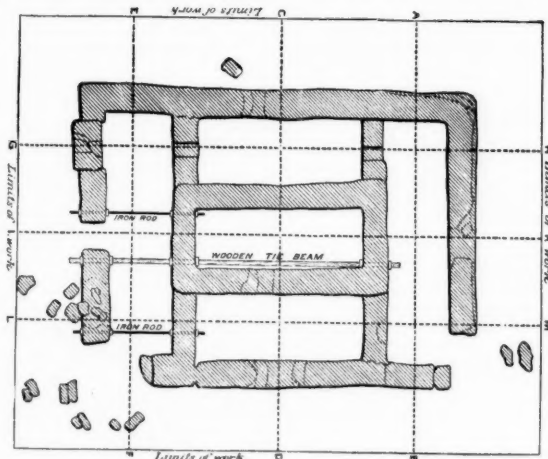
¹ Fergusson's Handbook, vol. 1, p. 695.

² Murray's Handbook, "Southern Italy."

three of them in the centre arranged side by side with their longer axes parallel, and each measuring about 10' x 24', and two others, each about 9' x 35', occupying respectively the northern and southern ends of the building, and placed across the ends of the central rooms, with their longer axes east and west. The central part of the building is three stories high, the remainder, two stories, making eleven rooms in all. The northeastern and southeastern corners of the building have fallen, and large blocks of the material of which they were composed are strewn upon the ground in the vicinity. The exterior walls rise to a height of from 20' to 25' above the ground, while the walls of the central tier of rooms are 28' to 30' above the ground-level. The tops of the walls, while rough and uneven, are approximately level.

The masonry of the Casa Grande is peculiar and distinctive. At the ground-level the exterior walls are 3½' to 4½' thick, and in one place over 5 feet thick. The interior walls are from 3' to 4' in thickness. At the tops all the walls measure about 2 feet, the reduction being accomplished partly by exterior batter and partly by interior set-backs at the respective roof-levels. The walls are not adobe, but consist of rammed earth in large blocks, 3' to 5' long, 2 feet high, and 3' to 4' thick. Each of these must weigh considerably over a ton, and it is quite clear that they were not moulded and laid in the wall, but were manufactured in place, probably by the aid of a box-like frame of wicker which was moved along as the work progressed.

The material, which was procured in the immediate vicinity, was admirably suited to the purpose, and when dry is almost as hard and durable as sandstone. Atmospheric erosion is very slight, and although the walls have been exposed for many years the joints marking the courses can still be clearly made out. With slight repairs, such walls will last indefinitely in the dry and sunny climate of



southern Arizona, but without them, even in that favored region, they must eventually fall.

The examination referred to revealed the fact that the destruction of such walls came not from erosion, as might be supposed, but from sapping at the ground-level. Rain-storms in that region are rare, although sometimes violent, but in themselves they do no damage, for well-executed earthwork does not wash out. When, however, the ground has been soaked, moisture rises by capillary attraction into the lower part of the walls, making that part less hard than the remainder, although perhaps only to a very small degree. Therein lies the danger: the wind blows almost continuously over these regions, often with violence, giving rise to the sandstorms which are characteristic of that part of the country. Great clouds of sand and small gravel are swept over the surface of the ground and hurled with tremendous force against any obstacle in their path. The walls, being less hard at the ground-level than above it, are gradually sapped or undermined, until finally the support becomes inadequate for the mass of masonry above and the wall falls *en masse*. Then surface erosion commences and in a few years the remains are marked only by a shapeless mound. It was found that in the Casa Grande some of the exterior walls were undercut to a depth of over 2 feet.

Aside from sapping of the walls, it was found that the principal damage to the ruin had been caused by the craze for relics which seems to have possessed the numerous tourists who visited it. The ruin is on the main road, travelled by the daily stage from Florence to the railroad, and is often visited. Practically every vestige of wood in the ruin had been removed and carried off, although in order to accomplish this the lintels of openings and remains of floor-beams had to be torn or dug out of the masonry, in which they were in some cases imbedded for more than two feet. Only one or two little stumps, high up in the walls and out of sight from the ground, remained.

The structure was well provided with openings, which were, of course, the weak points in the walls. When the lintels were torn out the masonry above soon broke down in arched or A-shaped cavities, which gradually increased in size until the wall was opened to

the top. This tendency was increased by the arrangement of the openings, which were placed in pairs one above the other, and by their number. There were doorways from each room into every adjoining room, except that the rooms of the middle tier, three stories high, were entered only from the east. Some of the doorways, however, were not used, and were closed with blocks of solid masonry built into them and smoothly plastered over, long prior to the final abandonment of the structure.

Thus there were two main items which the repair-work should provide for: sapping of the walls at the ground-level, and breaking-down of the masonry above the lintels which had been removed. In addition, the south wall was found to be so far gone as to necessitate the use of ties, for the southeast corner of the building had fallen and in the middle of the south wall, where once there had been two openings one above the other, there was an open space. A section of wall over 20 feet high was thus left standing alone. It was necessary also to provide against further vandalism, for, although all the wood had been removed by tourists, it was to be feared that, finding nothing else portable, they would carry off the walls piecemeal.

In planning the work the principle was adopted that the appearance of the ruin should be changed as little as possible, and that the new work, while inconspicuous and not noticeable to the casual visitor, could still be separated and clearly distinguished by the archaeological student. The amount of money appropriated was insufficient and part of the work remained unfinished, but so far as it was done it was carried out on the lines planned. The refuse and debris were removed from the interior of the building and from a space of 10' outside of it: in places the refuse was over 6' deep. Where the walls had been undermined they were underpinned with hard-burned brick laid in cement-mortar. The surface of the brickwork was set back 1" from the face of the wall and finished with cement-mortar, of the same color as the wall itself. The illustration, which is from a photograph made before the brickwork was surfaced, gives a good idea of the work. The broken-out lintels were replaced and the spaces above them were filled-in with the same construction, surfaced in the same way. Owing to the insufficiency of the appropriation only a part of the openings were so treated.

The south wall was held in place by two iron tie-rods and a wooden tie-beam. The wide range of temperature in the region, even between day and night, for the day reading is not infrequently 130 degrees, and the nights are always cool, would produce so much expansion and contraction in an iron rod 60' long that without some compensating device the wall would be rocked upon its foundation and its rapid destruction would follow. A jointed wooden beam 60' long and 6" x 8" in section was used. This beam and the tie-rods are the only part of the work which disfigure the ruin, but their use was unavoidable.

As an additional protection to the ruin the President proclaimed the land about it to be a public reservation. Authority for this was contained in the Act of Congress which made the appropriation, and it was deemed desirable to reserve not only the land on which the building stands, about 40' x 60', but also all that covered by the remains of which the building is only a small part. In all 480 acres were thus reserved.

Soon after, provision was made for a paid custodian of the reservation and the Rev. I. T. Whittemore of Florence, Ariz., who had been active in procuring the passage of the act authorizing the work, was appointed. As the reservation is under the care of the Secretary of the Interior and severe penalties are provided in the general law for the defacement or destruction of public property, it is believed that the ruin will not suffer much from vandalism in the future.

It has been proposed to place a roof over the structure, but it is to be hoped that this project will not be carried out. It is not necessary, for the work which has been done, and what should be done to carry out the plans, will preserve the ruin for many decades, if not a century. Surface erosion is so slight that it can be ignored, and a roof would be a disfigurement, almost a sacrilege. For over two hundred years the old walls have stood as they now stand, caressed by the breezes or lashed by the storms, washed by the rains and kissed by the sun, covered only by the blue sky of the sunniest of lands; through it all, immovable and unchanged, while generations after generations of men have come and gone, a mute but eloquent reminder of days and years and centuries gone by, and of times when we and our fathers and our fathers' fathers were yet "in the womb of time."



DAMAGES FOR DELAY IN BUILDING-CONTRACTS.

THE differences between the Trustees of the Devonshire Building in Boston and the contractors (Norcross Brothers) growing out of a claim on the part of the Trustees for damages at the stipulated rate of \$100 per day for delay on the part of the contractors has finally been settled by the allowance and acceptance of the sum of \$5,500 on account of this item. This is one of the few cases, we think, in recent years where the owners have succeeded in holding the contractors to their liability under the clauses of the contract, which provide a stipulated per-diem amount as damages for delay in

the completion of the work. Ex-Mayor Matthews and Wm. G. Thompson represented the Trustees of the Devonshire Building and Messrs. Hopkins & Smith, of Worcester, the contractors.

One of the causes that may have contributed to this result was the fact that the Trustees used the form of contract prepared some ten years ago by Mr. Matthews for the *American Architect* and published at the time in this journal as a form far preferable for use by the architectural profession to those commonly found in architects' offices, particularly that recommended by the American Institute of Architects.

No Lien for Damages. — In the case of a building-contract, where the owner has wrongfully interrupted the contractor, and prevented his completing the work, the contractor is entitled to a lien for the reasonable value of the work already done and the material furnished, but he cannot have a lien for the damages he has sustained by reason of the breach of contract by the owner.

[Pardue vs. Mo. Pac. R. Co. (Sup. Ct. Nebr.), 71 *Northwestern Rep.* 235.]

Effect of Contract against Delay. — The duty to complete work within the time specified being created by contract, neither the fact that the contractor was enjoined, nor that he was delayed by bad weather, will excuse non-performance of the stipulation.

[McQuiddy vs. Brannoch (Mo.), 70 *Mo. App. Ct. Rep.* 535.]

Liability of Owner who Impedes Work. — A contractor may recover the price agreed for the brickwork of a building, though he has not finished the chimneys, where such failure was due to the refusal of the other to perform his contract by putting on the roof timbers, so that the work might proceed.

[Vaughn vs. Digman (Ky.), 43 *S. W. Rep.* 251.]



DETROIT ARCHITECTURAL SKETCH-CLUB.

THE series of five discourses on Architectural History given by the Detroit Architectural Sketch-Club at the Museum of Art has been a great success.

Norman and Gothic (illustrated) by Mr. J. E. Scripps and Renaissance (illustrated) by Mr. A. Kahn, of Nettleton & Kahn, architects, completed the course. The large attendance showed the general appreciation and benefit of these papers. They will be repeated in a similar way next season.

On March 28th, Mr. M. B. Burrows was elected a Director and J. A. Gillard, Secretary, to succeed A. Blumberg.

J. A. GILLARD, Secretary.



[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

THE WEST PORCH: TRINITY CHURCH, BOSTON, MASS. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

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

DETAIL OF NORTHWEST ANGLE OF THE SAME PORCH.

THE publication of these views of the new porch that fairly completes Richardson's early masterpiece seems to afford a fitting time for expressing on behalf of the profession generally their sense of the obligation they are under to the now very large class of artist-artisans who enable them to give proper physical expression to the designs conceived by themselves. To no class, perhaps, are architects more indebted than to the modellers and carvers who execute the carved and sculptured decorations of their buildings, and though the individuals who do the actual work are often nameless, even to the superintending architect, the class is none the less held in honor by him. It is Boston's good fortune to have in the studios of John Evans & Co. one of the largest and best and certainly one of the best-organized carving establishments in this country, and it has trained and sent out a large number of workmen who are established for themselves in different parts of the country, each forming the nucleus from which is extending an ever-widening area of good work, each holding to the tradition of doing his work well and with the artistic thoroughness in which he was trained in Boston finally, although his earlier training might have been gained in England, France, Germany, Italy or Sweden. As Trinity Porch introduces a more than ordinary amount of carving, it is very fortunate that there were at hand men who could carry out the architects' intentions in such a way that the porch will always be an interesting subject for attentive study.

RANDOLPH HALL, CAMBRIDGE, MASS. MESSRS. J. R. COOLIDGE, JR. & V. WRIGHT, ARCHITECTS, BOSTON, MASS.

This private dormitory for Harvard students is to be finished for next year's occupancy.

REAR VIEW AND PLANS OF THE SAME.

THE CASA GRANDE, ARIZONA.

SEE description elsewhere in this issue.

[The following named illustrations may be found by reference to our advertising pages.]

GARDEN ENTRANCE TO THE PALAIS DES BEAUX-ARTS, PARIS: EXPOSITION FOR 1889. M. FORMIGÉ, ARCHITECT.

This plate is copied from *L'Architecture*.

NAVE PIERS, WALTHAM ABBEY. DRAWN BY ROLAND W. PAUL.

This plate is copied from the *Builder*.

[Additional Illustrations in the International Edition.]

SOUTHWEST VIEW OF WEST PORCH OF TRINITY CHURCH, BOSTON, MASS.

[Gelatin Print.]

THE GRAND LYRIC HALL, DUBLIN, IRELAND. MR. W. N. BYRNE, ARCHITECT.

DETAILS OF THE SAME.

BISHOP LLOYD'S HOUSE, CHESTER, ENG.

GOD'S PROVIDENCE HOUSE, CHESTER, ENG.



[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.]

PERSPECTIVE AND DESCRIPTIVE GEOMETRY.

SCHOOL OF ARCHITECTURE,
COLUMBIA UNIVERSITY, April 4, 1898.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — It is some years since I contributed to your pages a number of chapters upon the theory and practice of Perspective. I am minded now to present the subject to your readers from a somewhat different point of view and to urge the value of Perspective Drawing both as a practical aid in designing and as a disciplinary study.

Drawing in Perspective is often regarded chiefly as a technical accomplishment, serviceable to the specialists who devote themselves to making pictures of buildings which shall be intelligible to the laity, but which is of no practical value to the designer. Nothing could, as I conceive, be farther from the fact. By putting his design into perspective an architect is able to anticipate, to a great degree, the experience which is to come to him when his building is erected, but which then comes too late. The plans, elevations and sections, of course, effect the same result to a great extent. They show all the most important relations of lines and masses, relations which are best and most conveniently set forth, considered, and determined by these orthographic procedures. But no building ever was built that did not when done exhibit fortuitous conjunctions of neighboring parts that nobody could ever have had the wit to foresee. Some of these prove fortunate beyond all expectation, others most unlucky. But they all present themselves as real elements in the composition, just as much so as the relations exhibited in the plans and elevations, and the designer needs to become acquainted with them while they are still within his control. The doctrine, the dogma, that if a thing looks well in elevation it will come out all right in fact, seems to me to be as contrary to experience as it is to reason. It is as unreasonable and in general as unfounded as is the opinion, nearly related to it, that an experienced and well-trained architect can tell from the plans and elevations, if the shadows are properly cast, just

how a building is really going to look. Nobody can. One may, of course, learn all about the common and familiar types of structure so as to know by heart what will happen every time they are employed. But memory is not imagination, and when a combination of forms is new or unfamiliar, so that the representative imagination is called upon to picture it to the mind's eye, perspective drawings are certainly a valuable if not an indispensable auxiliary.

If this is so, the habit of drawing and sketching in perspective, as the architects of the Renaissance habitually did, and as many modern architects habitually do, both with the masses and with the details, is a safeguard against disaster which it would seem that no designer could afford to neglect. But it is a habit which he cannot indulge unless the making of perspective drawings, both with the free hand and geometrically, has become perfectly easy to him through constant practice. To leave out such practice in the study and in the teaching of architectural design has long seemed to me to be a grave omission, an omission which, with my own students, I am taking every reasonable occasion of supplying.

Another reason for making drawings in perspective is that it tends to cultivate the habit of thinking of things themselves, instead of thinking only of their pictures. Under our present methods of work, problems, both in construction and in design, have to be solved not in the workshop or at the building, where all the facts are in evidence, and cry out to be met, but in our offices, with pencil and paper, by the faint light of imperfect recollection, incomplete memoranda and a halting imagination. It is impossible under these conditions not to consider how one's drawing is looking rather than how his stone, wood or brick is going to look. It is, therefore, desirable to make drawings that shall resemble real things as much as possible, in form and, indeed, in color. What is more, it is impossible not to cultivate one's tastes and judgments rather for drawings of architecture than for architecture itself. I have even known men, when asked their opinion of a new building, to be so confused by the unaccustomed presence as to say that they thought they could judge better of the design if they could see the elevations. The best remedy for this is to study and draw out actual buildings. But perspective drawings, also, compel one to think of the real aspect of things. They are almost as good as models. They exhibit buildings as they really look and as they really are, that is to say as solid objects, having thickness as well as length and height. Things occupying space have three dimensions, and to understand how they really go one needs to keep all three in mind. But orthographic projections, such as plans, elevations and sections, present only two of these dimensions at a time. This is convenient for the workmen, who need precise information as to sizes and shapes, and is equally convenient for the draughtsman, who works with T-square and triangle and whose responsibility is limited to furnishing this information. But the architect and designer are responsible for the total result, and the habit, in designing, of thinking of things piecemeal, considering only one of their aspects at a time, tends to substitute for a comprehensive understanding of all the facts in all their relations the partial and artificial conceptions which elevations and sections suggest.

The third dimension can indeed be indicated, in a degree, by means of shading and cast shadows, and by judicious modifications of tone, as in "aerial perspective." The best-trained men freely employ these means at every stage of proceedings to model their work, as a painter might say, and thus give it a semblance of solidity. Such drawings are still, however, highly fictitious, the view presented being always an impossible one. Indeed the more one makes them look like reality, by dint of color and chiaroscuro, the more likely he is to deceive himself, and the more need there is of summoning the imagination to construct them, in the air.

This is, indeed, so notorious that in places where the sufficiency of properly shaded plans and elevations to tell the whole story is most emphatically asserted, the need of cultivating the representative imagination, so that one may be able to "think in space," and thus supplement the deficiencies of this mode of presentation, is most strenuously insisted upon. It is recognized that the designer, while working at his plans, elevations and sections, is not likely to take the pains to combine them all into a single conception. Indeed, it will hardly be within his capacity unless he has gone through some special training to enable him to do so. In the Ecole des Beaux-Arts, accordingly, where the study of design in two dimensions is carried to the utmost point of refinement, and the casting of shadows with geometrical precision is assiduously practised, the study of Descriptive Geometry is required of all students and is pushed to an extreme limit, avowedly for this purpose. It is valued, not for its practicable serviceableness, which, save to stone-cutters and stair-builders, is not great, but for the sake of discipline, to accustom the mind to conceive of geometrical solids as they really are, and to build them up in space in the imagination from the orthographic representations of them. To this end innumerable theorems and problems are devised, relating to the intersection and interpenetration of geometrical figures, planes and lines, and the determination of their dimensions, and with these the students have to be familiar before they can be admitted to the School. It is possible that national pride may have a hand in this, Descriptive Geometry being a French invention.

But the method of Descriptive Geometry, with its projections and traces, is so artificial a one, and the drawings made bear so little resemblance to the things they represent, that the imagination of

most students is first overtaxed and then baffled, and they are tempted to follow the rules and maxims blindly, trusting that the result will come out all right, just as in the manipulations of algebra, without attempting, any more than in algebra, to understand the exact relations of things at every stage of the demonstration. But just so far as this is the case the main purpose of the study is thwarted. The imagination ceases to work at all. It is easy, however, in teaching the theory of Perspective, slightly to extend the field of discussion so as to embrace most of the problems taken up by Descriptive Geometry, and since it is the special province of Perspective to exhibit things as they look and as they really are, the obstacles presented by the technical artifices of Descriptive Geometry do not exist.¹ Every thing is presented in its natural aspect and in its real relations, *totus, teres atque rotundus*, and the imagination is encouraged and aided thus to picture it. This may not be of moment to the geometer and mathematician, but in the arts it is of prime importance. In a course of architectural studies, accordingly, it would seem as if theoretical Perspective might well be made largely to take the place of Descriptive Geometry, and it would seem, also, as if the skill attained in reaching the results would afterwards be of more practical service in architectural drawing than what the student carries away from the study of Descriptive. For the architectural draughtsman has daily use for his Perspective, while problems that require the devices of Descriptive Geometry for their solution seldom present themselves.

With my own pupils I have accordingly been disposed to extend the exercises in Perspective in this direction. The experiment, so far as it has been carried, seems to be working successfully, and it may, perhaps, result in our reversing in our own practice the relative importance hitherto assigned to these two branches of Applied Geometry. It seems to be an experiment worth trying, and if any of your readers should also take it up, I should be much interested to know how they fare.

WILLIAM R. WARE.

THE CASE LIBRARY COMPETITION.

NEW YORK, N. Y., April 12, 1898.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—It may interest those of your readers who entered the competition for the Case Memorial Library at Auburn, N. Y., to know that the matter has finally drifted, after considerable expense, part of it unforeseen and, in our opinion, unnecessary, into the hands of a firm of non-competing architects who, from all accounts, will do the work justice. We do not wish primarily to cast any reflections upon the intentions of those who conducted the competition, in which it is safe to say that many thousands were expended by those one hundred or one hundred and fifty ambitious and hopeful young (and older) architects who ran the race, because we believe that the conductors acted according to their lights, but does any contemplative man doubt for a moment that the competition was disastrous to the pockets and energies of both parties? The Library fund is, in

¹Take, for example, the problem of finding the line of intersection of two

FIG. 1.

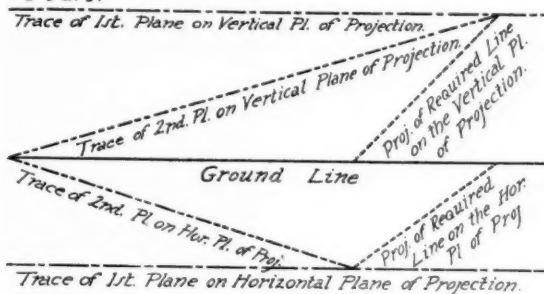
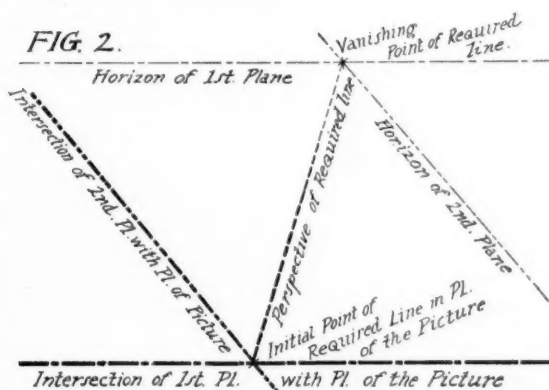


FIG. 2.



planes. In Descriptive Geometry it is solved as in Figure 1, in Perspective as in Figure 2.

consequence, smaller by considerable than it need have been, and many men of merit, judging from the published plans, have made the same kind of a gift to the Library as a man makes to a lottery when he buys a ticket. The amount of this gift is, to say the least, equal to the difference between what the competitor would have charged a client according to a proper schedule and what he would have received if he had won the prize. It was simple gambling on the part of the architects, judging from the current reports that a young man of small professional experience was one of the advisory committee, if not the most and only trusted "expert" engaged to pass on these plans, but we hope this is not a fact.

The Library Trustees got more work than they could afford to pay for adequately, and yet it was of no use whatever to them, compared with professional service of the best sort privately sought. This they could have obtained from a man or firm of acknowledged ability—who would have charged at Institute rates for preliminary sketches which they could have rejected at small loss, but would probably have accepted, and with the feeling that, practically and otherwise, the work was safe in such hands.

It is to the credit of the architects who got the work that they are said to have refused to enter the competition, and we are heartily glad that some architects have by staying out of the scramble been able to pick up the fragments thereof as a partial reward—for their forbearance.

Very truly yours, "VAIN REGRETS."



THE PARIS SEWAGE FARM.—A recent issue of the *Revue Pratique des Travaux publics* gives some particulars of the large sewage-farm which has been laid out at Achères for purifying the Paris sewage before allowing it to pass into the Seine. The inhabitants of Paris number 2,500,000, and the total flow of sewage is stated to average 17,660,000 cubic feet per diem. This is collected in great intercepting sewers, which convey it by gravitation down to Clichy, where it is raised 118 feet by powerful pumps and distributed by gravitation through the farm. The pumping-engines at present installed are capable of indicating 1,200 horse-power in the aggregate, but future additions will raise this to 6,000. It is stated that experience shows that 1 acre of suitable soil can take 1,580 cubic feet of sewage daily, so that an area of about 11,120 acres would be needed to deal with the whole of the discharge of the Paris sewers. A very high degree of purification is reached, the effluent proving to contain fewer bacteria per cubic centimetre than most uncontaminated streams. The land also has been greatly increased in value, being now worth five times as much as it was before being made a receptacle for the sewage. As a natural consequence, neighboring land-owners, who originally had fiercely opposed the establishment of a sewage-farm in their midst, are now demanding to have the sewage supplied to their own properties. The farm at Achères is 2,471 acres in extent, and is under the control of M. Bona, a civil engineer, who in the main raises beet root, though this crop will admit of much less sewage being passed on to the land than certain others. The main conveying the sewage from the pumping-station is 43.2 inches in diameter, whilst a secondary system of pipes, ranging from 31 inches to 16 inches in diameter, serves as feeders to the irrigation trenches, into which the sewage passes through 11-12 inch valves. The ground is laid out and the irrigating trenches are so arranged that the only service needed in regulating the flow is the opening or closing of the regulating valves just mentioned. The crop which can stand the most sewage is grass, a meadow being, it is stated, uninjured by a flow of 2,430,000 cubic feet per acre per year; lucerne can take 1,790,000 cubic feet per annum; artichokes, 593,000 cubic feet per annum; flowers, parsley, sorrel, etc., 536,000 cubic feet, leeks, cabbages, and celery, 325,000 cubic feet per annum; whilst beet roots, carrots, and beans will take only 197,000, and potatoes, asparagus, and peas but 141,000 cubic feet per acre per year.—*Engineering*.

THE STATUES IN THE TOWER OF THE PHILADELPHIA PUBLIC BUILDINGS.—The bronze base-plate supporting the statue rests directly upon the cover-plate of the apex-cap; it is 9 feet in diameter and 6-8 inches high, cast in halves, and formed of radial and annular ribs, 1 inch thick, cast on the upper plate, which is 1-1-4 inches thick; the halves are bolted together through two ribs that form the joint, and the whole is bolted to the apex-cap by eight 1-1-2 inch square steel eye-bolts with 2-1-4 inch-diameter nuts; these eye-bolts are held by the steel pins in the brackets of the apex-cap and placed in a circle. Two of these bolts enter the feet of the statue. Besides the eye-bolts, each foot is bolted to the base-plate by four 2-inch-diameter bolts, two of steel and two of bronze. The tree-stump, forming a part of the statue, is bolted to the base-plate by thirty-six 1-inch-diameter bronze bolts, while the parts that form the figure are bolted together through flanges, as also to the stump, thus forming one united mass—the connection between stump and figure being at the left hand, skirt of coat, and thigh of body to the upper portion of the stump with bolts. The thickness of the metal of statue varies from 1-4 of an inch in upper parts to 3-4 of an inch at the ankles and 1-1-4 inches for the soles of the feet. The stump averages 3-8 of an inch in thickness, and all flanges for joining the parts were 5-8 of an inch thick and about 3 inches wide. The base-plate is provided with two manholes—one to the outside and the other to the interior of the stump. These are furnished with watertight manhole covers. Another manhole is in the crown of Penn's hat, the cover-plate of which is glazed to light the interior of the figure. No internal braces were found necessary in any of the statues. The four groups of 24-feet-high statues at the base of the pyramid (a Swedish

man and boy, a Swedish woman, girl and lamb, an Indian chief and dog, and an Indian woman and boy) are supported on cast-iron base-plates bolted to the upper members of the framework below. The plates are covered by 3-8-inch thick bronze plate, upon which the statues rest, being bolted to the cast iron base-plate through the feet and other available members of the statues. The alloys composing the statues were: For William Penn and the Indian chief, 90 parts copper, 10 of tin. All other statues were 88 parts copper, 20 of tin, and 2 of zinc.—*Francis Schumann*.

CENTENARY OF THE METRIC SYSTEM.—The Brussels *Mouvement Géographique* has an article on the centenary of the invention of the metric system, which occurs next year on June 22d. The first twelve countries to adopt the system were France, Belgium, Holland, Greece, Sardinia, Chili, Spain, Italy, Switzerland, Denmark, Sweden, and Ecuador.

CHEAP STATUES FOR BEVERLEY MINSTER.—The Suffragan Bishop of Beverley writes an amusing letter in the *Times* recently, recounting the good feeling of the inhabitants of Beverley, Mass., in subscribing the price of two of the modern-mediæval statues which are being affixed to Beverley Minster. The sum, it appears, for which two statues are produced is 35*l*. Whether vacant niches in a mediæval building should be provided with modern statues is an open question; it depends to some extent on circumstances; but there can be no doubt that if it is done, the statues should be the work of the best sculptor's art of the day, only assimilated in line and general style into a certain harmony with the mediæval architecture. But we should like to know what kind of statues are being put up on Beverley Minster at 35*l*. a pair. The price tells a tale. They must be executed and charged, we should imagine, as mason's work; or perhaps they are made by machinery. At all events, it is impossible that the hand of an artist can be in them—unless the artist is being drastically plundered.—*The Builder*.

THE ATMOSPHERE OF LONDON.—Only by degrees are the marvellous qualities of our London atmosphere becoming known. No city in the world can boast such a peculiar aerial composition as that which the inhabitants of the metropolis have served to them daily and nightly, without money and without price—for neither the Government, County Council, nor Vestries have yet attempted to tax the highly nutritive air which we breathe. Most people think that our atmosphere consists of practically nothing. Quite a mistake. It is both meat and drink. A paper contributed to the "*Transactions*" of the British Institute of Preventive Medicine states that even in a suburb the dust particles number 20,000 per cubic centimetre in the open air, and 44,000 in a quiet room; while in the city—*O fortunatos nimium!*—the totals per cubic centimetre were 500,000 when taken from a roof, 300,000 in a court, and about 400,000 in a room. In other words, the air of the square mile is 900 per cent thicker than in the suburbs, which is in accord with the general experience that fogs are both more dense and more frequent over the centre than in the outskirts. But what is especially interesting is to learn that although dust is the great carrier of micro-organisms, there is only one of these articles per 38,000,000 atoms of dust. Thus it is calculated a man could live in the metropolis for seventy years and only absorb 25,000,000 microbes into his system from the air, or about the same number as he drinks in half a pint of unboiled milk. Of course, there are other serious objections to dust; but it is something to know that there is only one microbe to many millions of notes.—*London Telegraph*.

THE CATHEDRAL OF TOULOUSE.—This strange church consists of an early nave, to one angle of which was added in the fourteenth century an enormous choir with aisles and chapels overtopping by far the older church, and built evidently with the intention of some day adding a nave in place of that which still, fortunately, stands, not because the whole work is now harmonious, for it is very much the reverse, but because this old nave happens to be a work of extreme value and interest. It is a simple parallelogram, no less than 63 feet wide in the clear, and consists of three bays, each 45 feet from east to west. There is no evidence of the exact original extent eastward, but doubtless one or two bays were destroyed for the erection of the choir. This nave is said to have been built by Raimond VI while he was besieged by Simon de Montfort, in Toulouse, and with this date the character of the work fairly accords. The side walls are low and perfectly plain, and the enormous (and almost unequalled) span is covered with a simple quadripartite vault of brick. Here both the filling-in of the vaults, and the ribs which carry them, are all of brick, the ribs plain and square in section and the whole impressive rather for its extreme simplicity and fine scale than for aught else. Yet it would be wrong to deny the architect all credit for refinement, for at the west end there are some windows set within a bold arcading in the wall, and this arcading is carried on shafts whose capitals are carved so delicately and beautifully as to make a real sunshine in a shady place. The vault is very domical in its transverse section, and the several bays are divided by bold coupled shafts with sculptured capitals, which carry transverse arches (or ribs) no less than 3 feet 6 inches in width. Such a work as this is not only valuable to us as showing a very grand example of one of the broad unbroken naves so often seen in the southwest of France and in Spain, but still more as showing that it may be successfully executed in brick without any exaggerated—indeed almost without any—adornment, and yet with very grand effect. There is something so impressive in the vast dimensions of this nave that much elaborate ornament would be altogether out of place, and the refinement of the sculpture simply answers the purpose of showing that the artist had the power, where he had the will, of introducing delicate ornament with success.—*The Architect*.

