

THE AMERICAN ARCHITECT

AND

BUILDING NEWS

INDEX TO VOLUME LXXXVIII.

JULY—DECEMBER

1905

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1910
1911

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, JULY 1, 1905.

No. 1540.

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WE fancy the reporter hardly expected to be taken seriously when he wrote that the Board of Estimate and Apportionment of New York were "astonished" when they opened the bids for making the alterations to the unfinished Hall of Records in that city and found that even the lowest of them called for the outlay of over a million and a quarter of dollars—the actual appropriation being but five hundred thousand dollars. Why any one should feel surprised at any new development in the history of this building, it is not easy to comprehend. We do not recall all the devious windings of its history and some of them doubtless we never knew, but the story runs something like this: In the spring of 1897, under Mayor Strong, Mr. J. R. Thomas—because he had won the competition held to determine the selection of an architect for the proposed city-hall and yet had derived but little benefit from his success, since the building of a city-hall was abandoned—was commissioned as architect for the proposed Hall of Records. Two years later, a Tammany administration being in power, Mayor Van Wyck requested Messrs. Horgan & Slattery, the architects favored by all Tammany officials, to examine Mr. Thomas's drawings and report as to whether it were really necessary that the new building should be so distressingly expensive. Messrs. Horgan & Slattery obligingly reported,—just, probably, as they were expected, perhaps instructed, to report—that by making certain changes in the character and material of the interior finish over a million dollars could be saved. Mayor Van Wyck accordingly ordered Mr. Thomas, in spite of all argument and protest, to change his plans and save the money in the way that the Tammany architects advised. In July, 1900, the drawings were ready for the new bids, and a year later Mr. Thomas died, leaving ready prepared an unusually elaborate and complete set of drawings which should have enabled the speedy completion of the building. As soon as Mr. Thomas was out of the

way, Mayor Van Wyck appointed as his successors Messrs. Horgan & Slattery. But in the fall of that year the administration again changed, and one of the first steps taken by Mayor Low was to attempt to oust Messrs. Horgan & Slattery from all the jobs they were engaged on for the city. In the case of the Hall of Records, however, there proved to be a valid contract of employment which the new Mayor had not the power to cancel.

FOR five years, now, the Hall of Records has been in the hands of Messrs. Horgan & Slattery, and at the end of these five years, before the building is either complete or occupied, they are asking to be allowed to carry out "alterations" which the lowest bidder says will cost over a million and a quarter of dollars! If one could only imagine that this money was to replace the million that Mr. Thomas was compelled to forego, the situation would not be quite so bad, but that money went back into the expense account, as we understand it, some time ago. Thanks to the Municipal Art Commission, the embellishment will probably be better than it might have been, for they have been very ready to reject models for sculptures and carvings that the architects have brought to their attention. In fact, Mr. Bush-Brown and Mr. Martiny, who have the lion's share of the sculptural work, have not had a very happy time between the architects and the Art Commission. In one particular at least Mr. Martiny has achieved a result he did not aim at. If one imagines a theatre-drop to have descended in front of the eight figures that adorn the balustrade over the portico on Chambers Street and to have stopped when it reached a point just below the knees of the statues, he cannot but perceive that of the eight pair of legs he has before him at least six are busily engaged in doing a double-shuffle or some other "step." The sculptor, in place of making his figures architectural, has chosen to make them pictorial and in seeking to give each figure a natural and unconstrained attitude—which was well enough when the Art Commission had to pass on the figures one at a time—has really given to these feet and legs an air of levity hardly in keeping with the character of the building.

HAVING helped to make the fame, and perhaps the fortune, of an architectural firm of one nationality, the rulers of Tammany Hall, like the good politicians they are, are now doing the same thing for a second firm of architects of another race, and presumptively of a different faith. As the last overthrow of the Tammany power was in part due to the defection of the Hebrews, it may be fair to assume that the new architectural favorites are believers in the Mosaic laws, as well as descendants from Teutonic stock. The combination of architecture, politics and religion is not by any means solely a modern trinity, it is rather one of the ordinary associations of all ages, so we may with confidence look forward a few years to the time when Tammany, finding it desirable to harmonize and control the votes of our

Syrian, Egyptian and Arab citizens, finds it good politics to adopt as its official architects Messrs. Abou Ben Adam & Ali Achmet.

SPEAKING of the distribution of "places," with a view to placating national sensibilities, a rather curious condition develops itself in connection with the coming competition for the Peace Palace at The Hague, an affair which, dealing with the home of a great arbitral commission, it is intended to keep on the highest plane of correct procedure. The jury which is to examine and report on the competitive designs is to consist of seven members, one of whom is to be a lay member, representing the Commission, while the other six are to be architects representing Great Britain, Germany, France, Austria, Holland and the United States. This jury will be quite large enough for all practical working purposes, and the international scope of the affair is, perhaps, sufficiently recognized; but the non-representation on the jury of both Italy and Greece, once the homes of classic art in its purest form, is a curious omission. Perhaps it signifies that times are indeed changed, and that only designs in l'Art Nouveau will be considered as befitting this new landmark of a new order of things.

THERE are too many points of resemblance between the Peters-Hilprecht controversy of recent date and the Feuarent-Cesnola lawsuit of a score of years ago, for one who remembers the earlier case to be entirely satisfied with the manner in which the dispute over the Nippur temple-library find has been settled. The full Board of Trustees of the University of Pennsylvania has unanimously adopted the report of its sub-committee, which, for the last three months, has been examining the charges brought against Professor Hilprecht by Dr. Peters and weighing the evidence adduced in their support. This committee in its report gives as one of the reasons for its finding wholly in Professor Hilprecht's favor the fact that "the statements made by Dr. Hilprecht's accusers were wholly negative," a rather unexpected finding, as our remembrance of Dr. Peters's words is that they were particularly positive. The discussion is unfortunate, as for many years one will hear the "temple-library" find spoken of with the same mental distaste that one still experiences when any one mentions the "Cypriote collection" at the Metropolitan Museum of Art.

IF by a species of fiction, Columbia, Harvard and Yale were, as universities, each to contribute one hundred thousand dollars toward the million-dollar endowment fund for the American Academy at Rome, there was a certain propriety in hoping to receive a similar sum from the youngest of the institutions of this class, the University of Chicago, since it was in Chicago at the time of the building of the World's Fair buildings that was conceived the germ which has developed into the Academy which is now incorporated by act of Congress and recognized as a national belonging. If the contribution of one hundred thousand dollars from Chicago, which makes the total now nine hundred thousand, has been somewhat slow in coming, this is not to be taken as in-

dicating a less active interest but merely that the young university has so many needs of its own that it absorbs practically all the money that its chief benefactor is willing to provide.

IF we understand the statement made in the Minneapolis newspapers, that city is to derive presently whatever benefit may lie in the practice of holding an occasional *concours de façades*, after the fashion that has prevailed in Paris and some Belgian towns for a few years of late. It seems that a certain street in the section known as Columbia Heights is to be known as Architects' Avenue, and thereon are to be erected in competition a half dozen dwelling-houses designed by as many different architects practising in the city. If size, scale, cost and material are to be as much left to the selection of the competitors as are the plan, design and style, the competition may be a difficult one to decide and the resulting street-effect may be satisfactory and congruous or it may be only inharmonious and sky-rockety. The result, if the buildings are to be erected on city lots and so combined in a block or row, is not likely to be any more satisfactory than any section cut out of the street frontage of any city block covered with recently built dwellings, where each structure is already merely trying to shout down its neighbors on either side. If, however, each building is to stand on independent grounds and the competitors have met and agreed upon a building-line, a scale of heights and a common style, the result may be not only interesting but so satisfactory as to afford an example that is worth following by other improvers of real estate.

AS thorough an anachronism as we can conceive is to install tapestry in a steam-heated house, and yet there are American architects who not only permit but encourage their clients to import and hang these reminders of days when the bare stone wall of hall and chamber would have offered but chill comfort unless concealed behind tapestry hangings, which, in the case that a court were making a "progress," had been sent on ahead from the last stopping-place. The revival of the factory of the Gobelins was due partly to national pride and partly to afford relief in a time of industrial stagnation. But it is none too easy now to find a satisfactory outlet for the tapestries that are woven there nowadays. That there is a good deal of pretence in this regard for tapestry, even in France, seems to be indicated by the indifferent care that has been given to those hangings which have real merit or an historic importance. The City of Paris has some three hundred of these, and for years has made it a practice to lend them to any association or town which desired to decorate an exhibition-hall or drape about the benches at the unveiling of a statue or similar function. Lent in this indiscriminate way they have been handled with equal lack of care and often have been returned soiled, torn and damaged. The Ministry of Fine Arts has at length awakened to the situation and realized that it cannot expect others to respect what it shows so little respect for itself. The Paris tapestries have therefore recently been examined by competent judges and the best of them are now classed among the historic monuments of decorative art.

THE R. I. B. A. RULES FOR ARCHITECTURAL COMPETITIONS.

THE following regulations were approved by the Royal Institute of British Architects, on June 5:

If the promoters of an intended competition desire members of the Royal Institute of British Architects to take part therein, the conditions should be based on the following suggestions: 1. The promoters of an intended competition should, as their first step, appoint one or more professional assessors, architects of established reputation, whose appointment should be published in the original advertisements and instructions. The selection of an assessor should be made with the greatest possible care, as the successful result of the competition will depend very largely upon his experience and ability. The President of the Royal Institute of British Architects is always prepared to act as honorary advisor to promoters in their appointment of assessors. All the designs sent in should be submitted to the assessors.

2. The duty of assessors should be, after conference with the promoters: (a) To draw up the particulars, conditions and suggestions in accordance with these regulations, as instructions to competitors, such documents to be so drawn up as to form an agreement between the promoters and the competitors, and also to advise the promoters upon the question of cost and the amount and apportionment of the premium or premiums. (b) To determine whether the designs conform to the instructions, and to exclude any which do not. (c) To advise the promoters on the relative merits of the designs admitted to the competition, and to make a selection in accordance with the instructions. *Note.*—It is essential in drawing up the instructions to state definitely which of the conditions must be strictly adhered to, and which are merely optional, or of a suggestive character.

3. No promoter of a competition, and no assessor engaged upon it, nor any employé of either, should compete, or act as architect, for the proposed work.

4. The number, scale and method of finishing of the required drawings should be distinctly set forth, and they should not be more in number, or to a larger scale, than necessary to clearly explain the design, and such drawings should be uniform in size, number, mode of coloring and mounting. If the assessor advises that perspective drawings are desirable, it should be so stated.

5. Competitions should be conducted in one of the following ways: (a) By advertisement, inviting architects willing to compete for the intended work to send in designs. The promoters, with the advice of the assessor or assessors, should make their selection from such designs. The author of the design awarded the first place should be employed to carry out the work. (b) By advertisement, inviting architects willing to compete for the intended work to send in their names by a given day; with such other information as the candidate may think likely to advance his claim to be admitted to the competition. From these names the promoters, with the advice of the assessor or assessors, should select a limited number to compete, and each competitor thus selected should receive a specified sum for the preparation of his design. The author of the design awarded the first place should be employed to carry out the work. (c) By personal invitation to a limited number of selected architects to join in a competition for the intended work. Each competitor should receive a specified sum for the preparation of his design. The author of the design awarded the first place should be employed to carry out the work.

6. No design should bear any motto, device, or distinguishing mark; but all designs should be numbered by the promoters in order of receipt. Any attempt to influence the decision of the promoters, or of the assessor or assessors, should disqualify a competitor.

7. The author of the design placed first by the assessor or assessors should be employed to carry out the work, and he should be paid in accordance with the schedule of charges sanctioned and published by the Royal Institute. If no instructions are given to him to proceed within twelve months from the date of selection, or if the proposed works are abandoned by the promoters, then the selected architect should receive payment for his services in connection with the preparation of the competition drawings of a sum equal to 1¼ per cent. of the amount of the estimated expenditure.

8. In every case the amount of premium or remuneration for the competitive designs should be fixed under the advice of the assessor or assessors.

9. Where a deposit is required for supplying the instructions, it should be returned on the receipt of a *bona-fide* design; or if the applicant declines to compete and returns the said instructions, within a month after the receipt of replies to competitor's questions. The deposit required should not exceed the sum of one guinea.

10. Each design should be accompanied by a declaration, signed by the competitor, stating that the design is his own personal work, and that the drawings have been prepared under his own supervision.

11. A design should be excluded from a competition (a) if sent in after the period named (accidents in transit excepted); (b) if it does not substantially give the accommodation asked for; (c) if it exceeds the limits of site as shown on the plan issued by the promoters, the figured dimensions on which should be adhered to; (d) if the assessor or assessors should determine that its probable cost will exceed by 10 per cent. the outlay stated in the instructions, or the estimate of the competitor, should no outlay be stated. If the assessor or assessors be of opinion that the outlay stated in the instructions is inadequate, he or they shall not be bound in the selection of a design by the amount named in such instructions, but the question of cost shall nevertheless be a material element in the consideration of the award; (e) if any of the other instructions are violated.

12. It is desirable that all designs and reports submitted in a competition, except any excluded under Clause 11, should, with the consent of their authors, be publicly exhibited after the award has been made, which award should be published at the time of exhibition. At the close of the exhibition all the designs, with the exception of the one placed first, should be returned, carriage paid, to their authors.

13. It is essential to the success of any competition that the promoters should agree in their instructions that the award of the assessor should be adhered to, unless there is some valid objection to the employment of the author of the design placed first, as to which the assessor should be satisfied.

14. In the case of works of considerable magnitude, it is desirable that three assessors should be appointed. As stated above, the President of the Institute is always ready to advise on this or other points.

MARBLE DECORATION.

THE art of marble decoration consists in applying real marble to purposes partly constructive, but chiefly decorative. In doing this, we avail ourselves of the natural colors and patterns of the materials at our disposal, which are sometimes used in solid masses and sometimes in a system of veneering with thin slabs. Marble is, correctly speaking, a combination consisting chiefly of carbonate of lime, carbonic acid and water, it burns into quicklime and is for the most part soluble in acids with effervescence. In the language of the architect and marble mason, however, all stones are called marble which are harder than alabaster and gypsum and which are capable of receiving a good polish. The materials available in marble decoration include, besides various kinds of limestone, granite, porphyry, serpentine, several kinds of spar and alabaster. Among the stones which are used as decorative marbles in addition to the limestones proper are—Connemara, or Irish green. This substance is not properly a marble, although it is extensively used in decoration. It is called "Gabro" by the Italians and is really a serpentine containing large fragments of the noble or precious serpentines. The noble or precious serpentines are those which have a certain degree of transparency, being of a dark and sometimes olive green color. Large quantities are brought from the neighborhood of the Lizard, in Cornwall. It is chiefly of a deep olive-green, variegated with bands and blotches of rich brownish red mixed with lighter tints. This variety is obtained from the Balk, near Landewednack, at Kynance Cove, at Signal Staff Hill, near Cadgwith, at Cennack Cove, St. Keverne and on Goonhilly Downs.

Serpentine of an olive-green base with greenish-white veins is found near Treloawatren. A variety with a deep reddish-brown base, studded with crystals which shine with a metallic lustre, is found at Maen Midgee, Kerwith Sands. In Anglesea, a greenish serpentine, sometimes slightly reddish, is found at Llanfechell and Ceryg-maelion. A brecciated serpentinous marble with white veins is found at Tregala, near Llanfechell. In Ireland there are two varieties of serpentine, or, as it is more commonly called, Connemara, or Irish green. One, which is quarried at Letterfrack, is of a dense, opaque and uniformly

deep green color. The other exhibits twisted and interlacing bands of white. It is quarried at Ballynahinch, at Lissoughter Hill, Recess and Streamstown. A dense, olive-green serpentine is found at Aughadovey, and a foliated green variety with yellowish-green veins at Crohy Head, in County Donegal. A deep leek-green serpentine is quarried at Rock Wood Glen, County Sligo. The Italian varieties of this decorative stone are known under specific names. For example—Verde di Genova, Verde di Pegli and Verde di Prato are simply varieties of serpentine. The best quality has a grass-green ground, with spots nearly black, of noble serpentine. The best modern substitute for these beautiful ancient decorative stones and one which is often mistaken for the famous Verde Antico, is quarried in Anglesa. Egyptian Green, a marble quarried in the neighborhood of Carrara, Italy, is also sometimes mistaken for Verde Antico. This marble has a darkish-green ground with spots of grey and occasionally of white. Another variety has a red ground with clear dark-green veins and a network of white lines. Red-spotted Verde Antico has a deep-green ground with small red and black spots, and occasionally white fossil entrinital fragments. It is extremely rare and only found in small fragments. Verde di Genova or Vert de Genes, is a brecciated serpentine, quarried at Pietra Lavazzaria, in Genoa. It is composed of fragments of leek-green, dark-green, brown and red stone, united in a ground greenish-white. Verde di Pegli is a serpentine found near the torrent of Verenna, in Genoa. Some varieties are brecciated, having a ground of light green with spots and patches of rich green, produced by fragments of serpentine. Verde de Prato is a deep-green serpentine with dark spots, occasionally consisting of noble serpentine. It is quarried amongst the Apennines, at a few miles from Florence. It is, however, not obtainable in large sizes. A very beautiful variety of spar, found in small sizes in Labrador and known as Labradorite, exhibits various tones of bright blue and green, sometimes translucent, in veins and patches, with opaque green and grey, and streaks of greenish-gold. Porphyry is another beautiful stone much used for decorative purposes, one variety, that known as Laconian Marble, but which is really a green porphyry, having been much used by the ancients. The old quarries, which are situated at Levetza, between Sparta and Marathon, have been recently re-discovered. A very beautiful porphyry, known as Roseo Antico, is quarried near the First Cataract of the Nile, in Egypt, and also in the deserts near Mount Sinai. It has a reddish-brown or chocolate base, sprinkled with small white crystals which ought to be free from any tinge of rose color.

Marbles have been classified under eight groups, namely—the uni-colored, which includes only black and white; the variegated, having irregular spots and veins; the madreporic—which contain fossil remains of madrepores, animals belonging to the family of stony-corals or sea-anemone, or similar organisms, generally apparent as white or grey spots, with regularly disposed stars or dots in the centre; the shell marbles, containing only a few shells; the lumachella, consisting of shells closely united by means of a paste or cement; the Cipollino, having veins of green tale; the Breccios, containing angular fragments united by paste; and the Puddingstone, containing rounded fragments similarly united. When marble has been shaped as required for fixing, it is finished or polished. This process need not be gone into here in detail, suffice it to say that the most durable finish is always obtained by means of "tin-putty" or putty powder. Alum has been occasionally used for rapid polishing, but the surface obtained by it is only of a factitious character and easily impaired. A good test, by which the use of alum can be detected is—apply water to the surface of the marble, when, if alum be present in any quantity, the water will be absorbed, leaving a dull white stain. With regard to this test, it must be observed that a high polish, even if properly obtained, is always more or less impaired by the application of water. The test should therefore be applied only near the edges of polished slabs, or to such portions as are not intended to be seen. Various preparations are used by marble masons for filling up small interstices which occasionally appear in marble, so as to give it a perfectly even appearance. Gum shellac is the principal ingredient used for this purpose and sometimes coloring matters are combined with it, in order to make it agree in appearance with the marble to which it is applied. M. Theodore Chateau, in his work on "*The Technology of Building*," gives a recipe for a lute or stopping for filling up the interstices of marble. It consists of a yellow wax, resin and Burgundy pitch, made into a thick paste with a little sulphur and finely sifted plaster. A kind of red putty is made with six parts of sulphate

of iron to one of rough saltpetre. This mixture is exposed for twenty-four hours then reduced to a powder, washed several times and rolled into sticks for use. A little of this and some lamp-black are combined with coloring matter and mixed with the stopping. For green or yellow marbles Chateau recommends a stopping made from gum shellac and sealing-wax of the color required. This is spread over the marble and takes a good polish.

The proper arrangement of colors is one of the most important points in decorative works. It is most essential, in forming designs with variously colored marbles, to so arrange the materials as to produce agreeable decorative results. There are certain principles of color decoration recognized amongst artists who work with paint or distemper and these principles should as nearly as possible be followed in employing the natural colors of marble. One of the first rules in decoration is that the lightest colors should be applied to the largest surfaces. The surface of a panel may not exceed the united superficies of its stiles and rails, but it should be lighter if anything, than these latter, because its surface is seen in one mass. No color in a decorative composition should appear isolated and strike attention on account of its singularity. To avoid this and to produce a generally harmonious effect, colors should be repeated. Thus, the general color or the dado may be repeated, although in smaller sizes, in the frieze; the colors in the skirting should be repeated in the dado-capping and again in the cornice; and in the case of a marble ceiling, some of the colors in it should be identical with some of those in the wall-panelling, although the latter may well be darker in its general tone. The darker and heavier colors should occupy the lower part of a composition and the lighter colors the upper part. It is desirable to make ceilings appear remote, avoiding in them large masses of heavy or startling colors, which may bring them nearer to the eye in appearance. Heavy colors of no very decided tone may properly prevail in floors, to which they give the appearance of firmness and solidity, but colors of startling brilliancy will give a floor the appearance of rising. The primary colors, red, blue and yellow, are usually sparingly employed, blended tints being mostly applied to large surfaces. In marble the pure primary colors are not available in large sizes, as their effect is subdued by means of veins and spots. It is easy, therefore, to avoid glaring effects, the difficulty being, as a rule, to obtain any pure color at all. Pure blue in any considerable size is never found, all the so-called blue marbles being really greyish or slate-colored. There are certain kinds of spars in which brilliant blue tints are found, but only in very small patches. The general effect of blue in decoration is to give the effect of distance, and therefore of size, to any part of a composition. Hence in ceilings and in similar situations, bluish-grey and bluish-white marbles will best produce the desired effect. With red, yellow, orange and especially gold, the contrary result is obtained; and these should therefore be applied to parts which we desire to bring into prominence. As explained by M. Chevreton, decoration in color may be arranged according to harmonies of analogy or of contrast. This author recognizes six kinds of harmony in color decoration—three of analogy and three of contrast. Of the harmonies of analogy, the first is harmony of scale. This is produced by the simultaneous view of different tones of any color, no tones which are widely different being placed in proximity. The second, or harmony of hues, is produced by the simultaneous view of different hues, but belonging to neighboring scales of color, such as purple, red and orange, or orange, yellow and green, all hues being of the same, or nearly the same, depth. The third, or harmony of a dominant colored light, is produced by the simultaneous view of colors assorted according to the law of contrast, but with one color predominating, the effect being such as would result from the view of all the colors through a slightly colored glass. Of the harmonies of contrast, there is first the harmony of contrast of scale. This is produced by the simultaneous view of two different tones of the same color or scale of tones. Black and white would afford an example of this; so would deep red and pale pink. The second, or harmony of contrast of hues, is produced by the simultaneous view of tones of color of different depths, belonging to neighboring scales or groups of tones. Dark purple and pale orange-red would afford an example of this. The third, or harmony of contrast of colors, is produced by the simultaneous view of colors belonging to very different or distant scales, assorted according to the law of contrast. The difference in the depth of adjacent tones may further augment the contrast of colors. Dark red and pale green, or dark violet and pale orange, in close

proximity would again be examples of this. There are, properly speaking, only three colors, red, yellow and blue, all other hues being combinations or modifications of these. White is only a combination of all the colors, as is proved by the prismatic or rainbow colors into which white light is separable. To produce the effect of the most complete harmony upon the eye, we must therefore employ the three colors, or such combinations of them in such proportions as would, if the colors were intermingled, produce the effect of white. When we look upon one pure color, such as blue, there is a sense of incompleteness, because the eye demands the presence of red and yellow, either separately or combined, to form orange. We can, in fact, produce the complementary hue which will harmonize with any one pure color by a combination of the remaining two. Thus, green will harmonize with red, orange with blue, and violet with yellow. Coming to hues of a more compound character, it will be found that yellowish-green harmonizes with purple, orange-yellow with violet-blue, and greenish-blue with reddish-orange. The amount of color surface may be regulated according to the depth of tone in each case; thus a small surface of deep red will compensate the eye for a large surface of pale green. It will be understood from the foregoing that those species of harmony mentioned by Chevreul, in which various tones of one color only are admitted, cannot produce perfectly satisfactory impressions upon the eye. There will always be that sense of incompleteness connected with them. A sense of coldness is produced by a composition in which blue predominates, while red, yellow and gold convey the impression of warmth. An ante-chamber paneled with white or pale-grey marble, with the dado, cornice and framing to the panels in dark grey and with some of the principal mouldings in black, can form an attractive composition in itself, but is especially valuable if its lack of warm color can be made to heighten, by contrast, the glory of an interior beyond it, richly decorated in varieties of color. One must not, however, run into the error of employing too many varieties of color in one composition. Some of the finest decorative effects have been produced with not more than three varieties of colored marble; and it is seldom advisable to exceed this number.—*The Stone Trades Journal.*

BEAMINSTER, DORSET.

BEAMINSTER or Beaminster is mentioned in the Domesday Book as forming part of the lands of the Bishops of Sarum, one of whom, Ormund, in the reign of William Rufus gave it to augment the prebends of his church. The



prebends, therefore, until 1649, held it and were esteemed its lords. During the Commonwealth it passed into other hands, but reverted to the prebends of Salisbury in 1797.

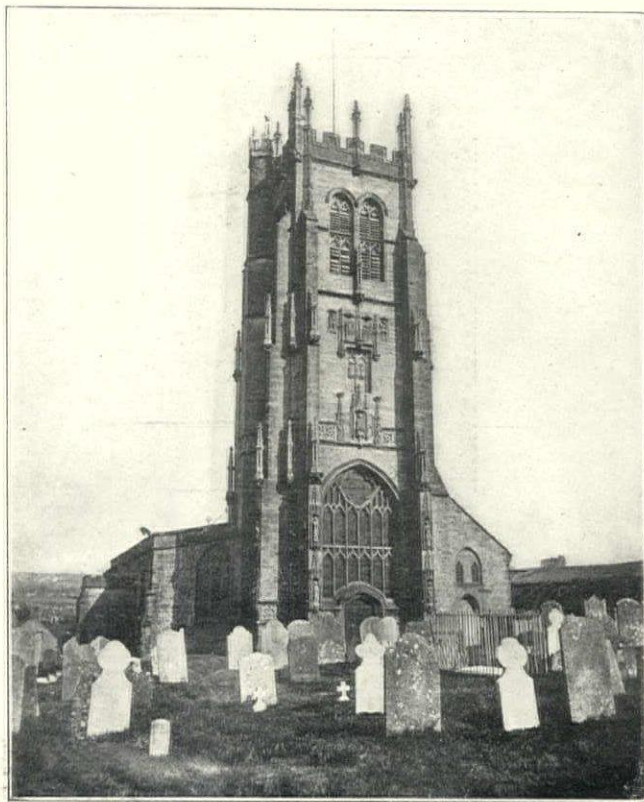
It was formerly a far more important place, with double the population, but the closing of the sailcloth factory and a pottery have brought it down to little more than a village. Possibly also the steadfast opposition to a railway keeps the town back and makes it a sleepy old-world place, where you mostly see decrepit old men, lazy young boys and numbers of women, old and young.

The country around is fertile and mostly pasture land. If the farmers were energetic and would go with the times it might be a splendid dairy-producing district, for, unlike parts of Wiltshire, it has no arid uplands.

Beaminster played a small part during the civil wars. On Palm Sunday, 1644, Prince Maurice was quartered in the

town, and, in consequence of the quarrelsomeness of the different forces, it took fire and was nearly burned to the ground. Fairfax passed through it the next year and found it, says Spriggs,

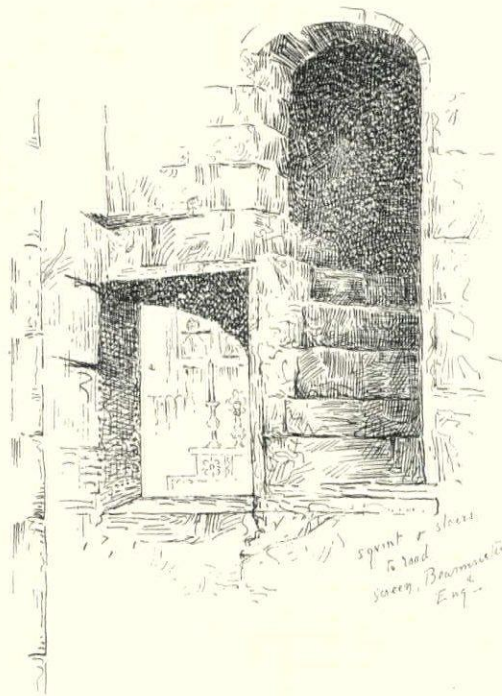
"the pitifullest spectacle that man can behold; hardly a house left unconsumed." The town was also the victim of two subsequent fires in 1684 and 1781; and only the other day it was partially wrecked by a flood. The whole country being a network



BEAMINSTER CHURCH.

of small watercourses, which flow into a not much larger river; a rainy season, followed by a storm, produces the inevitable inundation.

The church, a chapel of ease to Netherbury, is a fine Perpendicular building with a grand square tower 100 feet high, decorated with niches bearing statues. On the west front is a representation of the Crucifixion, with St. Mary and St. John on either side; below this is the Blessed Virgin as patron, with St. George and another saint. In other niches are similar

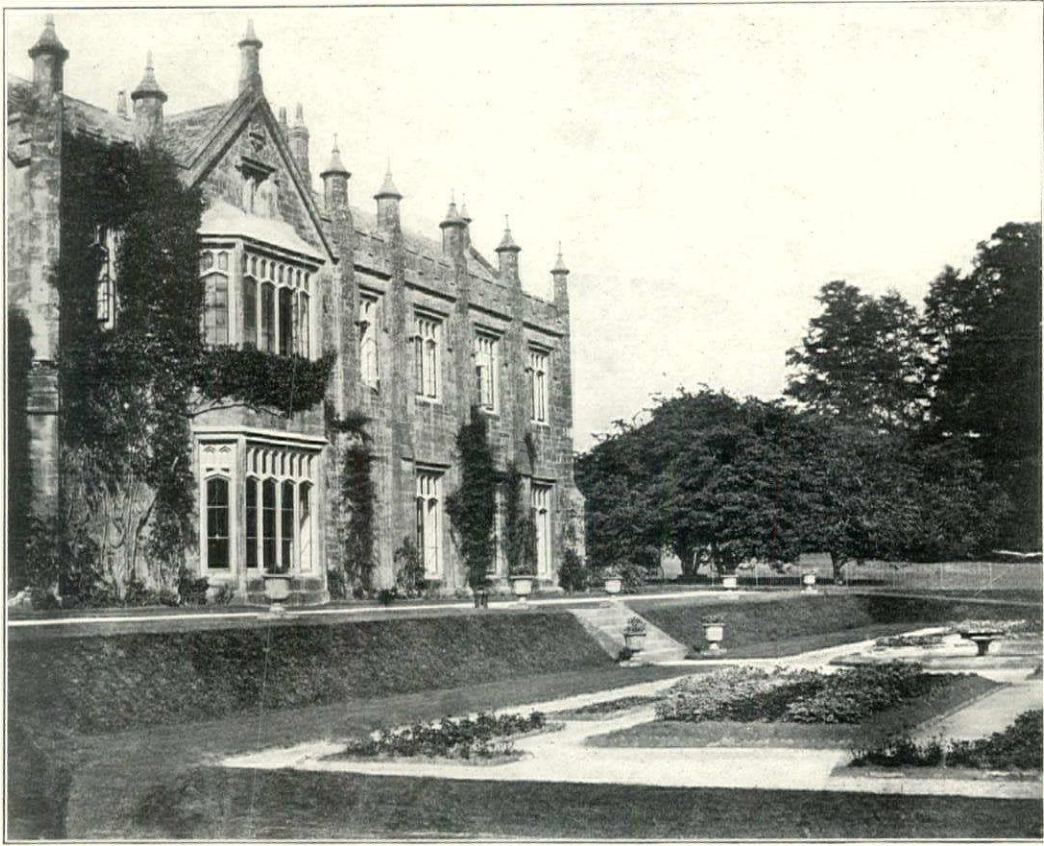


statuettes of saints. On the west side of the "mort-house" is the remains of an Early English doorway. Whether this was a mortuary chapel or a part of the earlier church seems to be

unknown; but some of the older inhabitants speak of it as having originally been separated from the south aisle of which it now forms a part. In the interior is some quatre-foil paneling similar to that which surrounds the tower.

The interior is fine for a parish church of such dimensions,

ham, the earlier one erected to the memory of Thomas Strode, a sergeant-at-law, who died in 1698, being a noticeable piece of Seventeenth Century work. The niche behind the figure is of black marble, the pilasters of red, the shell base of gray and the figure of white. The heraldic arms above are in color, and



PARNHAM MANOR, BEAMINSTER, DORSET, ENGLAND.

but the chancel arch and the windows were rebuilt in the Perpendicular style, and although the paneling of the former is good it will be seen by the photograph that it does not make up for the beauty of the Early English arch which its mother church of Netherbury still retains. The bays of the nave are Early English, with clustered columns and plain capitals, with the exception of two, which are carved with foliage. In the "mort-house" are some corbels of the Early English period—rudely carved heads of cherubim with colored nimbi, and one square, especially beautiful, of a bird sitting amongst foliage. In the south aisle is a curious "squint," giving a view of the altar; and beside it a flight of steps leading to the rood-loft, now no more. The roof is pointed, open timber; the supports resting upon corbels of angels bearing books, musical instruments and shields.

The pulpit is composed of oak panels of fine Jacobean workmanship in the best style of the Renaissance. It would seem that the same taste prevailed in many of the villages in this part of the country, or that some skilled workman was ordered to renew the pulpits of the various churches. Just as the buildings are all Early English, rebuilt in the Perpendicular period with square towers, so the fonts in several are the still earlier Norman ones and the pulpits carved oak of the Renaissance style. Beaminster has lost its font, the present one being quite modern, as are the sedilia and the chancel-screen, the stalls and the seats in the body of the church. Some few years ago square pews and a gallery were destroyed; but the Conservative inhabitants still delight to sit and pray upon the same spot that was formerly covered by the family pew! How the gallery people manage I do not know. The glass is more or less bad; how rarely can one give a more favorable verdict of modern glass-staining! But I cannot refrain from noting (though out of place here) that the east window of Romsey Abbey Church is exceedingly brilliant and about the best example of modern work one knows in this country. The design may be somewhat confused, but nobody wants pictures on glass; as to the color, it is transparent and glowing—simply exquisite. It is the work of Messrs. Powel, of Whitefriars.

In the south aisle are two monuments to the Strodes of Parn-

ham, the earlier one erected to the memory of Thomas Strode, a sergeant-at-law, who died in 1698, being a noticeable piece of Seventeenth Century work. The niche behind the figure is of black marble, the pilasters of red, the shell base of gray and the figure of white. The heraldic arms above are in color, and

the drapery over the bewigged member of the law is partially gilt. There is a certain fitness in the central figure which is not ungainly; but the little cupids, representing Grief and Prayer, are charming in line and graceful in attitude. This period of sculpture is foolishly tabooed and often boycotted, as at Romsey, where a tomb is placed in a disused chapel, upon the site of an altar, because it disfigured the nave! The other monument is later, of gray and white marble, with the sarcophagus, pyramid and "Religion" business—to the profane mind suggestive of a Roman toga-ed man in a bath, being held down by a female attendant.

The free school, founded by the father of Lords Bridport and Hood, the celebrated naval heroes, seems, at all event for a time, to be non-existent; but the birthplace of the Hood family still remains the Manor Arms, an old stone-mullioned building. More interesting is the old Tudor mansion of the Strode family, "Parnham." A long avenue of elms leads to the house, and from the terraced garden is a vista lovely to behold of intersecting green hills, with the Church of Netherbury in the distance. The hall was built by John Strode in 1449, but Nash destroyed it by reducing it to a bald-walled, flat-ceilinged, uninteresting and commonplace room.

SOPHIA BEALE.

BOOKS AND PAPERS

WE have at last received the three parts which complete this interesting work.¹ The first part appeared some two years ago or more, and was reviewed in this journal October 18, 1902. The author, in his preface, says: "The large amount of good Renaissance architecture remaining in Bath seems a sufficient reason for giving a more minute account of it than has appeared since the days when the elder John Wood published his '*Essay Toward a Description of Bath.*'"

No doubt the revival of Classic architecture which took place

¹"*The 18th Century of Architecture of Bath.*" by Mowbray A. Green, A.R.I.B.A. Illustrated by measured drawings, photographs and sketches. Bath: G. Gregory, 1904. Published by subscription £1 11 6.

in Bath and elsewhere toward the end of the 18th Century might be termed a Renaissance, but the word is generally applied to the style of architecture which was introduced into England in the 17th Century and called Jacobean, and which had been a classical revival in Italy and France nearly a century earlier. The Bath revival was essentially Classic both in construction and detail, much of the ornament being that of ancient Greece and Rome.

The architects, John Wood and his son, had a chance which falls very rarely to men in the profession, the same kind of luck which fell to the lot of Christopher Wren, for they were practically allowed to rebuild Bath, just as Wren was called upon to re-stock London with churches. And it must be allowed that if much that was interesting was swept away and destroyed, the Woods conceived and carried out some grandiose ideas. They looked upon the city as a whole, and streets and squares were built with a harmony of style rarely seen. The Regent Park in London, and the approach to it by Regent St. and Waterloo Pl., were conceived in the same spirit, but Nash only had bricks and stucco to work in; the Woods had stone. Indeed, it was to prove the utility of one particular quarry in the neighborhood that the elder man built that rambling block of stone called Prior Park.

When one looks at such designs as the Circus, with its three stories of coupled columns (324 pairs with, respectively, Doric, Ionic and Corinthian capitals), one cannot but feel that the younger Wood was a great architect with grand ideas. The Crescent is equally fine, but the columns are single.

In the details of ceilings, balusters, fireplaces, halls, pavements and so on, this sumptuously illustrated book is overflowing with exquisite designs. The bridge in Prior Park is almost an exact copy of the Palladian bridge in Wilton Park, attributed by Mr. Green to Robert Morris, but there is, I believe, no question that Sir William Chambers was the architect. The Wilton bridge was built in 1736; the Bath one some time after 1737, when the work at Prior Park was commenced. Whether Wood had Chambers's working drawings or whether both bridges were built from some plan or description by Palladio is not known.

The book is rendered more interesting by a chapter on the Bath Theater Royal and the fac-simile of a letter by Mrs. Siddons in which she says taking leave of the public is to her "awful and affecting." She feels "as if her foot were now on the first round of the ladder which reaches to another world." Another chapter is devoted to Mrs. Piozzi, the friend of Dr. Johnson. What a marvelous place Bath must have been in those days, when all the rank and fashion, the intellectuals and the warriors paraded up and down the terraces overlooking the Avon, with hills and Widcombe and Prior Park beyond! Now the North and South Parade are choked by houses, the view is mostly chimney pots, and the Avon neither clean nor classic.

EARTHQUAKE-PROOF BUILDINGS.

THE following from Mr. J. H. Stephens appears in *Indian Engineering*: "There has been a good deal said about the late earthquake in all the papers, and its effects on buildings. Its effects on all descriptions of buildings seem to have been disastrous, but more particularly so on those of a more solid character. The rules of the storms seem to apply to earthquakes. The bending willow escapes, whereas the unyielding oak is taken up by the roots. Whether the earthquake be volcanic or tectonic, the effect on buildings seems to be very much the same. Also it is no respecter of persons. It enters palaces and huts and damages both, showing its powers more forcibly on the larger rather than on the smaller constructions. If houses in India could be built in wood they would suffer less by earthquakes. If of rubber or other elastic material they would probably not suffer at all. But what if we could rest the foundations of our buildings on a cushion of rubber, water, or sand? Would the shock of the earthquake be less?"

"It has been found that when a building rests on a bed of clay it is liable to continual motion. In the wet weather the clay expands and the building is raised upward. In the hot weather the clay contracts and the building is lowered. The result is that such buildings, however well constructed, are very much cracked. The clay bed seems to have lines of least resistance, which can be traced for miles in the hot season by open fissures in the surface of the earth. Where a building intercepts such

a fissure in the surface of the clay bed there is a large crack in the walls and roof of the building. However good the quality of the construction, nothing can save the building from cracking, and the opening is invariably in line with the cleavage in the bed of clay. In a town like Madras, where houses are pretty near to each other, and the line of cleavage in the clay cannot be traced, it is yet found that buildings on a clay subsoil, however substantially built, invariably show cracks in the walls as the seasons change from hot to dry, and in some cases that the walls also take a slight tilt to one side. This has been going on to my knowledge in several very fine houses in Madras for about twenty-five years without any other harm or danger to the houses. This is due entirely to movement in the clay subsoil.

"To counteract this movement in building on clay subsoils in Madras, Mr. Chisholm, Mr. Irwin and myself always went down to permanent moisture in the clay subsoil, filled the trench with 2 or 3 feet of compressed sand, and started our foundations on this sandy bed. Such building, though erected on clay and subjected to all the variations of expansion and contraction in the clay subsoil, yet never cracked. Is this due to the cushion of sand below the foundations? If a cushion of sand can protect a building from the motion due to the contraction and expansion of the subsoil, can it also, in a certain degree, protect a building from the motion due to an earthquake? Do you not think that the matter is worth experimenting on? In Calcutta and in the North generally, where earthquakes have already done so much damage, I am not aware that any attempt has been made to protect buildings or to do anything to mitigate the evil. It is hopeless perhaps to do anything to existing buildings. But I understand that large building schemes are in the air, especially the grand Victoria Memorial. Can nothing be done to protect these? A good cushion of sand has been frequently tried down South, and has resisted the motion in the subsoil caused by expansion and contraction. It is true that this motion is slow compared to the motion in the subsoil caused by an earthquake, but what has done complete good in one case may do a little good in the other. At any rate, it ought to be worth experimenting on. There may be ways of using this or any other material by which half the shock of an earthquake may be averted.

"I would like to see this matter fully discussed in your Journal. I do not pretend to know more than others regarding the manner in which an earthquake accomplishes its work of destruction. But after late experiences, I do feel that the whole profession should assert itself, and bring all its varied experience in the past to fight the powers of the earthquake. And if every engineer and practical scientist does his little best in this direction, I am sure that we will succeed. Vibrations in the air, caused by the firing of heavy guns, and its destructive effects on buildings, can be, and have been, in one case, effectively stopped, and similarly, vibration in the subsoil, possibly, can be stopped so far as it affects a building."

ILLUSTRATIONS

FIRST CHURCH OF CHRIST, SCIENTIST, CENTRAL PARK WEST AND 96TH STREET, NEW YORK, N. Y. MESSRS. CARRÈRE &

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Additional Illustrations in the International Edition.

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NOTES AND CLIPPINGS.

THE VICTOR EMMANUEL MONUMENT, ROME.—Year by year and almost month by month, with that indecent haste which characterizes our time, New Rome engulfs, envelops and smothers the ancient city. Here and there, it is true, skilful excavations are unearthing fresh ruins of temples or the stumps of columns; but much as they rejoice the souls of archæologists, these excavations do not make up for the havoc wrought by the architects. The colossal monument to Victor Emmanuel draws near to completion; already its blinding whiteness begins to show above the scaffolding and canvas which have hitherto concealed it. They say that to make room for it a bit of the charming Palazzo di Venezia will have to be sacrificed. The huge thing dominates the Forum and dwarfs the Capitol. I do not pretend to say that it is too big, if by its size we are to measure the greatness of Victor Emmanuel's service to Italy. But it is out of all historic proportion. Hard by stands Trajan's memorial, taking up but a modest space except in height, and Marcus Aurelius has to put up with a beggarly equestrian statue. Out of respect to the venerable shades which haunt the ancient city, where precious things, rich with the rust of centuries, fill such a little space, one would like to see the glory which is at best but a half century old demeaning itself more modestly. Be this as it may, one feels in standing before this monument, or before the great hotel they have built alongside to keep it company, or in strolling down boulevards threaded by tramways, or old streets, where the trolleys go whizzing by—one feels, I say, that the conquest of ancient Rome by the modern world is already an accomplished fact. Long as was the resistance, it is over now; the metamorphosis begun will be carried to its logical conclusions. For all this, the conquest is not all on one side. It is well known that the conquered are wont to leave their mark upon the conqueror; so it is with Old Rome. Ringed round by an unfriendly circle of new boulevards, new quarters, stared down upon from the heights of the Janiculum by the colossal statue of Garibaldi, the ancient city with its narrow alleys, its ruined temples and theatres, its magnificent palaces, its churches, its fountains, preserves indomitable its ancient spirit, infecting with it all who come within its boundaries.—*Edouard Rod, in Figaro.*

SCHOOL OF ARCHITECTURE AT ROUEN, FRANCE.—The French Government has inaugurated at Rouen, under the direction of the École des Beaux-Arts, a school of architecture, open to foreigners as well as to French citizens. Foreigners (of both sexes) who wish to enter this school must be provided with a letter of introduction from the ambassador, minister, or consul-general of their country, giving the date and place of birth of the candidate for admission. Candidates must produce certificates showing that they are prepared to undergo the necessary examination for admission. The age limit is from fifteen to thirty, both years inclusive. The studies are exactly the same as the course at the Paris school, and the diploma is that of architecture issued by the French Government.—*The Builder.*

THE ROOF OF YORK MINSTER.—The roof of the nave of York Minster is timber painted to look like stone. The dean and chapter propose to increase the illusion by putting up flying-buttresses outside, as though they were needed to offset the outward pressure of a heavy roof upon the walls. Experts assert that these buttresses, by producing an inward thrust, will impair the stability of the splendid nave. This project is likely to excite as much hostility and controversy as the recent reconstruction of the west front of Peterborough Cathedral or the late Lord Grimthorpe's drastic measures for the restoration of St. Albans. Diocesan authorities at Ely, with more practical minds, have decided to sell the Bishop's London residence, in Dover St., off Piccadilly, in order to help out the stipend of the new Bishops of Suffolk and Essex. The Bishops of Ely have had a London residence for nearly seven centuries, first the famous palace of Holborn, where John of Gaunt died, and since the time of the Georges in the gloomy Dover St. house.—*I. N. F. in New York Tribune.*

ARMORED CONCRETE FOUNDATIONS.—In consequence of the treacherous nature of the clay soil, a small house recently erected from the designs of M. Cappé in Paris has been provided with a foundation consisting of an inverted arch of armored concrete having an internal radius of 34 ft. 4 in., being 19.6 in. thick, and

extending over the whole length of the site, which is 61 ft. 3 in., with a span of 26 ft. 8 in. The ground was carefully excavated to the form of the extrados of the arch, which was then carried out in concrete of the requisite thickness, with abutments at each side, in which longitudinal flat-iron bars 1½ in. by ¾ in. were anchored, with occasional upright anchor bars. The internal space in the hollow of the arch was then filled with damp river sand, well rammed in shallow layers and finished with a perfectly level surface at the springing-line of the arch. On this a layer of concrete 3.93 in. thick was laid with bars of hoop-iron embedded at intervals, strained across and hooked over the anchor bars in the abutments, so as to form a continuous tie, and to counteract any tendency in the concrete arch to spread. Full details of the construction are given in the *Nouvelles Annales de la Construction* for May.

KING LEOPOLD TO BUILD A BELGIAN PANTHEON.—King Leopold, after having been throughout a considerable portion of his reign in relatively straitened circumstances, owing to the immense sums embarked in those Congo Free State enterprises that for many years were wholly unproductive, is now obtaining from these investments such enormous returns that he literally does not know what to do with his money. As his relations with his three daughters are the reverse of pleasant, he has no desire whatsoever to do anything for them in a financial way, and rather than that they should benefit in any degree by his wealth prefers to expend it on the nation, thereby acquiring—a little late in his reign, it is true—a name for generosity, if not to his family, at any rate to his people. It was not long ago that he deeded the whole of his extensive landed estates in Belgium to the Belgian nation, to take effect after his death, a gift, however, which may possibly remain inoperative, owing to his failure to consider the rights of his children in the matter. He has also deeded in the same way his colossal private interests in the Congo Free State to the Belgian nation, and now, in order to signalize the celebration this year of the seventy-fifth anniversary of the proclamation of Belgium's independence, he has decided to endow the Belgian people with a magnificent Pantheon, destined to honor Belgium's illustrious dead. It is to cost \$9,000,000, paid out of his privy purse, and is to be constructed in that part of Brussels known as the "Namur Gate Quarter." The site has already been acquired, and the buildings by which it is occupied are being torn down, including the well-known Théâtre Molière. The King's favorite architect, Bouvard, a Frenchman, has been intrusted with the designs, which, like the Pantheon, or German Walhalla, erected by King Louis I. of Bavaria at Donaustauf, near Ratisbon, is an almost exact copy of the Parthenon at Athens. It will, when completed, prove the most noble monument of the Belgian capital and permanent memorial of a King who, despite certain unpleasant features of his private life, has, by his cleverness and statesmanship, secured for Belgium in the concert of nations a place and an importance altogether out of proportion to her small size and population.—*Marquise de Fontenoy in New York Tribune.*

EXCEPTIONAL CONCRETE-STEEL ROOF GIRDERS.—The Leonardt Warehouse, in Los Angeles, designed by Mr. L. J. Mensch, C.E., of Chicago, is interesting for several reasons. It includes the longest span concrete-steel roof girders hitherto constructed, the walls are built of concrete blocks—the newest form in which cement is applied to building construction; the sky-lights are of armored glass, an excellent fire-resister, which does not seem to meet with much more than theoretical approval in this country, and the roof girders carry two suspended galleries 16 feet wide, and calculated for a floor load of 150 pounds per square foot. While the combination of novel methods in this building is useful as an object lesson to conservative natures, the most noteworthy feature is the great span of the roof girders. These members are straight on the under side, and the upper surface slopes up toward the center, where the depth is 6 feet 6 inches, the width being 14 inches, and the span 102 feet. The greatest span hitherto attempted in concrete-steel is less than 60 feet, and the girders here mentioned constitute a remarkable example of the adaptability of this material. Further, the whole building, with a floor area of 104 feet by 150 feet, was completely built in less time than would have been taken by the preparation of the steel roof trusses originally contemplated. The concrete-steel girders cost a little more than the estimated price of steel trusses, but by the substitution of concrete blocks for brick sufficient saving was effected in the walls and footings to counterbalance the difference.—*The Builder.*

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, JULY 8, 1905.

No. 1541.

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AMONG the old-fashioned beliefs that are being set aside as too antiquated for observance, we are tempted to include the one that accords any virtue to trial by jury, so often does a judge nowadays set aside, disallow or change in some way a jury's finding. The notorious "Westminster Chambers" case seems to be one in which the Massachusetts courts take such delight that they seek to keep alive, as if it were another Jarndyce case. A few weeks ago we recorded that the jury had awarded the plaintiffs damages against the city of Boston in the sum of \$485,091. We have now to add another chapter to the story, for Judge Schofield, of the Superior Court, before whom the case was last tried, after a hearing in chambers has, because of some power he finds vested in himself, reduced the award by the sum of more than \$125,000, on the ground that the award made by the jury was "excessive." Judge Schofield kindly allows the plaintiffs and defendant twenty days to consider whether they will accept his action, declaring that if they do not he will set the verdict aside altogether and order a new trial. The lay mind is puzzled by such seemingly purely autocratic action.

THE disadvantages of lack of co-ordination in legal requirements that are in one direction impressed on automobilists nowadays through the variation of local speed-limits, and in another are brought home to those hindered in securing a divorce through variation between the statutes of the several States, have, in still another quarter, attracted the attention of the New Jersey Chapter of the American Institute of Architects to the difficulties and annoyances to which architects and builders are subjected through the needless variations of the building requirements of different cities throughout the State. The Chapter, feeling not only that the building community is needlessly harassed by these quite unnecessary variations, but that much private loss to owners

and some public danger accompany the present condition of things, has formulated a resolution calling on the various municipalities of the State to appoint commissions to discuss and adopt a general code of building regulations that shall have application to all the towns in the State. New Jersey is a compact little State and has an unusual number of towns of approximately the same size, the consequence being that builders operating in several adjacent towns are very likely to forget that what is permissible in X— is altogether forbidden in Y—, whereas actual conditions are such that the same building code could fairly be made to apply to both. The New Jersey Chapter in seeking to promote the formulation of a general law has rendered just the sort of service to the public that such an organization should undertake to render.

THE Washington reporters seek to create a reputation as a philanthropist for the late Secretary Hay, on the ground that he became largely interested in the Washington Housing Association, an organization that has for its field of operations the building of two-story tenement-houses adapted to provide comfortable, well-built and sanitary dwellings for the working-classes, both white and colored. There is certainly no class of society more worthy of philanthropic attention than that which includes the workingman, and there is no class which is treated with so little economic consideration, no class which has to pay as great an excess over real value, and consequently no class from which a profit is so unfairly extorted. To provide people of this class clean, comfortable and safe dwelling-places at cost price would properly be held to be a philanthropic act; but it seems to us that it is a misuse of words to say that the organization in which Secretary Hay invested so much money is engaged in philanthropy, when the rentals are based on a scale to yield the stockholders dividends of 3 per cent. As the organization doubtless holds the sites of its buildings in fee simple, it seems to be engaged in a very safe speculation, being able to hold its property for a future rise in real-estate values and meanwhile receiving 3 per cent. annually on the sums invested. It is a matter for congratulation that the tenants as well as the stockholders are satisfied, but that only means that it is a fair and honorable business transaction where both parties derive a benefit through dealing with one another. The late Secretary seems to have shown good business sense in his investments, but we question whether he considered himself a philanthropist because of having made them.

A RATHER unexpected piece of information comes from Washington in the shape of a statement that sixty draughtsmen have been discharged from the office of the Supervising Architect with the close of the fiscal year, because there was not enough work on hand to give them employment! We are familiar enough with the discharge of Government employes just after an election, when their votes are no longer needed, or because the unwise expenditure of appropriations has exhausted

available funds and no more can be had because of the existence of a Congressional recess, but the discharge of skilled workmen, who should be normally and regularly employed, because there actually is nothing for them to do is a noteworthy, and in some ways a most discreditable, incident. Discreditable, since workers in the arts of peace are discharged while the workers in the science of destruction are kept busy, although at the very moment our Chief Magistrate is posing as the high particular advocate of peace! We fancy that the Supervising Architect, Mr. Taylor, must, with very mixed feelings, have notified his sixty draughtsmen of their discharge, for though in his annual report for last year he professed "pride and pleasure" in being able to report that the work of the office was "more nearly up to date than it has been for many years previously," he can now hardly relish having so thoroughly caught up with it that there is nothing, comparatively speaking, now left undone. We believe that a Congressional majority now feels it was a mistake to allow Speaker Cannon to sidetrack the "omnibus" Public Building bill at the last session.

WITH woven fabrics as a constructive material, the building fraternity has little to do; in fact, the employment of cotton duck as a roofing material is the only instance we can recall of a true constructive use of a loom-woven fabric of vegetable or animal origin, for though wire netting is unquestionably loom-woven it hardly counts as a fabric. But it is just possible that there may be conditions where, unless a woven fabric can be used, much time and money must be spent. We do not know the exact conditions under which many bolts of the cheap and common cheese-cloth were used by the Commonwealth of Massachusetts in building a certain section of State highway on the island of Nantucket. But the material was used and with success, where, seemingly, the heavier burlap could not be used, to secure a foundation upon which to build up proper underbody and surface for a highway. It is just possible that in building operations there might at times be encountered cases of quicksand, where draining is impossible and the use of some freezing process too expensive, where cheese-cloth spread over the quicksand would hold in place successive layers of concrete and cheese-cloth long enough to set and so form a sort of floating platform which would answer much the same purpose as the floating bed of clay that serves to give frictional support to the pilings of many of Chicago's earlier and lighter buildings.

EVER since architects and engineers gained a fair knowledge of the treacherous character of the soil underlying Chicago, they not only have exercised extraordinary care in the construction of their foundation work, but have devised systems of distributing loads that have made practically safe many very unusual building operations. But it has always been understood that any serious draining of this subsoil would not only imperil the old buildings that rest on piles, through allowing the piles to rot, but would cause such general settlement in the upper strata as would be almost sure to bring disaster on many of the later buildings. Consequently, the operations of the Illinois Tunnel and Conduit Company have been watched with much anxiety and close atten-

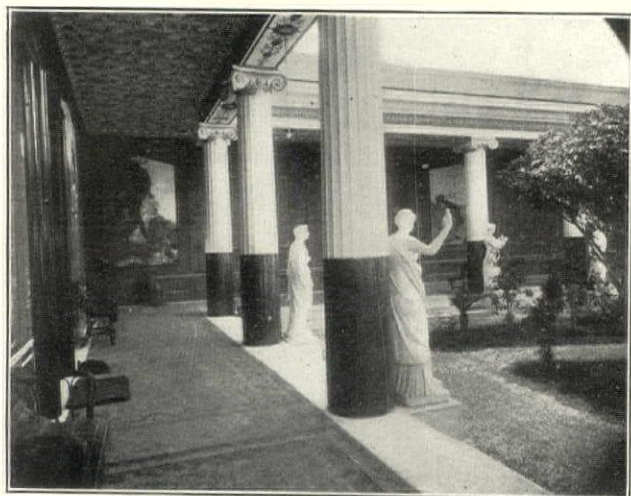
tion, as it was felt that the pumping operations which enabled the building of the tunnels constituted a very dangerous drainage of a large part of the built-up area of the city. The settling of the street surface recently along the route of the new freight tunnels in many of the downtown streets has been marked enough to attract general public attention, and this is far from being a bad thing, although it gives the sensational newsmonger an unusually good chance to be extra gloomy.

CONSIDERING it was for many years held that tunnel-building was beyond the capacity of American engineers, proof in support of the belief being found in the repeated quiescences of the North River tunnel, our engineers have recently accomplished some remarkably successful work in that line, although the largest piece of work that is now called a tunnel—the New York Subway—was not a piece of true tunnel-building, since by far the greater part of its length was built in the open cut. Again, in Boston, where the interesting "slice method" of building has been so successfully used, hardly any of its subway system, save the East Boston tunnel, can be said to have been built by tunneling, as the term is understood in London and Paris, yet as engineering operations the subway work in lower Broadway, New York, and Washington Street, Boston, have been far harder to conduct to a successful issue than the deeper bore-holes in London.

THE easy complacency of the average American citizen is never more conspicuous than in the matter of enduring needless exposure to explosions, intended or unintended. The risk from what may be called the domestic explosive—the lamp, the water-tank, the heating apparatus and the automobile—must be endured, simply because no man of us all can keep his own skirts so free from blame as to allow him the right to call down the law's compulsion on his neighbor. Chemical explosions—soda fountains, drugs, fireworks in storage or in course of manufacture—also must be accepted philosophically, but when it comes to explosions that may be called industrial and intended, explosions deliberately planned and prepared for, the public has a right to hold to the strictest accountability anyone who allows such explosions to cause damage to the property or person of another. Yet the public powers allow blasts to be fired by ignorant quarrymen in crowded neighborhoods and think it quite a matter of course that, as happened in New York last week, the windows of a public school should be shattered by the pieces of rock hurled through them amongst the children from an improperly secured blast in a neighboring sewer. This latest incident should assure Fire Commissioner Hayes that he had decided none too soon to establish a squad of fifteen firemen who are to have the supervision of the firing of all blasts in the city hereafter. The idea of a real supervision is an excellent one, but fifteen men, however active, is rather a small force for the purpose and the only way they can work effectively will be to have all blasts fired at the same hour, after examination and approval. But this would not only make such hour of the day one to be looked forward to with dread by all nervous people, but would also seriously delay building and engineering operations.

THE VILLA ACHILLEION.

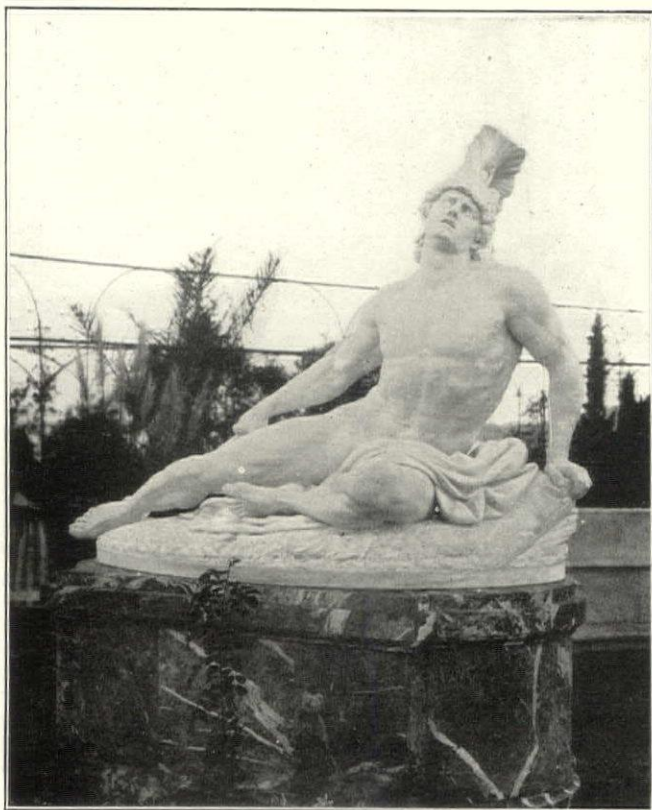
ITS rocky coasts bathed in the deepest of blue seas, the Island of Corfu nestles below the projecting Greek coasts of Epirus, separated from its mother soil by a narrow and deep channel of the Adriatic. The natural beauties of this island are constantly attracting visitors from various parts of the world: from Italy, Austria, Germany and France, and even



AN ANGLE OF THE PORTICO: VILLA ACHILLEION.

from the British Isles, come numbers who spend here the pleasant months of the late winter and early spring.

It was here, upon this isle, green with olive and vine, that the late Empress Elizabeth of Austria built the Villa Achilleion, which she was destined to enjoy but a very few years. Upon a high bluff, overlooking the sea toward the East, and but six miles south of the city of Corfu, this country-seat was completed in 1891 from the plans of Raffaello Garitto, of Naples. Evidently



"ACHILLES:" IN THE GARDEN OF THE VILLA ACHILLEION.

greatly admiring the brave Achilles, the Empress decided upon the name of Achilleion, placing in her residence here a fine painting of the hero leading his forces, and in the garden a fine statue of Achilles, the work of the sculptor, G. Herter, of Berlin. Upon the construction of this house and grounds there were expended \$1,600,000, and for the furniture of the residence the further sum of \$800,000.

Portions of the house adjoining the garden are excellent and the lovely vistas, obtained from various points, are delightful. The garden plan is well arranged upon a central axis, with the principal portion of the residence at its upper end. While the porticos of the building surround the upper level of the garden upon two sides, it is open toward the sea upon the east, and upon the fourth side, at the north, the main axis of the gardens descends by stages and its paths finally fade away and disappear toward the sea below. At these different levels are to be found many fountains, terraces, vistas and dainty seats and statues of various kinds, some of these being reproductions of well-known works at Pompeii. The charm of this garden, placed upon such a favored site, with the odors of roses, honeysuckle and orange, and the green of olive, palm and vine, with its fountains and its vistas, both near and distant, is hardly to be equaled in any other nook on the Mediterranean.



WEST PORTICO: VILLA ACHILLEION.

After the death of the Empress this entire country-seat was offered for sale by the Emperor, and a Belgian company has endeavored to buy the estate. This company proposed to convert the present building into a casino and to rival Monte Carlo with a pleasure resort at Corfu. It offered the Emperor \$200,000 in cash with promises of an annual income of \$20,000 for twenty-five years, and agreed to erect public baths and make general improvements for the city of Corfu, amongst others to construct a car line to the Villa from the city. In this way it secured the consent of both the Emperor and the civil authorities. The Island of Corfu, however, is governed by the King of Greece, who at present refuses to allow such a gambling resort in his domains, and it is probable that the Villa Achilleion will remain unoccupied for some time to come. FRANK E. PERKINS.

HEATING AND VENTILATING.—X.

THE proper care of a heating system is as important to its successful operation as the first design, and it therefore becomes necessary for the architect or designing engineer to understand the principal points of its management so that he may be able to give suitable instructions to the operating engineer who is to take charge. Such information is also necessary to determine the cause of difficulties which may come up later should they be due to faulty management.

¹Continued from page 200, No. 1539.

Starting in the boiler-room, special care should be given to the quality of the fuel and the methods of firing. All flues and smoke passages should be kept free and clear from accumulations of soot and ashes by means of a brush or steam jet. Pumps and engine should be kept clean and in perfect adjustment, and extra care should be taken when they are in rooms through which the air-supply is drawn, or the odor of oil will be carried to the rooms. All steam traps should be examined at regular intervals to see that they are in working order, and upon any sign of trouble they should be taken apart and carefully cleaned.

The air-valves on all direct and indirect radiators should be inspected often, and upon the failure of any room to heat properly the air-valve should first be looked to as a probable cause of the difficulty.

Adjusting-dampers should be placed at the base of each supply flue so that the flow of air to each room may be regulated independently. In starting up a new plant the system should be put in proper balance by a suitable adjustment of these dampers, and when once adjusted they should be marked and left in these positions. The temperature of the rooms should never be regulated by closing the inlet registers. These should never be touched unless the room is to be unused for a day or more.

In designing a fan system provision should be made for air rotation, that is, the arrangement should be such that the same air may be taken from the building and passed through the fan and heater continuously. This is usually accomplished by closing the main vent-flues and the cold-air inlet to the building, then opening the class-room doors into the corridor-ways and drawing the air down the stair-wells to the basement and into the space back of the main heater through doors provided for this purpose. In warming up a building in the morning this should always be practised until about fifteen minutes before school opens. The vent-flues should then be opened, doors into corridors closed, and cold-air inlets opened wide, and the full volume of fresh air taken from out of doors. At night the dampers in the main vents should be closed, to prevent the warm air contained in the building from escaping.

The fresh air should be delivered to the rooms at a temperature of 70 deg. to 75 deg., and this temperature must be maintained by a proper use of the shut-off valves, thus running a greater or less number of sections of the main heater. A little experience will show the engineer how many sections to carry for different outside temperatures. A dial thermometer should be placed in the main warm-air duct near the fan, so that the temperature of the air delivered to the rooms can be easily noted.

The exhaust steam from the engine and pumps should be turned into the main heater; this will supply a greater number of sections in mild weather than in cold, owing to the less rapid condensation.

HOSPITALS.

The best system for heating and ventilating a hospital depends upon the character and arrangement of the buildings. It is desirable in all cases to do the heating from a central plant rather than to carry fires in the separate buildings, both on account of economy and for cleanliness.

In the case of small cottage-hospitals with one, three or four buildings placed close together, indirect hot-water affords a desirable system for the wards, with direct heat for the other rooms; but where there are several buildings, and especially if they are some distance apart, it becomes necessary to substitute steam, unless the water is pumped through the mains. For large city buildings, a fan system is always desirable. If the building is tall compared with its ground area, so that the horizontal supply ducts will be comparatively short, the double-duct system may be used with good results. Where the rooms are of good size and the number of supply flues not great, the use of supplementary heaters at the bases of the flues makes a satisfactory arrangement. Direct radiation should never be used in the wards when it can be avoided, even in connection with an independent air-supply, as it offers too great an opportunity for the accumulation of dust in places which are difficult to reach.

It is common to provide from 80 to 100 cubic feet of air per minute per patient in ordinary wards, and from 100 to 120 cubic feet in contagious wards.

The usual ward building of a modern cottage-hospital generally contains a main ward having from 8 to 12 beds, and a number of private rooms with one bed each. In addition to

these, there is a diet-kitchen, duty-room, toilet-rooms, bath-rooms, linen-closets and lockers.

For moderately sheltered locations 30 square feet of indirect steam radiation has been found sufficient in zero weather for a single ward with one exposed wall and a single window, when upon the south side of the building. For northerly rooms, 40 square feet should be used. In exposed locations the heaters may be made 40 and 50 square feet for south and north rooms respectively. The standard pin-radiators, rated at 10 square feet of heating-surface per section, are commonly used for this purpose. In case hot-water is used, the same number of sections of the deep-pin pattern, rated at 15 square feet each, may be employed, making a total of 45, and 60 square feet per room. For corner rooms having two exposed walls and two windows, the amount of radiation should be increased about 50 per cent, over that given above.

In the case of the main wards, each bed should be treated as a single room with one exposed wall unless the ratio of wall and window surface per bed is greatly out of proportion.

The warm air in both large and small rooms is usually admitted through wall registers placed just below the windows.

One of the most satisfactory arrangements for the cold-air supply to the heaters beneath the main ward is to use the whole basement as a cold-air chamber, with inlets upon both sides. The heating-stacks are suspended at the ceiling with casings having open bottoms and taking their air-supply directly from the basement. The air-supply to the heaters for the private wards may be taken from the cold-air chamber under the main ward or they may have separate inlets from out of doors, as is most convenient. In any case there should be at least 3 square inches area in the ducts for each square foot of radiation in the heaters. The steam mains and branches to the stacks are left uncovered, and so supply enough heat to produce a layer of warm air at the ceiling, and thus prevent the floor above from becoming cold. Figure 41 shows a stack

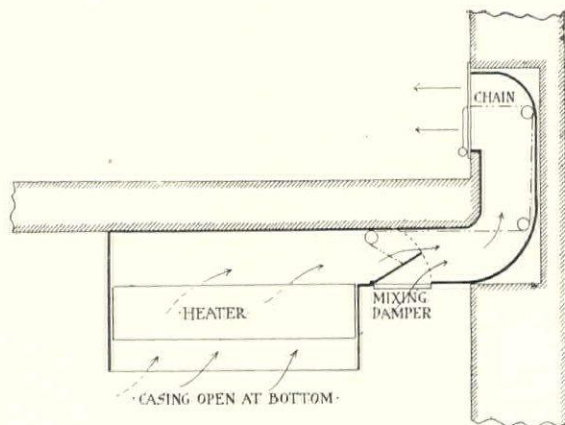


FIG. 41.

arranged in the manner described. The cold-air inlets to the basement air-chamber should be furnished with cloth checks, and the total opening required should be provided on each side of the building.

The warm-air ducts exposed in the basement, and the back and sides of the flues running up in the outside walls should be covered with an inch of good insulating material such as seaweed quilting or plastic asbestos or magnesia. If the quilting is used, that portion exposed in the basement should be covered with canvas. The area of the warm-air flues should be about 100 square inches for each bed. A flue 6"x16" is commonly used in single rooms. The wards are usually provided with fireplaces, and these may be utilized for the discharge ventilation. The flues should not be less than 8"x12" for single wards, and the equivalent for each bed in the large ward. Each flue used for this purpose should have a loop of steam pipe for producing a draught. A loop of 1-inch pipe, 10 or 12 feet high, is usually sufficient for this purpose. It should be brought into the flue above the throat of the fireplace, and if made of extra-heavy pipe will not be injured by the heat from the fire. If there is a fireplace in the large ward it should be of ample size and provided with an aspirating coil. In wards containing 10 or 12 beds good results have been obtained by providing a fireplace at one end, having a flue area of about 4 square feet, with an aspirating coil of 20 square feet of heating-surface, in the form of a return-bend coil placed in an inclined position on its side across the flue. Another vent of the same size should be pro-

vided at the other end of the ward, preferably near the ceiling; this is especially for summer use, but may be used at other times when the fireplace does not prove sufficient. Adjustable shut-off dampers should be placed in each of the vents and provided with chains for operating from the floor. Small wards having no fireplace should have a galvanized-iron vent-flue with a connecting register near the floor. Other rooms, such as diet-kitchen, bath-rooms, etc., should have vent-flues of about 1 square foot area each. All vents, except fireplaces, should be gathered in the attic space and connected with one or more main vents passing through the roof. The roof ventilators may have an area of from .7 to .8 of all the flues connecting with them, and should be provided with suitable cowls or heads, and shut-off dampers which can be operated from the floor beneath. The vents from the small rooms should be provided with steam loops the same as the fireplace flues.

Other rooms than wards are usually heated with direct radiators, the sizes of which may be computed in the same manner as for dwelling-houses. The operating wing may be treated in a similar manner to the wards. Sufficient air should be provided in the operating, etherizing, and recovery rooms to change the entire contents at least ten times per hour. The radiating-surface for heating and ventilating may be computed by the methods already given, allowing an efficiency of 500 B.T.U. for steam and 400 B.T.U. for water, under these conditions.

The large window and skylight in the operating-room is usually made with double sashes, and one or two lines of 1 1/4-inch pipe run around the outside, between them. A high-speed electric fan, 12 or 15 inches in diameter, for a small operating-room, placed near the ceiling and discharging into an outboard vent-flue is very useful for clearing the room of ether during or after an operation.

Steam-tables for the kitchen, sterilizers, and laundry machinery require a higher pressure than is necessary for heating.

If the grade of the different buildings is such that the entire heating system can be run with a gravity return to the boilers, it is best to do so and employ a separate high-pressure boiler for other purposes. A laundry mangle requires from 60 to 80 pounds pressure to operate successfully; sterilizers 25 to 30 pounds, and steam-tables 10 to 15, although 5 pounds is often sufficient for this purpose if the supply-pipes are made of ample size. A good arrangement for small plants, is to provide sufficient boiler power for warming and ventilating purposes, and run it at a pressure of 3 to 5 pounds. In addition to this a small high-pressure boiler carrying 70 or 80 pounds should be furnished for laundry work and water heating.

Steam at 25 or 30 pounds pressure for sterilizers and steam-tables may be obtained by the use of a reducing-valve, and the small amount of condensation trapped to the sewer.

In the case of large institutions the entire boiler plant may be run at high pressure, and reduced as required for the different purposes. When this is done, each reducing-valve must have its corresponding trap in the return, discharging into a vented receiver from which the condensation is pumped back to the boilers automatically. Where the buildings are much scattered, high-pressure steam may be carried in the mains and each building provided with its own reducing-valve and trap; the trap

When the buildings differ in elevation, it is necessary to establish false water-lines in the different buildings by the use of water-line traps discharging into a vented receiver located in the boiler-room.

Sometimes the buildings can be grouped so that one water-line trap will care for several buildings. Each building should be separately connected with the mains, and provided with valves so it can be shut off in case of accident or repairs. An arrangement for making the return connections without the use of a receiver is shown in Figure 42. In this case all traps discharge into a return main which is vented through the balance pipe of a pump regulator into the outboard exhaust.

The exhaust from the laundry engine should be turned into the drying coils, with a connection for admitting high-pressure steam through a reducing-valve, as may be necessary to make up the full amount required. The trap on the return should be arranged so as to discharge either to the receiving-tank or sewer

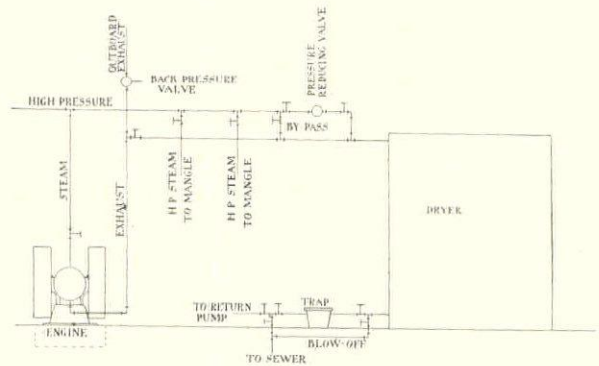


FIG. 43.

according as live steam or exhaust is used. Figure 43 shows a typical arrangement for laundry piping.

The necessary boiler power for heating water for laundry, kitchen, and bathing purposes may be taken as one horse-power for each five inmates, including both patients and attendants.

In large buildings where the double-duct system is employed all of the air is heated to the maximum required to maintain the desired temperature in the most exposed rooms, while the temperature of the other rooms is regulated by mixing with the hot air a sufficient volume of cold or tempered air at the bases of the different flues. This result is best accomplished by designing a hot-blast apparatus so that the air shall be forced, rather than drawn, through the heater, and by providing a by-pass through which it may be discharged into the ducts without passing over the heated pipes.

The quantity of heat required per room may be computed by first finding that necessary for ventilation, and adding to it the amount required to offset that lost by conduction through walls and windows.

The temperature to which the air must be raised to warm the coldest rooms may be determined as follows:

Select one having the greatest wall-exposure compared with the number of occupants and first compute the quantity of heat necessary to raise the required volume of air for ventilation from zero to 70 deg. Next determine the heat-loss by conduction through walls and windows, and find to what final temperature the air must be raised in order to furnish this additional quantity of heat. This process can best be shown by working a practicable example: The air-supply to a ward is 12,000 cubic feet per hour, and the heat-loss through walls and windows is 10,000 B.T.U. per hour. To what temperature must the entering air be heated to warm the room, and what will be the total heat required for both heating and ventilation?

The heat required for ventilation, that is for raising the air-supply from zero to 70 deg., is $\frac{12,000 \times 70}{55} = 14,000$ B.T.U., nearly,

and the total heat required is $14,000 + 10,000 = 24,000$ B.T.U.

The question now becomes, to what temperature will 24,000 B.T.U. raise 12,000 cubic feet of air?

This may be found by the formula—

$$\frac{\text{B.T.U.} \times 55}{\text{Cu. feet of air}} = \text{Rise in temperature.}$$

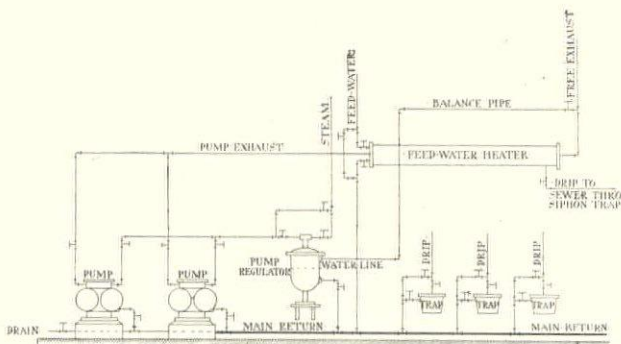


FIG. 42.

from each building discharging into a common main leading to a vented receiver. With systems like the above, carrying a high pressure, it is necessary to maintain a sufficient pressure day and night to operate the pumps, or the returns will become filled with water.

Substituting the quantities in the problem in the above, we have—

$$\frac{24,000 \times 55}{12,000} = 110 \text{ degrees,}$$

which is the temperature to which the above quantity of air must be raised in zero weather to warm the room. In designing a heater for this purpose the depth must be considered as well as the square feet of surface.

Pipe heaters for raising the air from zero to 100 deg. should not be less than 14 rows deep, and for a temperature of 130 deg.

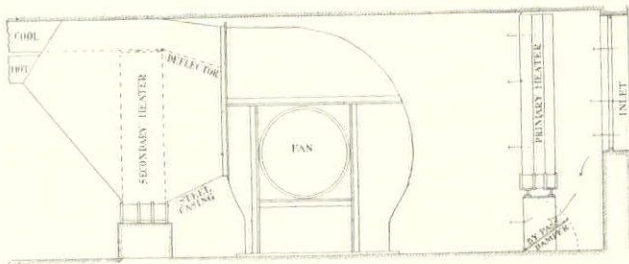


FIG. 44.

they should be 18 rows deep, for steam pressures of 10 to 15 pounds: and the efficiencies will be about 1,300 B.T.U. and 1,200 B.T.U. respectively. According to this, we should have to provide $24,000 \div 1,300 = 19$ square feet of surface in the main heater

for the room considered in the preceding example, and the heater should be 15 or 16 pipes deep. Instead of mixing the hot air with cold outside air, it is better to first draw all of the air through a primary or tempering heater, raising it to a temperature of 55 deg. or 60 deg., and then make the secondary heater of sufficient size to raise the temperature to the desired maximum.

When this arrangement is used the first heater may be made about 7 pipes deep and the second from 8 to 12, according to the temperature desired.

The total heating-surface may be computed the same as though it were all placed in one heater. When this is done both heaters should have the same over-all area, that is, they should have the same height and length, the only difference being in the depth or

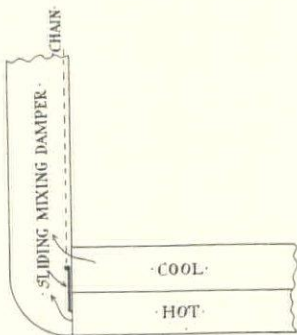


FIG. 45.

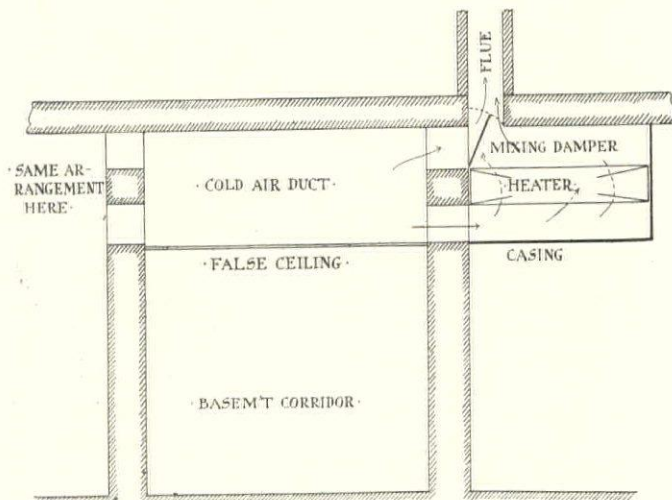


FIG. 46.

rows of pipe. Figure 44 shows a typical arrangement of fan and heaters and Figure 45 a common form of mixing-damper used for this purpose. In the best-equipped plants, graduated mixing-dampers operated by automatic means, controlled by thermostats, are used in place of hand dampers.

When supplementary heaters are used at the bases of the flues a primary heater of sufficient size should be provided to raise the air to 65 deg. or 70 deg., and the secondary heaters proportioned the same as in school-house work, that is, made one-half as large as a direct radiator would need to be if placed in the room.

Figure 46 shows a layout where the main basement corridor is used for an air-duct, with secondary heaters placed at each side.

Waiting-rooms, corridors, etc., may be heated with direct radiation if desired. Vent-flues of a size sufficient to remove .8 of the total air-supply at an average velocity of about 300 feet per minute should be provided, with the registers near the floor. The vents should be gathered into groups in the attic and connected with roof vents in the same manner as in school-house work.

C. L. HUBBARD.

(To be Continued.)

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ILLUSTRATIONS

For description, see article elsewhere in this issue.

THE VILLA ACHILLEION, CORFU, IONIAN ISLANDS. SIG. RAFFAELLO GARITTO, ARCHITECT.

APPROACH TO UPPER GARDEN: VILLA ACHILLEION, CORFU.
 GARDEN PAVILION: VILLA ACHILLEION, CORFU.

BIOLOGICAL LABORATORY OF THE CARNEGIE INSTITUTION, COLD SPRING HARBOR, LONG ISLAND, N. Y. MESSRS. KIRBY, PETIT & GREEN, ARCHITECTS, NEW YORK, N. Y.

HOUSE OF E. L. ROGERS, ESQ., LAWRENCE, LONG ISLAND, N. Y. MR. T. HENRY RANDALL, ARCHITECT, NEW YORK, N. Y.

INSTITUTIONAL CHURCH. MESSRS. ROOT & SIEMENS, ARCHITECTS, KANSAS CITY, MO.

BACHELOR APARTMENTS: W. 46TH STREET, NEW YORK, N. Y. MESSRS. ISRAELS & HARDER, ARCHITECTS, NEW YORK, N. Y.

SECTION AND ELEVATION OF THE SAME.

Additional Illustrations in the International Edition.

NEW YORK STOCK EXCHANGE, BROAD STREET, NEW YORK, N. Y. MR. GEORGE B. POST, ARCHITECT, NEW YORK, N. Y.

NOTES AND CLIPPINGS.

THE LOUVRE AS A GARAGE.—A new danger threatens the Louvre. The great palace of art has for years been imperiled by the presence of the Colonial Office in the wing on the river front, and each session the Minister of Fine Arts vainly asks that the Colonies shall be provided for elsewhere. The Colonial Minister never objects to the demand, but professes an equal solicitude for the safety of the picture galleries. Now, however, it has been discovered that the Colonial Minister has had a room fitted up for his automobile exactly beneath the Rubens gallery. An explosion of petrol might occur here any day, and then the far-famed collections might be burnt up.—*London Chronicle*.

A VERY, VERY FAMOUS BELL.—One reads in a London newspaper the simple announcement that the bells of Chertsey Parish Church will not be heard again for some little while. And why not? Two eminent London bell-founders examined them and pronounced the hangings unsafe. The newspaper goes on to remark that the Chertsey bells are accounted the finest eight-bell peal in the south of England. They were rehung in 1859, when the tenor bell, of 20 hundredweight, 14 pounds, was recast at the order of the Baroness Burdett-Coutts. There are two bells in the Lombardic capitals that are supposed to be all of 600 years old. And you would think that is all.

But it is not. It is No. 5 in this peal, called the "Abbey bell," about which is centered an incident more often mentioned in American schools than any other historic event, not excepting the creation of Adam, the utterance of Ethan Allen at Ticonderoga, or the last words of Nathan Hale. It may be said that the Abbey bell in Chertsey has started more orators on their fiery path to glory than any other bell, or object, or idea in the ken of man. It has delighted youth on the last days of school for many and many a year. No other bell has thrilled so many spines or clapped so many hands. Who does not recall the memorable scene when he got up on the platform, his knees shaking, his voice a timid and faint squeak, the room before him all floored over with grinning, mocking faces. He mumbled and stumbled through that "pome" he had rehearsed with such overpowering effect in the woodshed at home. He thought he must break down. Alone of all the blurred mass of faces in the room he could distinguish his mother's—more anxious than his own. He could see her lips moving with his. It was they that helped him over that word at the start that nearly stumped him. He gathered courage from her look. His voice grew stronger as he went along. And didn't he shout it out, I tell you, when he came to that line,

"Curfew shall not ring to-night!"

It was the Abbey bell at Chertsey that was not to ring that night, and that lives in Rosa Thorpe's lines to provide so much conceit to American youth and pride to American teachers and parents. American school children will next be subscribing a fund to keep the decrepit thing in repair, if the English should neglect to do it,

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, JULY 15, 1905.

No. 1542.

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WE believe that every community that has established a municipal art commission has been well satisfied, through experience, that such a body can be of the highest usefulness. At all events, such is the case certainly in Boston and just as surely in New York. As the New York body proves to have unexpected powers, it was only to be expected that attempts would be made to undermine it, and it is only natural that the first step should come in the shape of whisperings that it was very unfair that the members of the Municipal Art Commission should have to give so much of their time to their work and yet never be paid for it, and that, really, they ought to be salaried officials. It is a hardship, but in the fact that none but citizens of the highest type will give without recompense the time needed to fulfil their duties lies the real virtue and value of the Art Commission in such a place as New York. Once attach salaries, even the smallest, to these places and they will surely go to the ordinary place-hunter, a being about as capable of dealing properly with the matters that would be brought before him as Mrs. Leary's cow, and never again would there be found on the board men of the type who have hitherto discharged their duties so acceptably. But, as one looks over the report for last year and sees how many and how important matters the members of the Commission have to consider, it is impossible not to feel that too great a sacrifice is demanded of them, and that their numbers should be increased, so that matters might be dealt with by committees rather than by the whole body as now. The Fine Arts Federation has recommended such increase, and it has been suggested that the counsel of an engineer and a landscape architect would often be of value on many of the problems that have to be acted on.

IT is good news that the Board of Estimate and Apportionment of the city of New York has at length adopted a definite plan for dealing with the very difficult

matter of providing better terminal facilities at the New York end of the Brooklyn Bridge. Although a definite scheme has been decided on, it is in its architectural treatment subject for much further study, but Messrs. Carrère & Hastings will be able to give it the study it requires before the expiration of the time that must elapse before the city can take the steps necessary to secure possession of the land needed. Roughly speaking, the new terminal structure will not interfere with any of the existing lines of traffic, since Park Row and Chambers Street will penetrate the lower story of the building, which will be bounded by Reade Street, Duane Street, Park Row and Centre Street.

IT has been very slow in coming, but the indictment by the Grand Jury of Cook County, Ill., of forty-nine persons—thirty-two of them for "assault with intent to kill"—for misdoing of one kind or another in connection with the current teamsters' strike in Chicago, is the best piece of news that has issued from that hot-bed of anarchistic socialism for many a day. As a grand jury is warned not to bring in an indictment unless it has discovered sufficient evidence to make conviction probable, we may hope that Labor will shortly receive a lesson at least thirty-two times as impressive and lasting as the very wholesome one administered when the notorious Sam Parks was sent up from New York to Sing Sing. In this Chicago *eclaircissement* there come to view not only "labor leaders," "business managers," "walking delegates," or however they may be called, who live on the fat of the land so long as they can keep a strike in operation, but also a man named Driscoll, who appears to be professionally a "trouble broker"—one who will create trouble where none was, if paid to do so, and, if paid, will also quiet trouble where trouble exists—who will provide "sluggers" to maim or kill non-union "strike-breakers," and having put these sluggers at work will, if paid well by those interested in breaking a strike, set other rowdies at work to "do" the sluggers first hired. Driscoll's is an interesting character and curious calling, and though he is one of the forty-nine presented by the Grand Jury, he must have been included in the list for his own protection, as it is understood that he turned State's evidence and provided proof that made the other indictments possible.

IT is rather curious that the only example of the work of T. Henry Randall that we have ever had the pleasure of publishing should have appeared in the issue published the week before his death, which took place at Annapolis on Saturday last. Mr. Randall, who was but forty-three years of age, had had the benefit of a very thorough education, that portion of it relating to his profession having been pursued at the Massachusetts Institute of Technology and later at the Ecole des Beaux-Arts, and his work showed the imprint of a mind and faculties that had profited by their opportunities. The practical training in his profession he acquired in the office of H. H. Richardson, he being at one time, we believe, in practical charge of the houses at Washington built for the

late John Hay and for Mr. Henry Adams and later being employed on the Allegheny County Court-house. Later he entered the office of Messrs. McKim, Mead & White, so that during his formative years he was brought into contact with the best traditions and the highest class of work. For the last fourteen years he practised alone, accomplishing a considerable number of buildings in Washington, Philadelphia and New York, but none of such signal importance as to attract to him that public attention that his work really deserved.

TWO or three amusing things relating to theaters have fallen under our eyes recently which serve to show how constantly the matter of building fireproof theaters is in the minds of those who are responsible for them. M. Coquelin, the younger, is about to build a really fireproof theater in Paris, and he is so convinced that the plans perfected by himself and his architect, M. Binet, will produce a fireproof structure that he has promised that when it is finished he and his architect will shut themselves up in the building and will then try to burn it down—a promise that marks him out as being as good an “advance agent” as he is great comedian. Next, a very sensible suggestion comes from Germany, to the effect that there should be two iron fireproof curtains, with a space of three or four feet between them, the said space being provided with ventilators at the top. The idea here is that if both curtains are down and heated gas and flame succeed in passing the first curtain they will be held by the second until they escape through the special vent at the top, or, again, if one of the curtains chances to be out of order then there would be the second one to offer its single resistance. Another German has imagined a theater whereof the entire parquet is supported on strong rollers suitably geared and movable by steam or water pressure. Here, when an alarm, is given the entire parquet with its seated audience is rolled outward into the street, a portion of the façade moving with it, all operating quite like a bureau-drawer. For the escape of those in the galleries he provides in a needlessly complicated way. In his place we should provide a species of sidewalk elevator which, as soon as the parquet floor had been rolled away, should ascend gently from the yawning chasm to the gallery levels and, having received the occupants of those endangered heights, as gently sink down again to the street level for their discharge.

IT is regrettable to note indications that trouble may be brewing between the Boston Master Builders' Association and the Boston Bricklayers' Union, after so many years of harmony between them. The “agreements” that have been arrived at between the two bodies at stated periods have, we believe, always been scrupulously lived up to by both parties, and, as a consequence, the entire labor situation in Boston has been steadier than it has been in other cities. But the Union was of a different mind when it came time this year to renew the agreement; it was the old story, the Union had grown too “strong” and imagined it was proper to use its strength in any way that pleased it. It accordingly issued to its members a set of rules or “conditions of service” upon whose observance rested the right of these members to

earn their bread by their daily toil. To these rules the Master Builders' Association has made answer in a statement which presents the other side in each case. We have neither document in full before us, so can only say that we heartily agree to the Association's assertion that “business men are always entitled to exclude from their premises all persons other than those with whom they have business.” It is inexcusable effrontery that a labor union's “business agent” should claim the right to enter premises to discover whether his union's rules are being broken when the community's own peace-officers may not enter the same premises in search of suspected person or goods, unless they come armed with a search-warrant.

IF there were no other reasons, the mere fact that the regulating of building operations in a municipality gives public officials a chance to interfere with, hamper and prejudice private interests, thus throwing temptation in the way of “grafting” in the path of such officials, must in these days render such officials objects of suspicion, a condition of affairs so galling as to make honest men undesirous of taking place in a municipal building department. Because of the character of the metropolitan press and the widespread interest in the affairs of the metropolis, the building fraternity knows more about the shortcomings of the New York Department of Buildings than it does about those of departments nearer at hand. Of this fact we are reminded by the announcement that Mayor Weaver, of Philadelphia, amongst the other reforms he has undertaken, has just required the resignation, “for the good of the service,” presumably, of Mr. Robert C. Hill, the head of the Bureau of Building Inspection. The letter requiring Mr. Hill's resignation declares that he has so administered his office that certain persons might be favored “according to the exigencies of political dictators,” and as he has been connected with the department for eleven years it is obvious that, if he has been a faithful servant of the party machine, he must have been more or less indirectly the means of procuring valuable contributions to the machine's exchequer, even if the private accounts of himself and his friends were not benefited.

VERY much to our surprise the plaintiffs in the “Westminster Chambers” case have, far within the time fixed by the court, signified their acceptance of the award as reduced by Judge Schofield, although such acceptance seems to deprive them of the possibility of recovering \$126,000 more than they now can. Apparently, Judge Schofield's threat to order a new trial, if his award should not be accepted, had a depressing effect on the valor of these obstinate litigants, and doubtless the thought that the legal costs of another trial would go far to consume any increase in damages that such trial might secure to them had its chastening effect also. If the city of Boston also accepts the award, then the end of the noted case will have been reached; but as legal costs are a matter of indifference to a municipality, while the date of the actual removal of any funds from its treasury may be of very real moment, there would be nothing to cause surprise if the city solicitor should advise the Mayor to let the case be heard again.

HEATING AND VENTILATION.—XI.
CHURCHES.

CHURCHES may be warmed by furnaces, indirect steam, or by means of a fan.

For small buildings, the furnace is more commonly used. This apparatus is the simplest of all and is comparatively inexpensive. Heat may be generated quickly, and when the fires are no longer needed they may be allowed to go out without danger of damage to any part of the system from freezing. It is not usually necessary to make the heating apparatus large enough to warm the entire building at one time to 70 deg. with frequent change of air. If the building is thoroughly warmed before occupancy, either by rotation or by a slow upward movement of outside air, the chapel or Sunday-school room may be shut off until near the close of service in the auditorium, when a portion of the warm air may be turned into it. When the service ends, the switch damper may be opened wide, and all of the air discharged into the Sunday-school room. The position of the warm-air registers will depend somewhat upon the construction of the building, but it is well to keep them near the outer walls and the colder parts of the room. Large inlet registers should be placed in the floor near the entrance doors, to stop cold draughts from blowing up the aisles when the doors are opened, and also to be used as foot-warmers.

Ceiling ventilators are generally provided, but should be no larger than is necessary to remove the products of combustion from gas-lights, etc. If too large, much of the warmest and purest air will escape through them. The main vent flues should be placed in or near the floor and should be connected with a vent-shaft leading outboard. This flue should be provided with a small stove or flue-heater made especially for the purpose. In cold weather the natural draught will be found sufficient in most cases.

The same general rules follow in the case of indirect steam as have been described for furnace heating. The stacks are placed beneath the registers or flues and mixing-dampers provided for regulating the temperature. If there are large windows, flues should be arranged to open in the window-sills, so that a sheet of warm air may be delivered in front of the windows to counteract the effects of cold down-draughts from the exposed glass surface above. These flues may usually be made 3 or 4 inches in depth and should extend the full width of the window. Small rooms, such as vestibules, library, pastors'-room, etc., are usually heated with direct radiation.

Rooms which are used during the week are often connected with an independent heater so that they may be warmed without running the large boilers, as would otherwise be necessary. When a fan is used it is desirable, if possible, to deliver the air to the auditorium through a large number of small openings. This is often done by constructing a shallow box under each pew, running its entire length, and connecting it with the distributing ducts beneath the floor by means of a pipe at the center. The air is delivered at a low velocity through a long slot, as shown in Figure 47.

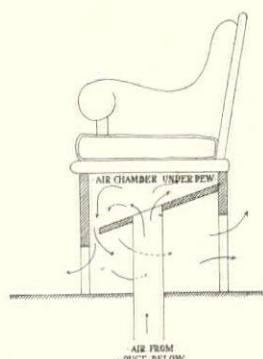


FIG. 47.

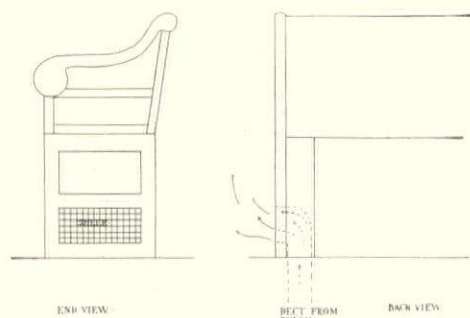


FIG. 48.

Another method is to deliver the air through small registers in the ends of the pews near the floor (Fig. 48).

Where the space beneath the auditorium is not used for other purposes the bottom may be cemented and the whole space used as an air-chamber and the pipes connecting with the pews may connect directly with it.

As the church service is usually only an hour in length, and the cubic contents of the room large in proportion to the number of occupants, an air-supply of from 1,000 to 1,200 cubic feet of air per hour per occupant will generally be found sufficient. If the church is warmed by air rotation up to a temperature of 65

deg. to 68 deg. before service, and then fresh air from out of doors be delivered at the same temperature during the service, the animal heat from the audience will usually be found sufficient to keep the room warm in all ordinary winter weather. This makes it possible to use a smaller main heater than is the case in other buildings where the floor-space is less closely packed.

A heater capable of raising the full volume of air to 75 deg. or 80 deg. in zero weather is usually sufficient. It is often desirable to keep the auditorium moderately warm during the week without running the fan. This may be done by providing a separate system of indirect stacks placed beneath floor registers located at inconspicuous places around the room. These heaters may take their air directly from the basement, which in turn should be connected with the room above either by special openings or by the use of stairways and open doors.

When the fan is running these registers should be closed unless it is desired to utilize the heaters in warming up the auditorium before service.

A fan run by a direct-connected motor at a comparatively low speed is preferable for this class of work on account of its quietness of action. The warm-air flues in the window-sills should be retained, but may be made narrower, if a fan is used, owing to the higher velocity of the air; slots 1 inch in width are usually sufficient for this purpose. Heaters should be placed at the bottom of the window flues to raise the air to a temperature of 110 deg. to 120 deg.

HALLS.

The treatment of a large audience-hall is similar to that of a church, and such hall is usually warmed in one of the three ways already described. When a fan is used, the air is commonly delivered partly through registers in or near the floor, and partly through those placed in the wall about 8 feet above it. They should be made of large size so that the velocity of the entering air shall not exceed 200 or, better, 150 feet per minute over the whole area of the register face, in order to avoid draughts. If diffusers are used over the wall registers, velocities twice the above may be allowed. Where there are raised floors as in a balcony, the air may be forced into the space beneath it and be delivered through openings in the risers, as shown in Figure 49. A part of the vents should be placed in the ceiling and the remainder near the floor. All ceiling vents, both in halls and churches, should be provided with dampers, having means for holding them in any desired position.

If indirect gravity heating is used, it will generally be necessary to place heating coils in the vent-flues for use in mild weather; but if fresh air is supplied by means of a fan there will usually be pressure enough in the room to force the air out without the aid of other means. When the vent airways are restricted, or the air is impeded in any way electric ventilating fans are often used. These give especially good results in mild or heavy weather when natural ventilation is sluggish. The temperature of the room may be regulated by varying the number of sections in use in the main heater or by the use of a by-pass

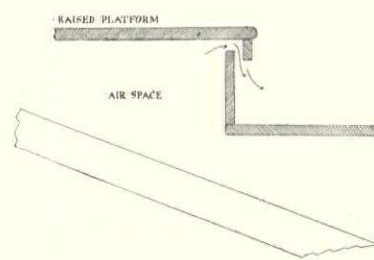


FIG. 49.

damper which allows part of the air to pass around the heater instead of through it.

One of the best arrangements is a combination of these two methods. A rough or partial regulation may be obtained by manipulating the steam valves and a finer adjustment by the use of the by-pass damper. For the best results the latter should be operated automatically by a thermostat placed in the hall. After an audience-hall is once warmed and filled with people, very little heat is required to keep it comfortable even in the coldest weather. The air-supply per occupant may be taken about the same as for a church.

THEATRES.

In designing heating and ventilating systems for theatres, a wide experience and the greatest care are necessary to secure the best results.

A theatre consists of three parts: the body of the house, or auditorium; the stage and dressing-rooms; and the foyer, lobbies, corridors, stairways and offices.

The only satisfactory way of warming and ventilating the auditorium is by the use of a fan, and the most approved method of air distribution is to force it into closed spaces beneath the floors, and allow it to discharge upward among the seats. One of the best arrangements is through chair legs of special latticed design, which are placed over suitable openings in the floor. In this way the air is delivered to the room in a large number of small streams at a low velocity without draughts or currents. The method of discharging the air through the floor risers as shown in Figure 49 is often used where the expense of the special chairs is considered too great. The discharge ventilation should be largely through ceiling vents and may be assisted by the use of ventilating fans. Vent-openings should also be provided at the rear of the balconies, either in the wall or ceiling, and these should be connected with exhaust fans placed either in the attic or in the basement as is most convenient.

The close seating of the occupants produces a large amount of animal heat, which is usually sufficient to increase the temperature of the room from 8 deg. to 10 deg., or even more; so that in considering a theatre once filled and thoroughly warmed it becomes more a question of cooling than of warming.

The dressing-rooms should be provided with a generous supply of fresh air, sufficient to change the entire contents once in 10 minutes at least, and should have discharge flues of sufficient size to carry away this amount of air at a velocity not exceeding 300 feet per minute. In order to maintain a constant air-supply, the temperature of the room should be regulated in some independent way. This is usually done by placing direct radiation in the rooms. The foyer, corridors, etc., are generally heated by direct radiators which may be concealed by ornamental screens if desired. Where there are offices connected they may be treated in a manner similar to rooms of like kind in other buildings. The air-supply for theatres may be taken as from 1,200 to 1,500 cubic feet of air per hour per occupant.

CHAS. L. HUBBARD.

(To be Continued.)

SCULPTURE IN ITS RELATION TO ARCHITECTURE.¹

I FIND, when I think of architectural sculpture, that for me it naturally falls under either of two heads. First, *Constructional Sculpture*, or that which is formed out of a piece of the structural material of the building, which actual piece has to perform its original office as weight-bearer or receiver of a thrust, such as columns, caps of columns, keystones, corbels, brackets and the like. Secondly, *Applied or Superficial Sculpture*, under which heading I place niche-figures, the filling-in of spaces such as spandrels, panels and friezes; also mere surface-work upon walls and other structural features.

In both classes fitness for its purpose should be the greatest quality in the sculpture, and under this quality of fitness beauty stands supreme; for unless the sculpture adds beauty to the building as a whole, it has no logical reason for existence nowadays. The time when its chief office, perhaps, was to record history is of the far past.

In constructional sculpture an absolutely essential requirement is, that it not only aids, but also appeals, to the eye and brain as aiding the building material of which it is formed to do its work, be that work support or resistance; yet how frequently one sees a *feeling* of weakness owing to unfortunate selection of lines and masses, even if an actually serious weakening of the material is not there.

Yet we have such magnificent examples of the past to refer to, amongst others the wondrous Caryatides of the Erechtheum. Every line of those figures and their draperies being designed to aid the impression of carrying, the choice of type, with such a build of neck, the restraint from all suggestion of movement, the figures there as if they could never know fatigue, and yet as if they realize that an important duty has been imposed upon them. But then these figures have not been overloaded with work by the architect, for the mass they had to carry would satisfy the eye as of a reasonable bulk. How different are the

couple of crouching figures one frequently sees nowadays struggling under a load of thirty feet or more of bay-window, a terrible selection of the unfit!

Another example of the great past, which has always given me the greatest satisfaction as constructive sculpture in conjunction with architecture, is the winged Assyrian bull which formed decorative bases of some huge doorway into an Assyrian king's palace at Persepolis. Not only is the stone left frankly between the legs, but the very pose of those beasts is selected to give the greatest feeling of carrying strength: not a suggestion of bend in a leg; each is rigid and firmly planted upon the ground; and the great wings folded back tightly against the pier on either side create the impression that they are there to hold the wall safe from lateral movement.

The great lessons to be learned from a thoughtful analysis of the works of the past, their mistakes as well as their successes, must result in the appreciation of certain laws which should guide us in our present work. Nobody deprecates more than I the all-too-frequent imitation of those old works, or a conglomeration of them, in the architectural sculpture of to-day; but such laws of fitness as they have established beyond question should be adopted; whilst the thought and feeling in our sculpture should be *entirely* of our own times; that is the only way to have living sculpture—generally it is merely the resuscitation of dead bones which is introduced on buildings.

I should much like to know what you architects think of a matter which has always worried me in certain examples by that very great master Michael Angelo. Is his treatment of the four lying figures on the tombs of Lorenzo and Giuliano de' Medici justifiable? In me they have always created the impression that the whole block of white marble, of which each figure is carved, is slipping off the architectural base sideways.

Speaking of Michael Angelo, I think that his habit of leaving parts of his work merging into the stone (if it was not that he had got tired of that particular work, and put it on one side, and so left it unfinished) was the outcome of his long practice of working in conjunction with architecture; and for architectural sculpture, when it is structural, it has considerable value. I saw a treatment of this kind in the caps or bracket heads in a church at Cullompton a week or two ago which pleased me very much: the head-dresses were merged into the stone of the shafts of the columns, and the impression of the weight being thus carried down was very agreeable compared with the usual more detached head.

But when we see this mannerism being deliberately introduced meaninglessly into sculpture which is intended for no architectural purpose, but to be placed in a gallery or drawing-room, as an eminent foreigner does it, to me it is merely an affectation; and if this phase grows (as from its ease and saving of labor appears likely), one pictures the room of the future collector as being rather like the crypt of some cathedral, where they treasure sculptured scraps off the building.

Another fault of the past which I think we ought to avoid is where the pose or placing of the figures shows no appreciation of the laws of gravity. In our pictures we have long abandoned the faults of the workers who understood nothing of perspective, yet in architectural sculpture one sees figure after figure acting as bracket corbels and the like, reaching out and pretending to carry a mass of material, when in truth the material really carries them, to say nothing of the falseness of the impression upon the mind. In avoidance of this mistake, as far as I know his work, Alfred Stevens was most happy: he obtained a great richness of light and shade, and yet he obeyed the limitation of the possible in posing his figures; if a figure projects beyond the possible regarding gravity, there is sure to be another figure behind it counterbalancing that movement and holding back the projecting one. Also when he employs crouching figures to do carrying (as in the Dorchester House mantelpiece), the load carried is reasonable in bulk, and the weight is shared by some structural architecture; then, also, the figures have straight backs, and the feet on which the figures rest are posed as weight-bearers. Of course, his inclination is for curling line rather than for the vertical lines of the severer schools, but in their fitness they are very fine.

As to my second heading, *Applied or Superficial Sculpture*, where it is merely surface ornament upon walls and other structural parts, I feel the most fit work is that which is incised, the retention of the surface of the wall being recognized as a necessary character in the treatment. What magnificent wall surface decorations were those Assyrian bas-reliefs of the lion hunts of Assur-bani-pal. The best of them are the finest things of their

¹A paper by Mr. W. Reynolds-Stephens, read before the Royal Institute of British Architects and published in full in its *Journal*.

kind in the world, as far as I can learn; yet, full of interest as they are, one never loses the feeling of the flatness of the wall upon which they were executed. I would ask you to note the minuteness to which the details of ornament are carried, especially in the horse trappings, yet in so masterly a manner that they in no way detract from the breadth of treatment of the whole. Alas! how often nowadays emptiness is mistaken for breadth by sculptors.

Before leaving outside work, I venture to remark and regret the large amount of money spent on sculpture which is wasted owing to the placing of it at a height apparently without regard to the neighboring houses and width of the streets. In the architectural perspectives, with all surroundings removed, and drawn from an impossible point of view, the sculpture may look rightly placed and reasonable; but when all becomes hard fact, how often the sculpture is only to be seen properly from the attic windows of opposite houses.

I suppose the Greeks set the fashion for friezes, but I believe in their use of it the buildings were almost always longer than they were high, which is seldom the case in our cities now owing to the great value of land; then those Greek buildings could usually be seen from some distance, and a scale of figure work and a projection of relief which they adopted, and which told well in their strong sunshine and clear atmosphere, are not of necessity suitable here under such very different conditions.

I was about to refer to a definite case of this misuse of sculpture in a new building in the Strand, but perhaps it is better rather to refer to an example (a building which you probably mostly know) in which I feel a really fit modern way of treating a building with sculpture is employed. I refer to Colney Chapel, at All Saints' Convent, St. Albans, by Mr. Leonard Stokes, where the money available for sculpture has been rightly concentrated upon a long band of rich work just over the main doorway, and three niche figures a few feet higher, and all needless ornament avoided. This is the sort of site which would inspire almost any sculptor to do his very best, and I think Mr. Wilson in his sympathetic work has not wasted his chances, with the result that the sculpture really adds a beauty to the building as a whole.

I think many of our British architects are to be congratulated on their appreciation of the necessity to protect outside sculpture somewhat from stress of weather; it is most essential, especially where it is much cut up and likely to give lodgment for water.¹ Much modern French work is quite wrongly treated in this respect, one sees carving with very high projection, without so much as a coping or moulding over it; indeed, the architects seem to select the sky-line and the most exposed parts of walls to decorate with carving, be it figure or ornament. I refer to this, as one sees buildings cropping up in London from time to time in which French influence is apparent, and I feel, although we should always be ready to welcome any good influence, we should look very carefully and critically into things and make sure they are good; and if we find them wanting, hoist the danger signal. We gratefully acknowledge a mass of good influence we have received from our French brothers-in-art, but it is no compliment to them to receive everything without question.

This matter of weather and water and frost is one which I think is all too frequently quite lost sight of by some sculptors, and the recognition of it should be more insisted upon by architects when using stone carving.

This is one of the things the old mediæval sculptors understood usually so well, and the great use they made of vertical lines is to my mind in great measure the outcome of this necessity; it was not only an eye for beauty that dictated those lines, but practical requirements as well, with the invariable result that the added fitness for their purpose meant added beauty as well. In cases where this was not sufficiently observed much of the damage owing to disintegration of the stone is due. I have noticed that where an arm is bent across the chest—which thus forms a ledge for water—the hand is placed rather higher than the elbow, and the elbow itself is detached slightly from the side to form an opening for the escape of the water, with the result that the figures designed by such knowing craftsmen usually have outlived the others.

Before referring to exclusively interior work I will speak of *treatment of material* which affects both outside and inside work. I believe one of the great defects of our British school of sculpture is the quite secondary place given to the consideration of the treatment of the material in which the work is to be finally

produced. The designing and modelling are in most cases the only things seriously considered. The great craving for mere realism has brought about almost a blindness to this important factor, material. Great slickness of handling the clay appears to be all-absorbing, without sufficient regard to the fact that the clay is only a passing stage in the work; so deep set is this that a highly skilful life study which is the mere result of patient and faithful reproduction of a model is lauded upon all sides as great art, the peculiarities of the model being accepted in lieu of the character of the sculptor, and the absence of both poetry and invention of design is not felt. Of course, when a sculptor is producing an ideal work in which the embodiment of some fine idea is his "be-all and end-all," then if an impression of great realism in a face, figure, or any other part will make the working out of his invention more convincing, undoubtedly the treatment of material may be considered of less moment; but even then a really fine artist will not overstep the limits of the material in which he is working. When sculpture is applied to architecture, and more especially when it is for structural parts, then I feel the material and its proper treatment are all-important. In our school training this matter is practically ignored, and I think you architects can render a very real service to British sculpture by emphasizing the necessity for a better consideration of treatment of material when you require work of sculptors.

As to interior work, it is wiser that figures never be used on ceilings; one can conceive grotesque figures and mannikins clutching round some pendulous structural knobs, looking and being fit. Alfred Stevens managed to introduce some cherubs' heads and wings satisfactorily on the soffit of an arch by showing them looking down through a panel frame, and as only parts of the wing show, it gives the impression that the rest of the cherub is safely on the upper side, and no fall likely to occur. But the use of figures as one often sees them springing from a cornice and stretching well into the curve or flat of the ceiling, without any regard to the laws of gravity, is to me an absolutely unfit use of sculpture. I have almost as strong an objection to human figures even in panels on ceilings, whether painting or sculpture; for besides the figures looking very insecure and out of place, the beholder is certainly most uncomfortable: the human figure is bound to assert itself, and call for attention from the living beings below—with neck-ache to the latter as a result. Further, the chances are that the living being has to dodge about the room before finding the one place from which the ceiling figures appear right way up. No, I maintain, all things considered, figure-work on ceilings is a mistake; there is ample scope for introducing them, if required, on the frieze, doorways, and especially chimney-pieces.

Nothing stands more fitly as motif for ceiling decoration than tree forms with their leafage and flowers: the very construction of stems and branches especially adapts tree forms for such a use; but even then, unless the stems are powerful, I think that the introduction of ties to the ceiling is most satisfying to the eye. How many of us admire the old plaster ceilings, the ornament on which is almost merged into the ceiling owing to the great number of coats of whitewash they have received. I wonder if there is a logical reason for feeling them to be so fit—the lost and found quality obtained by the merging conveying to the mind an assurance of security for the ornament. Anyway, a strongly undercut ornament gives the opposite impression.

I should like to say a few words on the question of proper lighting of sculpture which is used inside buildings. One sometimes sees sculpture in places where little or no light reaches it, or from an entirely unsuitable direction. I do not for one moment suggest that undue consideration should be given to the sculpture, but as "fitness for purpose" is one of the highest qualities in all architectural design, then I do say that unless the sculpture you are thinking of using will be properly lit, it cannot be the right place to use it—and on the great principle of fitness, better leave it out if you have no adequate place.

In private rooms, a great field (of which little or no use is made nowadays) for the proper use of sculpture is the chimney-piece, especially for bas-relief, when the fireplace is on a wall sideways to the source of light. I would suggest this for your most serious consideration.

But there is one place where sculpture is much used, and I think in most cases it is maltreated—I refer to the decoration of altars in Christian churches placed immediately under powerful east windows. I deliberately say that the sculpture is maltreated rather than misplaced, because I think few would question that the altar is undoubtedly the site above all others for placing the

¹Although in properly designed sculpture this risk should be reduced to a minimum.

most precious decoration. Now, if the extreme east end of the church has been established as the most fit place for the altar, then undoubtedly the fault lies with the east window. At one time I believed that there was a strongly established symbolism of "Hope of Resurrection" in the east window, but I find that this is not widespread, and certainly if any such symbolism existed it has been mostly lost sight of, for the majority of east windows are filled with pictorial glass illustrating a hundred-and-one subjects rather than that of the Resurrection. Then in the oldest Christian churches, and in many abroad now, no east windows, or only quite small ones, are introduced; and I therefore think, on the ground of more properly lighting the altar, which should have chief consideration in our churches, it would be a more fit and consequently more artistic treatment to obtain the light from the side-walls—from one side more than the other—and by this means also the choir could be adequately provided with light, especially if these windows are kept free from all dark or painted glass.

I remember how disappointed all concerned were when Henry Bates executed for Holy Trinity, Sloane street, at J. D. Sedding's request, the large white marble altar frontal—an entombment, a very beautiful work of art in itself—which owing to unfit lighting, although very high in relief, looked from the main body of the church like a sheet of paper. And yet here were two fine artists, architect and sculptor, but both failed to appreciate the competition of the large east window. Since dark painted glass has been put in the window, and the light from it further lessened by high buildings to the east of the church, the marble frontal tells better; but I understand that when an important service is to be celebrated the clergy cover it with a richly colored hanging—a manifest showing of failure to comply with the requirements of purpose, and a mistaken selection of material, chiefly owing to wrong direction of light.

On the English mediæval tombs our sculptors showed the keenest appreciation of architectural treatment in their work; the simplicity of line and the dignity of pose in those recumbent effigies are very remarkable (excepting perhaps the few which rest on their side), and they take a high place amongst architectural sculptures. Regarding them, it is to me a ground for rejoicing that the color with which they were evidently mostly, if not all, decorated at one time, has in great part perished, because, judging from such color as I have found remaining, it is evident that in that quality—color, I mean—they must have been very gaudy and very cut up, and nothing like so fine in that as in their sculptural quality.

How badly those painted tombs must have compared in color with the ones which relied upon a beautiful variety of real materials, some few of which yet remain, with their refined admixture of metals, enamels, gilding and the like, which the hand of Time has beautified, and not, as in other cases, obliterated. I do not suggest that we should again use color so freely as it was applied to sculpture in the great past: the gain of leaving material such as stone in constructional sculpture, to give its own impression of material strength, should prevent us again resorting to coloring such work; but a judicious use of mixture of materials for inside sculpture can be a great added beauty if fitly used.

Gentlemen, nowadays the average standard of the sculpture applied to buildings is not up to the quality of the architecture (there are some brilliant exceptions, I know, but generally it is so), and I feel this is chiefly because the sculptors want treating with more confidence and less as machines. The money paid is usually insufficient to provide thoughtful work, yet the total amount spent upon sculpture and ornament upon many buildings is ample to provide such building with a few parts thoroughly well decorated with good quality sculpture—as great a gain to the building as to the sculptor!

From some of you, I know, sculptors receive all sympathy, but not from the majority. Go to individual sculptors. First, set down, as fixedly as you like, conditions which it is just and right that you should impose; explain fully the site for the work and the surrounding materials; state the approximate scale of figures or ornament; state any direction of line you wish emphasized—the flatness or height of projections. Give subject you wish illustrated. Emphasize that you require a true recognition of use of material and provision against weather (if outside), and the like. State somewhat as to money available, and then let the sculptor make a small design model for you to see, and after that give him a freer hand than now, and the chance and credit to be the designer of the work; and as a result you will get the very best out of him, instead of, as now, most sculptors

looking upon their architectural sculpture as pot-boilers and keeping their best intellectual qualities for their other work.

With you rests the responsibility of making or marring the modern school of British architectural sculpture. You may not, probably will not, get just what you have pictured in your minds, but you will get living work with individual character, and I venture to think that a living donkey is more beautiful and fit than a dead child.

Think of the sculpture on the west front of Wells—figures evidently executed by a good many different sculptors. Did the architect get just what he expected? He probably specified for sets of a given size; yet some are about 6 feet, some 7 feet, and some 7 feet 6 inches for the same sized niches. Yet is the artistic result of the whole front of the cathedral damaged by this variation? Is not the gain of the living character of sculptor a greater gain than the ill-fit a loss?

Gentlemen, I may be wrong in much I have said, and certainly am so in the way I have put it down; but I am out of my element when writing, so I hope you will accept my remarks in the spirit in which I have intended them—as the frank expression of opinion of a very serious student of a great art.

DOES BRONZE STAIN STONE?

THE appearance of stains in granite and marble monumental work to which bronze has been affixed, is, not unnaturally, by superficial observers, attributed to the bronze. This belief has prevented many from using the metal in connection with memorial work, in fact, it has been made the basis of a prejudice which has become so deeply ingrained in the minds of some that at times it seems harder to eradicate the prejudice than it would be to remove the stains which it preconceives. That stains sometimes appear where bronze is present is true, but to argue therefrom that the bronze caused them, is to adopt a specious line of reasoning. There are three causes that produce stains upon the stone-work of memorials where bronze has been used: first in the smoky atmosphere surrounding soft-coal consuming cities a fine dust is deposited upon all the horizontal and all the approximately horizontal planes and projections of the work; it then needs only a fall of rain to wash all this accumulation of dust down upon the stone surfaces and thereby streak them. It is evident that the same results would be produced by any material presenting by its projections a like opportunity for collecting dust and shedding it when carried off by water. Another and second possible cause is traceable to the method of finishing bronze-work. In order to anticipate the darkening or oxidizing resulting from long exposure, it is customary at the outset to secure this effect artificially by means of acids. This does away with the newness and unpleasant brassy brightness of the untarnished material and imparts to the metal that rich color which is one of its claims to beauty. The process, if properly conducted, is in no way objectionable or injurious, nor is the effect thus artificially stimulated in any degree evanescent; it remains as permanent as though it were the result of years' exposure to the weather. But it not unfrequently happens that in the process of casting, air enters the mould and forms bladders or "blow-holes," and produces in the metal a spongy appearance; into these holes, or bubbles, the liquid acid enters and in time evaporates, leaving a residue which may be carried by rain or moisture to the stone and may, in the case of delicate marbles, occasion a stain, but the chances of disfigurement from this cause are so slight that it is hardly worth considering seriously, as, at the most, they are likely to be of an ephemeral character.

By far the most real cause of trouble is resultant from foundry practice. In preparing complicated moulds such as are required for busts or statuary, or any subject in which there occurs what is technically known as "undercut," it becomes necessary in order to remove the model or pattern from the mould which has been formed about it, that the mould so formed should be made separable into small sections, and as these sections are reassembled after the model has been removed, it is found necessary to pin them together in order to ensure their retaining their former position rigidly now that the support of the pattern is removed. The same is equally true, though in lesser degree of that portion of the mould known as the "core," and which as its name implies, is the body of sand around which the metal flows—the amount of space between this core and the outer mould determining the thickness of the finished casting. Now, these sectional pieces of both mould and core are pinned together with pieces of iron wire, and if these wire pins are insufficiently embedded into the mass of the core, and not covered with sand, the ends of the wire

pins are likely to come in contact, and by fusion become attached to the interior surface of the casting and if allowed to remain in the finished work, they will, in the course of time, become rusted, and the moisture generated by changes of temperature on the inside of the casting is likely to run down, carrying with it the oxide of iron, and stains are inevitable.

It will be seen from the above, that of all the causes of stain, not one is directly due to the bronze, and only one is really worthy of attention. It may be added for the comfort of the prejudiced, that examples of this are rare, and in all these few instances staining could have been prevented had the founder exercised a little more care in preparing the mould and cleaning out the casting.—*Stone Trades Journal*.

AMONG THE GREEK ISLANDS.

THE recent Archæological Congress at Athens was followed, says the *Scotsman*, by two extended excursions, in the course of which visits were paid to a large number of the most interesting sites on the mainland of Greece, among the islands and along the western coast of Asia Minor. Those sites on which excavations have recently been in progress were naturally selected for special study, and on this account the central point of the excursions was Crete, where three days were devoted to the sites on which Italian, English and American explorers have for some years past been so fruitfully active. The party had the advantage of the presence in almost every case of the archæologist who, as discoverer and explorer, had been identified with the particular site visited. The carrying out of extensive works of excavation, such as those at Ephesus, Cnossos, Delphi or Thera, means much of good to a locality. Employment is found for large bodies of workmen. There is a brisk demand for supplies. Visitors are attracted to the spot. The leader of the undertaking cultivates friendly relations with the personages of the locality, great and small, and, best of all, a sense of local and historical pride is aroused, so that the Cretans and Samians of to-day talk as familiarly of Minos and Polycrates as of their own demarch. Hence an explorer, who has identified a modern site with some ancient place or name, has appealed to this national sentiment, and won a place in the hearts of the people that no merely material service would secure. Dörpfeld has been maintaining that the Ithaca of Homer is not the modern island of that name, but the neighboring isle of Leukas, and the Leukadians look on him as the people of the Middle Ages regarded a saint, who had brought their locality into fame by some miracle or wonder. Freiherr Hiller von Gætringen, who was of the party, is a great favorite in the island of Thera, for he has not only uncovered the site of the ancient city, but has written a large work on the whole island, which is as interesting from the geological as from the archæological standpoint. These considerations, ideal as well as material, combined to produce such expansive friendliness on the part of the people that, wherever the expedition came, it was received with triumphal arches, bands of music, speeches overflowing with Hellenic and local patriotism, repasts elegant as well as abundant, and gifts of cigarettes and of flowers. The last, in carefully compacted bouquets or flung by fair hands before the feet of somewhat embarrassed savants, were a feature of these golden days of early spring. The most charming popular reception was on the island of Leukas, the people of which are in high spirits as the fellow-citizens of Odysseus. The ordinary traveler in Greece, whose relations with the people of a locality are primarily of a financial character, misses these glimpses of a kindly demonstrative people, whose unaffected friendliness has been one of the most pleasant features of the tour.

Apart from the social interest of the excursions, their value from the archæological point of view can hardly be over-estimated. It would have been quite impossible for a private party, using the ordinary means of travel, to have visited so many sites in so short a space of time. Olympia, Delphi, Mycenæ, Tiryns, Epidaurus, which, with other places on or close beside the mainland, were visited on the first of the two excursions, are, of course, easily accessible to the ordinary tourist; but Melos, Delos, Cos, Cnidus, Theras, old Samos, with all Cretan sites save Cnossos, lie out of the beaten track; and a visit even to Candia, Didymæ by Miletus, Pergamon, or Troy, involves some outlay in time and money. The advantage of having small steamers that would go anywhere where needed, and land a party in their own boats on any desired point of a rock-bound coast, is obvious, and from this the members of the expedition reaped the fullest

benefit. An unpremeditated descent of this kind on the site of the ancient Cnidus was one of the features of the trip.

We land and find the place only occupied by a few herdsmen, who bring round for sale their coins and broken terra-cottas. There are indications of the older excavations of the time of Sir Charles Newton and Sir Robert Murdoch Smith, but otherwise the place is unviolated and is profoundly impressive. Here, somewhere on this deserted hillside, stood that little shrine, open to the front and back and enclosed in a pleasant plantation of fruit trees and myrtle, within which stood the Cnidian Aphrodite of Praxiteles, to see which strangers came to the place from far and near.

On sites where the spade of the excavator has been effectively busy the historical imagination is hardly allowed time for this quiet brooding, so clamant are the present interests of the work in progress. Here the prevailing sentiment is scientific rather than romantic. The aspect of the excavations themselves is as a rule anything but attractive. Most often little is visible but the foundations of walls, while the decorative details and works of art that have been discovered in the course of the operations have been removed to a museum. Without these half the interest of the place is gone. Especially is this felt at the Temple of Diana at Ephesus. The site of this, perhaps the greatest and most famous of all the Hellenic shrines, lies very low, and was probably chosen on account of the existence of an earlier shrine, traces of which the recent British excavations have brought to light. It is now almost constantly under water, and presents necessarily a somewhat dismal appearance. Yet sculpture of the highest interest and beauty, as well as a unique treasure in smaller objects, has been found on the spot, and if reproductions of these were at hand the interest of the place would, to the ordinary visitor, be immeasurably increased. British enterprise, embodied in the person of Mr. J. T. Wood, achieved here a signal success, but the place does not produce the effect on the spectator that one would desire. It is a little disappointing, too, to find so much Roman work at a site like Ephesus superimposed on the Hellenic. Even the Ephesian theatre is not as it was in the time of St. Paul. On the other hand, the Cretan explorations have brought to light nothing but old work of the earliest and most interesting kind. The expedition visited five separate sites, where excavations have revealed not only the remains of great palaces, as at Cnossos and Phaestos, but prehistoric towns, with their narrow paved streets, their small closely-packed houses, their flights of steps, their suburban burying-places. One such town has been excavated at Gournia, in Eastern Crete, by an American lady, Miss Boyd, who received the party and conducted them over the carefully explored site. Miss Boyd has made herself popular in the best sense among the people, and the whole undertaking has been carried out in the most exemplary fashion.

A GLASS-AND-STEEL CHURCH.

THE accompanying illustration is a design for a steel and wire-glass church building for the Methodist Society of Des Moines, Iowa, by C. E. Eastman, architect of Des Moines.

The glass-and-steel construction will produce the effect of marble with many advantages over real marble. The entire outside wall and dome is to be opalescent wire-glass in a double steel frame producing a foot of dead air space between the glazed surfaces.



It is not an untried or experimental idea, but is only the application of store-front construction to the facing of an entire building. Among the advantages may be cited the following:

Its cost is less than good pressed brick construction—10 per cent. to 25 per cent. less.

A soft diffused light enters the building through the walls.

It is fire-resisting to a practical degree, and is easy of repair, new plates can be set as easily as re-glazing a window.

The glass is clamped in position on cushions of asbestos-felt, with provisions for movement of an inch at each division, which will allow of unequal settlement without apparent evidence either inside or outside.

It will not weather-stain or absorb dust.

It is simple in construction; the vertical divisions (4 feet apart) are made of two steel angles at outside and also at inside surface of wall laced, with the lacing between forming a slot through which the bolts pass with which the clamping bar is secured in position, thus the punching of the clamping bar is not required to be exact.

The clamping bar is of wrought bronze of half circle form and is sufficiently stiff to be a nut-lock preventing vibration from releasing the bolts with which the clamping bars are held.

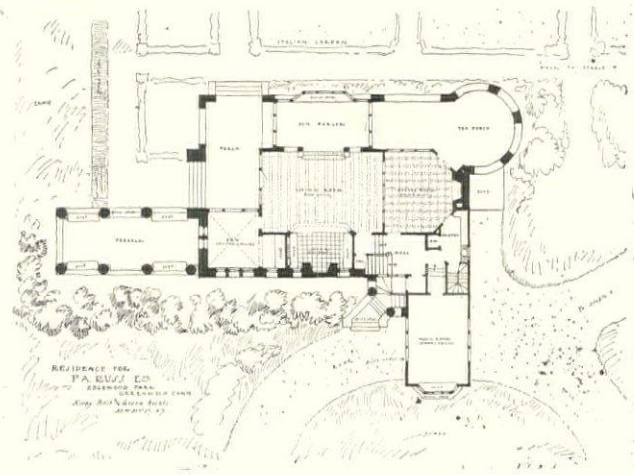
C. E. EASTMAN.

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NOTES AND CLIPPINGS.

A NEW FRENCH ARCHITECTURAL COMMISSION.—The French Government has appointed a "Commission Supérieure des Bâtimens Civils et des Palais Nationaux," which will include MM. Bouvard, Pascal, Moyaux, Guadet and Selmersheim, architects; MM. Roll and Tony Robert-Fleury, painters; and MM. Frémiot and Bartholomé, sculptors.

HEAVY LOSS ON A FIREPROOF BUILDING.—The new Congregational House, a modern fireproof structure, situated at 12-14 Beacon street, Boston, was recently badly damaged by fire. The loss was estimated at about \$30,000, the major portion being sustained on the building—an unusually heavy loss on a fireproof

structure. Extending from the basement to the roof, and attached to a pillar, was a wooden shaft about 12 by 9 inches, which was used to convey the large feed-wires to the several floors and was constructed so as to appear a part of the pillar to which it was attached. It is claimed that this shaft must have been introduced after the building was constructed, as nothing was known of it at the time of rating. There is considerable speculation as to whether the fire started near the basement or near the roof. It is agreed, however, that it started in or near the shaft and was conveyed by this means to all floors of the building.—*Fire and Water Engineering.*

THE NEW AMSTERDAM THEATRE, NEW YORK.—Some interesting features are to be found in connection with the design and erection of the New Amsterdam Theatre in New York, owing to the unusual height of the columns and the long spans of the girders supporting a roof-garden at the top of the building. In this part of the construction the most noteworthy member is a plate girder 83 feet long by 12 feet deep crossing the auditorium at a height of 75 feet above foundation level. This girder, which weighs 37½ tons, was delivered in sections and rebuilt in position upon timber falsework very much like that employed in bridge building. Two other roof members have open webs and are 55 feet long by 10 feet deep. These, weighing 12½ tons each, were hoisted into position by means of a 20-ton derrick. Several other girders weighed over 10 tons each. The total weight of structural steel in the columns and girders is about 1,360 tons. It is somewhat curious to learn that, with the exception of the heaviest members, all the steel work was made in Belgium. We do not often hear of foreign competition in the United States.—*The Builder.*

SPONTANEOUS EXPLOSIONS.—"An English engineer, M. Jaquet," says *Cosmos*, "gives some interesting details regarding a violent explosion of rocks that took place on Dec. 15, 1904, in the new Hillgrove mine, in New South Wales, Australia. The area involved in the explosion extended over about 100 metres (328 feet) in length and 30 metres (98 feet) in height, and the shock explosions, which frequently occur in this mine, are a source of disquietude and anxiety to the miners; it is probable, also, that their violence is increasing with the depth to which the mine penetrates. Such explosions, which may be called spontaneous, have been reported from many parts of the world. *Nature* recalls that in the lead mines of Derbyshire, for example, Straham has described masses of ore that explode as soon as disturbed by the pick. Numerous explanations have been given of these phenomena; they have been attributed to molecular tension, to gas imprisoned in the rock, and to compression of schists by granite. At Hillgrove, it is thought that the walls of the galleries are in a state of tension or unstable equilibrium, which is disturbed by the least accident."—*Literary Digest.*

THE LATE JAMES MANSERGH.—Mr. James Mansergh, who died in England the other day, was one of the world's leading authorities upon questions of water-supply and sewage-disposal. As a boy he was a contemporary scholar with the late Professor Fawcett, England's blind postmaster-general, at Queenwood College. After serving a long apprenticeship with a firm of prominent civil engineers, he was sent to Brazil, where he built 200 miles of the first railroad to connect Rio Janeiro with the interior. This was, mostly, through virgin forest. Returning to England, he laid out his first sewage-farm, the earliest experiment of this sort in the country. Then he went to London, to undertake a vast sewerage contract at West Ham. This nearly wrecked him financially, but established his reputation, and later on he established the water and sewerage systems of many important towns, not only in Great Britain, but in other countries. He was the practical author of the first bill ever passed by Parliament, authorizing the compulsory purchase of a private water plant by public authority. One of the greatest monuments of Mr. Mansergh's engineering genius is the great Elan Valley water system for Birmingham. He planned and created the whole sewerage system of Melbourne, said to be the largest contract of the kind ever undertaken, and did almost equally important work in two cities as widely apart as Colombo in Ceylon, and Budapest. As chairman of the Engineering Standards' Committee, he occupied a position of peculiar influence and authority in his profession.—*N. Y. Evening Post.*

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, JULY 22, 1905.

No. 1543.

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already received subscriptions amounting to nearly three hundred dollars in his behalf, Mr. Pease may not finally be so badly off, but we fancy he will hereafter be inclined to allow the profession to do its own fighting. It should be remembered that though lawyers often fail in collecting fees due to their architectural clients, they are not so unsuccessful in collecting their own fees from their said clients.

IT seems to us, though we may be mistaken, that an incident that recently happened in Glasgow could not have transpired in architectural practice in this country, and though the English journals seem to approve the claim put forward, we are inclined to look on the incident as a proof of that "pawky" spirit which is usually associated with the Scottish temperament. It seems that the contractor for the Glasgow Art Galleries died and left matters in such state that it was doubtful whether the building could be finished by his successors so as to be ready for the then approaching exhibition. The authorities accordingly undertook to encourage the zeal of these successors by promising them a bonus of five thousand pounds if the building should be delivered complete at the term of the original contract period. Their scheme was successful and the bonus was duly paid. The architect, however, in putting in his account, taxed this five thousand pounds bonus as if it were actually a part of the cost of the building on which his commission was to be computed. We doubt whether an American architect would have imitated his act, it is too much like taking a mean advantage of a fellow when he is down.

THE unqualified disallowing of a claim which possibly may be open to question is a device that is not infrequently practised by some of our own public officials when they find a plausible opportunity arising during the months just before an election. We do not know whether Minnesota holds a State election this autumn, nor do we know anything of the character of the present Governor of that State, but, on general principles, we incline to assume that he is merely "playing politics" in the action he has recently taken in declining to sign the pay-vouchers, in a small amount, of Mr. Channing Seabury, the chairman of the State Capitol Commission. Mr. Seabury's voucher is presented as covering a per diem of five dollars due him for services in connection with his duties as chairman of the Commission, and the Governor, although Mr. Seabury has been in office more than ten years and must have had similar vouchers cashed at frequent intervals, now has suddenly made up his mind that something is wrong and declares that, if Mr. Seabury has been paid in the past, he will endeavor to bring about the repayment to the State of the moneys collected by the chairman of the Commission. Now while we know nothing about Governor Johnson, we do know several things about Mr. Seabury and amongst others that it was the pleasure of the American Institute of Architects at its last annual gathering to elect him as Honorary Member because the profession at large, as represented by the Institute,

FIRST and last, we have at different times made such answers to many enquirers, advising them not to go to law over some matter laid before us, that, if the advice has been followed, we must have been the means of saving considerable money to needy practitioners. Not a few of these cases that we have frowned upon have been "ownership of drawings" cases, and in the outcome of the recent case of Gibbon vs. Pease, of which we have given some account, we are interested to find a measure of the value of our good advice. As the case was decided against the defending architect, he had not only to bear his own costs but those of the plaintiff as well. The latter prove to have amounted, for the original suit and its appeal, to some eight hundred and fifty dollars, while he had to pay his own counsel the considerable sum of thirteen hundred dollars, something over two thousand dollars that is for having decided against him a very immaterial question, as we venture to think. The profession, however, takes a different view, and, holding it, had the grace to come forward in aid of Mr. Pease directly, while indirectly the hope was entertained that the trial might lead to the downfall of Ebdy vs. McGowan as a leading case in such premises. To this end the Royal Institute of British Architects, the Surveyors' Institution, the Society of Architects and one individual contributor subscribed the sum of thirteen hundred dollars toward Mr. Pease's expenses—it is obvious that the architect's counsel took his case for the lump sum of these adventitious contributions. This leaves the unfortunate suitor burdened only with the plaintiff's costs, but his lawyers point out that even these are too much for a poor man to bear who undertook the fight as a matter of public professional policy, and they accordingly appeal to the profession—as he could not—to help him out of his predicament. As the *Builder* has

knew of, understood and appreciated the signal service he had rendered to the State of Minnesota and to the architectural profession in his manner of dealing with the delicate and troublesome matter of the first competition and the loyal support and encouragement he had given to Mr. Gilbert, the architect of the actual State-house. If Mr. Seabury has been willing to serve his State for so modest a per diem as five dollars, that commonwealth should hold itself exceptionally lucky.

THE tenant who is able to hold-up a building-under-taking, because he is the possessor of an unexpired lease, is a most uncomfortable creature to have to do with, for the courts always seem to be willing to sustain him in his blackmailing tactics, and eventually his terms have to be accepted, as a rule, though now and then there are delightful cases where his schemes go awry, just as, too, there are various cases where he is willing to show consideration for his fellow-man and even self-sacrifice. One of the oddest cases where a hold-up was effected came to light a few weeks ago in Newark, N. J. Early in May, a certain building on Market Street, belonging to Mrs. Louisa Sanders, was partially burned, the building being so badly injured that the authorities compelled the tearing-down of the walls and floors of the upper part of the building, as being dangerous to traffic in the street below. Naturally, the owner set about preparing to rebuild the entire structure, but just as she was ready to begin operations she learned that the person to whom, just before the fire, the lower story had been leased—a stipulation of the lease evidently binding him to make his own repairs—had taken out a building-permit and was about to put the lower story into condition for his own occupancy. As this would result in the landlord's deriving income from but a single floor in place of from several during the five years currency of the recent lease, she naturally objected, and sought to prevent the issuing of a permit to the now unwelcome tenant on the ground that the building was so badly wrecked by the fire that it invalidated all leases. Unfortunately, the city solicitor ruled that this degree of damage to the building had not been reached and that Mr. Silverberg's quarters could easily and inexpensively be put into condition for his occupancy, and that, therefore, the Building Department must issue to him the permit he asked for, no matter how great an injustice was done to the owner of the building and the former tenants of the burned out upper stories. One is quite inclined, in view of the circumstances, to agree heartily with the character who declared that "the Law is h'a h'ass!"

THE law is largely such an unreasonable and mysterious aggregation of the *obiter dicta* of self-important judges that it is beyond the power of the average man to feel sure that the property-right of the American Academy at Rome in the Villa Mirafiori may not be levied on with success by Signor Ernesto Biondi, the disappointed sculptor of the "Saturnalia," the connecting link possibly being found in the fact that the president of the Metropolitan Museum of Art, Mr. J. P. Morgan, is also one of the incorporators of the American Academy and

a contributor to its endowment fund. At any rate, newspaper reports from Rome represent not only that Signor Biondi is a very bitterly disappointed man over the outcome of his suit, as was to be expected, but that his cause has been espoused actively by his fellow artists who, if the reports may be believed, are ready to declare war upon America, American artists and the American Academy at Rome in the way of inaugurating some sort of a boycott against these offending parties, one newspaper declaring that Italian artists will "refuse, in a spirit of retaliation, to do even the smallest favor for any American artist who may find his way to Italy." Evidently Italian artists are believers in one of the tenets of trade-unionism—an injury to one is an injury to all.

ANY contractor who is willing to entrust to the honest keeping and tender mercies of officials of the new Republic of Panama the sum of twenty-five hundred dollars in gold, as a "guaranty of good faith," may have the privilege of putting in, before August 31, next, a bid for the construction of the new Government Palace and National Theatre, to be erected in the city of Panama. Isn't the collocation of words, the hinting at theatrical governmental performances, delightfully guileless, when considered reminiscently? If any American contractor, wishing to get nearer the scene of activity in the "Canal Zone," where fortunes are to be made and names unmade, decides to risk his twenty-five hundred dollars in gold, he must put in his bid written in Spanish and "folded so that only the name of the bidder will be visible!"—clearly, as the paper is not sealed, the honor of the Panama officials must be of the highest! Amongst other formalities he must make a declaration that he is "impressed with the importance of the work," and in his schedule must explain fully why he proposes to use such and such materials and systems of construction rather than some others which he might use. All these, and other things as well, must be set down in good and grammatical Spanish, and then, after all, the Government reserves the right to award the contract to the bidder who can "make the monetary arrangements with the treasury most convenient," a declaratory statement that seems to cover a multitude of possibilities.

IT is with regret that we learn of the death of Mr. Louis W. Pulsifer, a young architect whose delicate health for some years has stood in the way of his having the successful career that his abilities seemed to assure him. Mr. Pulsifer graduated at Harvard College in 1890, and then studied architecture at the Institute of Technology. His capacity was shown by the fact that he won the Rotch Traveling Scholarship.

WE have not kept an accountant's record of the attempt to raise the needed endowment for the American Academy at Rome, so we cannot feel sure whether the subscription of \$100,000 made lately by Mr. Henry C. Frick completed the total of the million dollars desired for the endowment or whether it was only the ninth of the hundred-thousand-dollars contributions. The fact is patent, however, that the endowment needed is to be secured in a remarkably short space of time.

THE CONSTRUCTION OF A STONE DOME.¹

THE construction of a stone dome is of great interest to the architect and to the craftsman; to the former because the study of masonry is of value both from an artistic and a constructive point of view, while to the latter its practical importance is self-evident.

The dome as an architectural feature is not here under consideration, nor is it proposed to go into the matter of the theory of dome construction.

The treatment of the subject will be confined to the constructional and more practical part of the work connected with a dome of moderate size, as well as the principles of stone dome construction.

A dome may be generally described as a spherical roof rising like an inverted cup over a circular or polygonal base.

If we cut a spherical dome by four vertical planes equidistant from the center and at right angles to each other, the spandrel portions of the dome contained between the plane surfaces are called pendentives, and this is the proper form of a pendentive dome (see Fig. 4).

When a spherical dome covers a square compartment of a building (such as is shown in Figs. 1, 2 and 3) it requires some

used in any bed joint making a greater angle than 23 degrees to the horizontal base (Fig. 1), because this has been proved to be the inclination of the weakest joint in a hemispherical dome, and all the stones above this angle press inwards, each circular course forming a horizontal arch, keying itself.

The dome is therefore independent of a keystone.

Copper cramps from 10 inches to 12 inches long have been used to tie the stones of a lower course together. They are inserted in the upper bed of the stone, but the objection to the use of cramps is that each stone in this course is brought into tension.

A much better arrangement is to have a continuous ring of iron or copper sunk into the bed of the stone (Figs. 6 and 7), which method is quite suitable for a dome of moderate span.

Whether the ring or cramps be used, they should be properly embedded in Portland cement.

The cement used in building the dome may help a great deal, as it also acts as a tie to a certain extent, depending on the tensile strength of the cement used.

It has been found that the weakest joint in a dome of a pointed form makes a much smaller angle than 23 degrees with the horizontal.

A stone dome need not be uniform in thickness throughout, for, if reduced gradually toward

the crown, it can do with less material (Fig. 1).

If the reduction at the crown is such that it is half the thickness at the base, the weight is then only little more than half of that required for a dome of uniform thickness and of the same size.

The greater the weight in the upper part of the dome, the greater will be the horizontal thrust. Therefore a dome requires less thickness and is more stable when an eye is formed in the top.

When circular openings are cut through the lower part, the stability is greatly diminished, both by the loss in weight and by the reduction of the base area of the dome.

Any increase in weight at the top (such as adding a lantern) will decrease the stability in a much higher ratio than the weight cut out near the base.

Pointed domes are more stable than spherical ones, and this form should be used when a lantern has to be supported on the top.

It is now my intention to deal with the setting-out of the dome as required in actual practice, and then to describe the working of the stones in it, after which the work connected with the pendentives will be taken up.

All the bed moulds could be developed from a quarter plan drawn down full size, but in order to show the "setting-out" clearly, a half plan looking up (Fig. 2) has been drawn.

The lines of the joints on plan are very easily traced if the soffit joints are shown in solid lines and the extrados joints dotted.

The bed moulds are here shown longer than would be used, so as to avoid confusion of the lines, but whatever length of stone is fixed upon, each stone should, if possible, be of the same length in that course, because the bed mould will then give the exact length of each stone in the course.

Before the plan can be drawn complete, at least one-half of the section (Fig. 1) would be required. The section gives all the joint moulds necessary (one for each course).

The thickness of the joints should be deducted when the moulds are cut, and the moulds should be made of stout zinc.

There is some difference of opinion as to the most economical method of working the stones for a dome. In regard to simplicity, the method about to be described is the most suitable, especially for the lower and higher courses, and may also be adopted for the other courses, but with these there is greater waste of material.

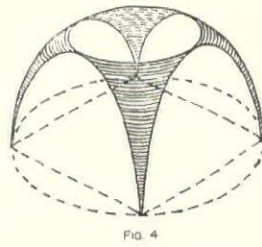
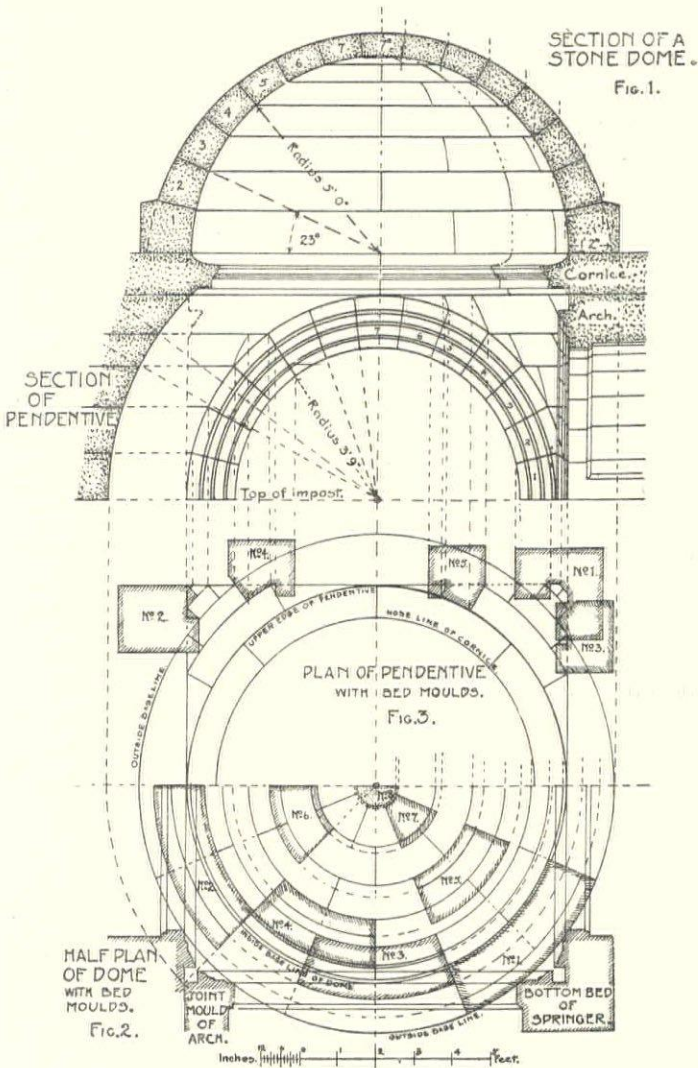


FIG. 4

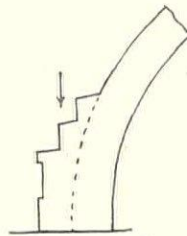


FIG. 5

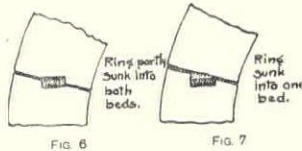


FIG. 6

FIG. 7

means of support for the whole of its base. This is usually provided by corbelling out a pendentive from the internal angle of each pier to meet the base of the dome; and all domes of this nature are commonly styled "pendentive" domes.

The outward thrust of a dome near its base requiring to be counteracted, it is usual to add mass on the outer surface just above the springing to do this (Fig. 5). This mass counteracts the outward pressure of the dome near its base, directing it into a more vertical direction. Metal ties embedded in the masonry near the base of the dome serve the same purpose.

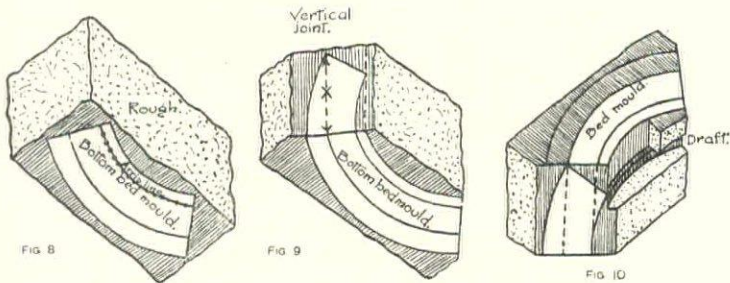
If a dome is hemispherical in form, with a proper thickness of material and without a lantern on the top, the ties need not be

¹A paper, by James S. Boyd, read before the Glasgow and West of Scotland Technical College Architectural Craftsmen's Society.

The saving in material effected by any more intricate method will not compensate for the loss of time involved in the work.

The form of the block required for working any of the stones is a rectangular prism; the length equal to the full length of the bed mould, as in Fig. 8, and the full height of the joint mould for that course, as in the section (Fig. 1).

First, work the bottom bed and scribe in the bed mould (Fig. 8). The inner arris line on this bed may be marked by a

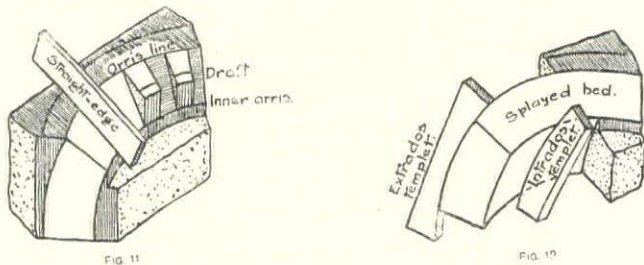


pencil through small perforations formed in the mould, or it may be scribed-in with a templet taken from the corresponding arris line on plan.

Next, work the vertical joints to the end of the bed mould square from the bed, as in Fig. 9. Square up lines on each joint from the arris lines on the bed. These lines guide the application of the joint mould, which is now scribed on each joint. A top bed is now worked parallel to the bottom bed and to the exact height of the joint mould. This bed is only a surface of operation, and labor need not be thrown away on it where it is not required.

It may be mentioned here that the stones for each course can be machined down to a gauge x (Fig. 9), the exact height of each joint mould, and this is a great saving in labor, but in each example described here it is assumed that the stones are entirely worked by hand labor.

Next, apply the bed mould on this bed and scribe-in the lines required (Fig. 10).

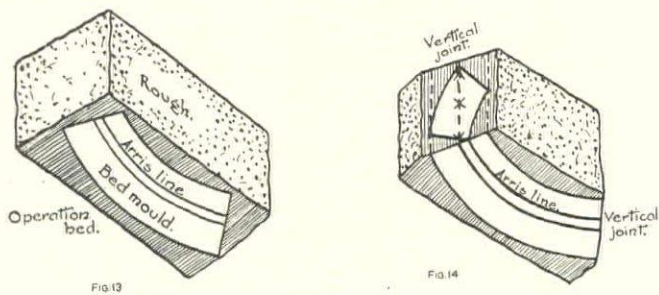


A draft is sunk at the lower arris of the splay joint; the templet used for this is taken from the corresponding arris line on the bed mould on plan.

Roughly square down the small part of the stone directly above the draft to the inner arris line drawn on the top bed (Fig. 10). This arris can now be trammelled-in from the top bed.

We next work off the conical splayed bed, drafts radiating from the center of the dome being sunk between the outer and inner arrises by the aid of a short straight-edge (see Fig. 11).

In Fig. 1 the back of the springer-course is shown vertical,



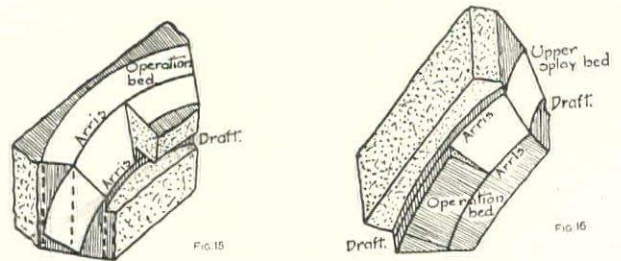
but if the back has to be cut to the extrados curve, it can now be worked off guided by a templet (Fig. 12) taken from the extrados curve in the section (Fig. 1).

The soffit can also be worked out by sinking drafts to a templet taken from the soffit curve in section (Fig. 1).

In each case, when templets are used, they should be held plumb and radiating to the center of the plan.

The shape of the rough block required for this stone is also a rectangular prism; length equal to that of bed mould and height equal to that of joint mould.

The stones may be gauged down to the height x in Fig. 14 by a planing machine, as already mentioned, or we may begin by working a bottom bed by hand, on which scribe-in the bed mould

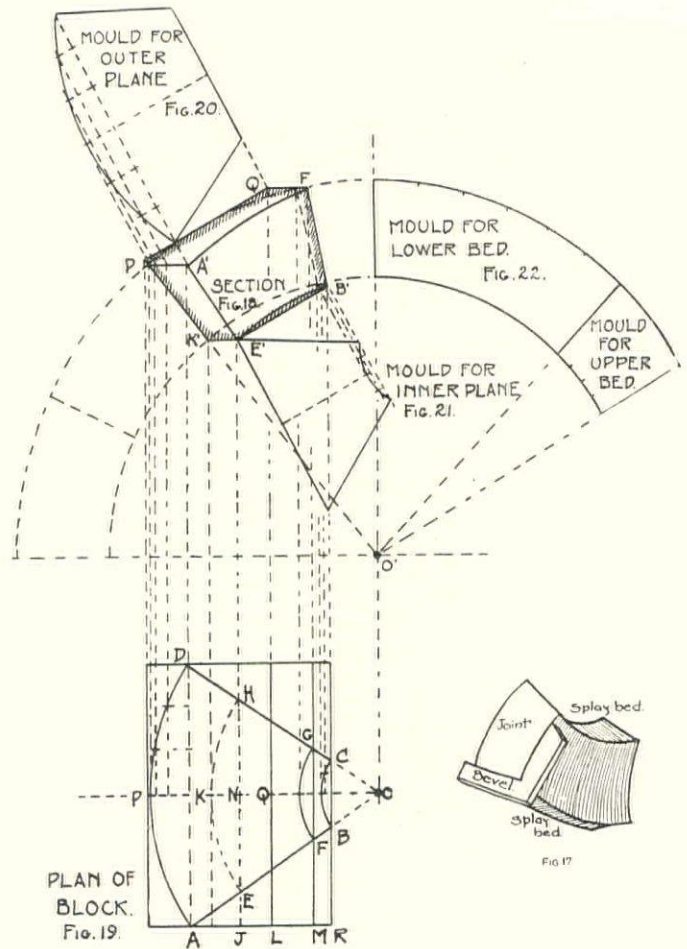


(Fig. 13). All that is left of this bed when the stone is finished is the lower arris, so that labor may be saved on the bed where possible. The vertical joints can now be cut square from the bed, and the joint mould accurately applied and scribed on the joints, as in Fig. 14. The stone is now brought to a parallel thickness by working the top operation bed to the height of the joint mould.

Apply the bed mould on this bed, and scribe in the lines required (see Fig. 15).

A draft is next sunk to contain the upper inside arris by the aid of a templet taken from that arris line on the plan or from the bed mould. Trammel-in the arris from the top bed, as in the first stone, and clean out the splay bed, guided by the short straight-edge.

To work off the bottom splayed joint, take a templet to the



bottom outer arris curve on plan, and sink a draft to contain the arris, which is now trammelled-on from the bottom bed (Fig. 16). The splay is now worked off, aided by the straight-edge.

Lastly, clean out the soffit and the back, as explained in con-

nection with stone No. 1. As an alternative method, the soffit may be cleaned after the top splay joint has been worked by means of the soffit templet; then the bottom splay joint may be worked by an arch bevel applied from the soffit, as in Fig. 17.

As already stated, when this method is applied to the middle courses of the dome, it involves a great loss of stone, as we can see by comparing the finished block (Fig. 17) with the rough block (Fig. 14).

In order to save material, the stone can be worked as a polygonal prism, as in Fig. 23.

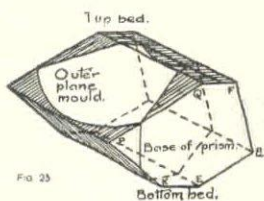


FIG. 23

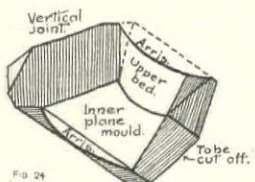


FIG. 24

To obtain the moulds, a sectional elevation of one block is drawn on a vertical plane passing through the center of the block and center of dome (Figs. 18 and 19). The stone prism (the base of which is the polygon F' B' E' K' P' Q' in elevation) is worked straight through, as in Fig. 23.

Measure the distances J E, M F and R B from the base of the prism, shown on the plan of the block (Fig. 19). These give four points which will enable the vertical joint to be worked at this end of the block.

On the top bed, Q F of Fig. 23, the topmost arris is scribed-in, using a templet to this arris, F G on the plan. A mould of the inner operation plane is developed, as shown in Fig. 21, and with this mould drawn on the inner surface of the prism its intersection by the conical surface of the upper splay bed (Fig. 24). The upper conical bed can now be worked through to the two curves just drawn, the straight-edge used always held radiating to the center of the dome.

The lower bed can be worked in a similar manner. The bottom arris line is drawn on the bottom bed of the prism, as in Fig. 24, with a templet to E K H on plan (Fig. 19).

Develop an outside operation-plane mould, as in Fig. 20, and with this draw on the outer surface its intersection with the bottom conical joint (see Fig. 23). The bottom conical bed is now worked to the two curves, aided by the straight-edge, as already explained (see Fig. 25).

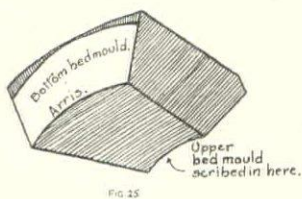


FIG. 25

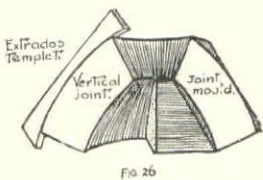


FIG. 26

Flexible moulds of the upper and lower beds are developed as shown in Fig. 22. The moulds are pressed into and around the conical surface, to scribe-in the interior arris of the upper splay bed and the exterior arris of the bottom splay bed (Fig. 25).

Guided by templates taken from the soffit and extrados curves, the spherical surfaces are now worked (see Fig. 26), a joint mould being scribed on the vertical joints as indicated.

The pendentive has already been defined.

The arrangement of the bed joints is worthy of some attention. These are much better if worked as conical or splay beds as in the dome, but as this requires more material and causes more trouble in working, they are generally horizontal, as shown in the section (Fig. 1).

Sometimes the lower courses only are worked with level beds, and the higher courses with splayed beds, as indicated by dotted lines in the section.

Observe also in the same figure that the courses are arranged to suit the stones in the arches, and a haunch is worked on each arch stone, which thereby forms a good bond with the pendentive.

The bonding of the two together in this way is often omitted, the pendentive courses being simply splayed on the back of the arch with a plain joint.

The profile of the pendentive (Fig. 1) is found by describing an arc of a circle with a radius equal to half the diagonal of the square plan (Fig. 2).

The bed joints are now projected through the profile, and we thus find the depth of each course in the pendentive. This shows the arrangement of the corbel, and how the courses vary in depth and form.

From the section of the pendentive a joint mould is made for each course except the bottom one.

Bed moulds are got from the plan (Fig. 3) by projecting the bed joints from the elevation. They include the over-all size of the archivolt projected from each joint in elevation to the plan.

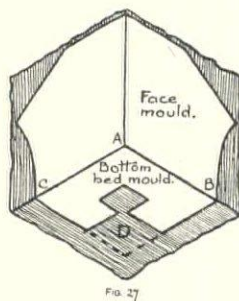


FIG. 27

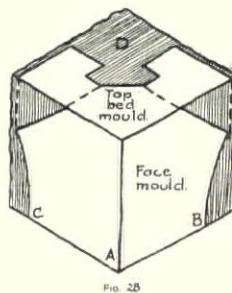


FIG. 28

Notice that there is a flat margin about 4 inches broad worked round the outside of the archivolt.

This margin miters with the pendentive surface, and greatly aids the workman in working the stones.

The vertical joints must now be set out on plan. These radiate from the center of the plan and are arranged to suit the size of stones available (see plan of pendentives, Fig. 3).

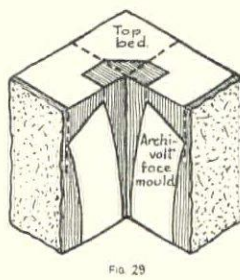


FIG. 29

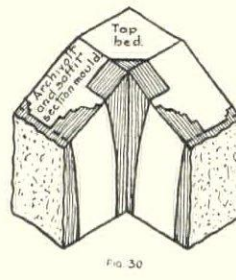


FIG. 30

The working of arch-stone No. 1 will now be described; notice that it is a double springer, with a very small piece of the pendentive worked in the angle.

The top and bottom bed moulds are marked on the plan (Fig. 3) and the face mould in the elevation (Fig. 1).

Begin by working the bottom bed, and on it scribe-in the bottom bed mould, as in Fig. 27. Work the vertical joints A B and A C to the lines of the mould and square from the bed.

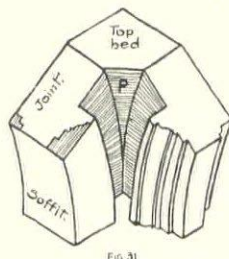


FIG. 31

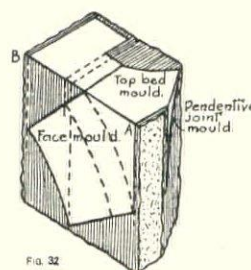


FIG. 32

On these joints scribe-in the face mould (Fig. 27).

Now work the top bed parallel to the bottom bed and to the exact height of the face mould (Fig. 28).

Scribe-in the top mould and work the check D through from bed to bed, keeping the plane containing the archivolt moulding clean, as in Fig. 29.

Apply the archivolt face mould (which is taken from the face

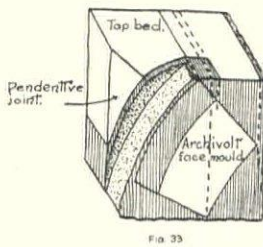


FIG. 33

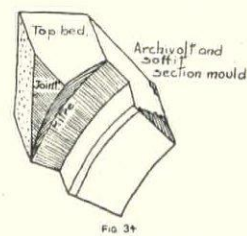


FIG. 34

mould already used), guided by lines squared down from the top bed, and scribe-in the soffit line, the splay joint, and breadth of archivolt (Fig. 29).

Next work the splay joints as shown in Fig. 30, and scribe-in the section mould of the archivolt and soffit panel.

The soffit, panel mouldings and archivolt are worked through, guided by templets where necessary (see Fig. 31). Then, lastly, the small part of the pendentive (marked P in the figure) is worked. The templet required for this is taken from the section of the pendentive at the springer course (Fig. 1).

The bed mould is shown in the plan (Fig. 3) and the face mould in elevation (Fig. 1).

First work the top bed (a part only of which will remain) and on it scribe-in the bed mould (Fig. 32).

Next work the vertical joint A B, and the pendentive joint square from the top bed. Scribe the face mould on the joint A B, and the section mould of the pendentive for this course on the other joint, as in Fig. 32.

Rough-out the surface of the pendentive, working from the joint toward the miter, and point off the vertical part between the joint A B and the pendentive joint (Fig. 33).

Also work a plane surface to contain the archivolt moulding, and scribe-in the archivolt face mould, the application of which is guided by lines squared down from the bed. The splay joints are now worked through from the face to the side A B.

Scribe-in the section mould of soffit panel and archivolt on both joints (Fig. 34), and work the mouldings through.

The small part of the pendentive and the outer margin of the archivolt are now cleaned into the miter, as in Fig. 34.

In building up the courses in the dome, the mason requires some means of checking the work as it proceeds.

In the arch the stones are tested by a trammel working from the center, but this cannot be applied to the inside of the dome surface owing to the position of the centering.

A very accurate method is to cut a wooden mould to the outer section curve for each course with the top edge level, as shown in Fig. 35.

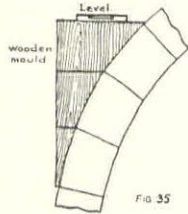
The mould is held exactly to the top and bottom arrises of the stone, and a spirit-level is applied on the top edge. The mould must be held plumb, and radiating to the center of the dome.

It may be made to take in a number of courses if desired, in which case the lines of each course would be marked on it to check them properly.

Another method is to work with a trammel revolving on a center point at the top of the dome, but this is not so accurate as the method already described.

In conclusion, great importance should be attached to the study of the science of masonry, both by the architectural student and craftsman.

Builders have at times had their wits highly exercised by difficult masonry problems, of which the one we have now considered cannot be classed as the most difficult.



IFFLEY, NEAR OXFORD.

ONE fine old church of Iffley is a most interesting example of Norman architecture, not impudently restored, although the Perpendicular period has left its mark. The worst was accomplished in 1825, when, I believe, the altar-tomb (1575-85) was removed from the interior of the church to one of the entrances.

The Knights Templars held property here, and Iffley appears in Domesday Book as *Givetelei*, from the Anglo-Saxon *giftaleya* ("fields of gifts"), but the termination *ey* or *ca*, an island, points to a period when the river circled round the marshy lands.

The church was erected by Robert de Cheney, Bishop of Lincoln, 1135-47, or by Juliana de S. Remigius, who gave it in 1175-95 to the Priory, and whose father, Robert, held an estate at Iffley.

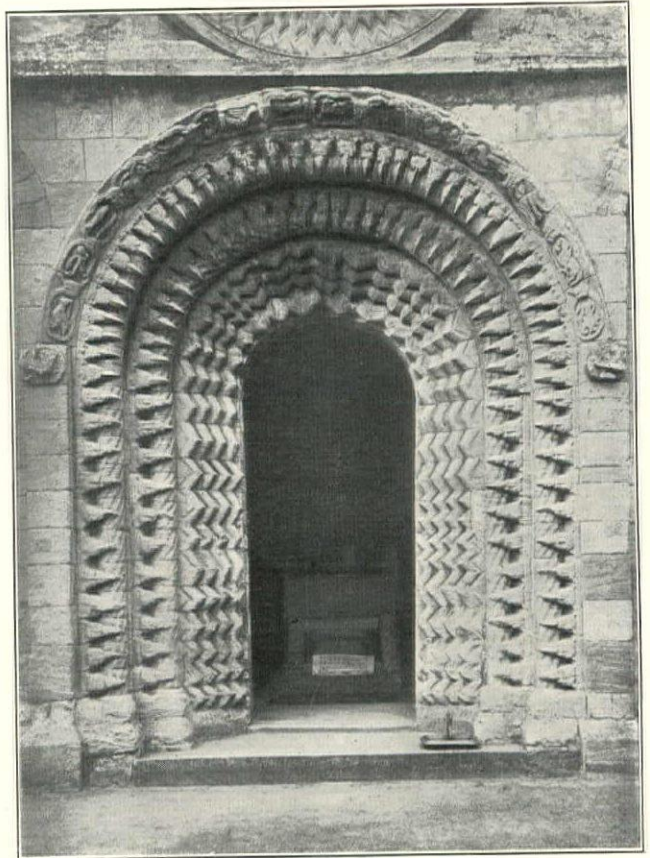
The massive embattled tower, with its early Norman windows and ornament, has six bells. Two are dated 1785; one cast in 1592 was re-cast 1869. The fourth is inscribed "Praise the Lord." The other two are dated 1642, and the Priest's bell, 1709.

The tower has two Norman windows (in the belfry) and a small turret at the northwest corner, which does not rise above the windows. In the centre of the battlements is the figure of some animal, said to be an ass; but as I had no glass with me I could not determine this.

The great west door is very richly ornamented with chevron and beak ornaments; the outer division is supported by brackets, represents the signs of Zodiac. The circular window above was restored very recently—1853-76. The three windows above this

continue the same decoration, but the outer mouldings are supported by colonettes. In the apex of the gable is a small window of the same character. All the windows and the door are deeply recessed.

The south door is more varied in ornament. The mouldings are supported upon capitals, the shafts of two of the columns



WEST DOORWAY, ST. MARY'S, IFFLEY.

being decorated. The jambs are ornamented with a series of rosettes. The arches of the interior which support the tower spring from piers with pillars of black marble at the angles. The capitals are plain, cushioned; the arches deeply recessed and decorated with zigzag and chevron ornament.

The chancel is Early English, probably the work of Robert de Efteley, Friar of Kenilworth, 1266-76, a native of the place. It has *sidilea* and a *piscina* of the same date. The windows are somewhat later. In the nave are four Perpendicular ones added by John de la Pole, Duke of Suffolk, 1463-91, and Elizabeth of York, but the outer Norman mouldings remain above the later work. The only original Norman windows remaining are two in the nave. The font is of black marble upon a circular pedestal and twisted columnettes and one square shaft at the corners, all resting upon a square base of two steps. The church-yard cross has been restored, practically re-built, as only the base and part of the shaft remains.

S. BEALE.

NINFA IN THE PONTINE MARSHES.

ON the fringe of the Pontine Marshes, that historic swamp which consuls, emperors and popes in vain endeavored to drain, there lies, says Mr. William Miller in the *Morning Post*, a deserted city, a Mediaeval Pompeii. The slow train, which winds round the spurs of the Volscian Mountains on its way to Terracina and the Latin shore, pulls up on the margin of a lake, resonant with the hoarse croaking of hundreds of Pontine frogs, and in five minutes we are within the magic circuit of the ivy-grown walls of Ninfa. A tall tower, once the proud creation of Cardinal Peter Gaetani, nephew of the great Pope Boniface VIII., guards the entrance to the abandoned town, whose sole inhabitants are the butterflies and the lizards and the frogs. A few children and a woman, gaunt with fever, the product of the marshes, come here by day to work at a mill, but no one sleeps within the ruined Mediaeval fortress.

Yet here was once a flourishing little community. On one of the deserted churches we could still see the frescos of saints, painted by some long forgotten artist, and the long trails of the

clematis cover houses once inhabited by the vassals of the ancient Pontine family of the Gaetani, whose chief still owns the great castle of Sermoneta on the hill yonder. A broken bridge half spans a rapid stream, which intersects the deserted town, and the mediæval streets and the old market-place have long since disappeared beneath a thick growth of luxuriant weeds, which flourish in the marshy soil. Here some novelist might lay the scene of a stirring romance in the dim twilight of the Middle Ages; indeed, a legend tells of a fair damsel who threw herself, for the sake of her lover, from the Gaetani tower into the silent lake below. Yet there was a time when Ninfa, now so picturesquely desolate, figured largely in parchment deeds, and was bought and sold as a valuable asset. Far back, in the spacious Byzantine days, when Rome was an annexe of Constantinople, and the Imperial Exarch still lingered on at Ravenna, the iconoclast Emperor Constantine, he of the unsavory nickname, granted Ninfa, and with it lofty Norma, which rises high above us on the mountain-side, to the sainted Pope Zacharias to be part of the Papal patrimony, and here, within one of these roofless churches, a later pope, Alexander III., the successor of our only English pontiff, and the mightiest adversary of Barbarossa, was consecrated with all the ceremonies of the mediæval hierarchy.

But the golden age of Ninfa was the close of the thirteenth century, when the Gaetani began to consolidate their little Pontine kingdom under the auspices of their great kinsman, Boniface VIII. In those days Cardinal Peter paid in hard cash some £94,000 of our money for the undivided possession of the township of Ninfa, and received it from his Papal uncle, as a fief forever, on condition that he should never alienate one single stone of it to the hated Colonna. It was then, too, that Boniface himself bought lofty Norma for £12,000, so that the Gaetani scutcheon might be seen on all the towns of the Marshes.

But fever was stronger than popes or cardinals. Gradually the deadly disease of the marshes crept over the dwellers by the lake of Ninfa. To-day the station-master and his family are the sole denizens of that low-lying ground, and for four months every summer they too reside up at Norma, and Ninfa is left without a living soul. Here at last is a place which modern Italy cannot "improve" out of its picturesque existence.

It is strange to find one of our countrymen in this unfrequented region. The station-master at Ninfa, at whose house we passed the night, had much to tell of the British abbot of an adjoining monastery, a man beloved by the whole countryside. Early next morning we attended service in this picturesque abbey-church, one of whose windows commemorates the safe return of a Gaetani from the great struggle between the Cross and the Crescent in the waters of Lepanto. Dogs and babies ran about the floor of the spacious building, while the peasants in their costumes knelt reverently at their devotions. Here, at any rate, the populace had much for which to bless the Government of the Popes. The fine bridge which leads to the abbey, the splendid road which leads in huge serpentines up to Norma, were the work of Pius IX., while the one man of modern times who has seriously grappled with the problem of the Pontine Marshes was Pius VI., the martyr of the Modern Papacy, whose name should go down to history in this region with that of Appius, the builder of the Pontine road, whose huge blocks we traverse outside Terracina, just as did Horace on that memorable journey to Brindisi and as did St. Paul on his still more famous journey to Rome.

Terracina still stands, as it stood in Horace's time, on the white limestone cliff, which shows above the dull level of the vast plain. At the foot of the rock a colony of herdsmen and their families from Trella, in the Abruzzi, have settled for the winter in conical huts of straw, like the Koutso-Wallachs whom one sees in Bœotia. The people of Trella are of Saracenic origin, and the women show their Oriental ancestry in the costume which they still wear—the white head-dress, on which the picturesque pitchers of copper or earthenware are so deftly poised, the braces and the dark cloth fastened over the skirt. Seldom in modern Italy, amidst the sartorial abominations of the slop-shop, does one see so much costume as here. But Terracina, despite the ugly modern town which has grown up near the sea, preserves in the tortuous streets of the rock-city all the attributes of the Middle Ages. The quaint beasts which support the outer pillars of the fine cathedral must have listened to the reading of the quaint charter of Pius II., who allowed the Jews to live at Terracina "because of the necessity which the citizens have of borrowing money." The town walls contain blocks of stone which withstood many a Papal siege,

and if recent excavations have cruelly dislodged the ghost of the great Theodoric from the vast ruins on the promontory above the town, his memory is preserved in the name of the local theatre and in those of many a local tradesman. But here the climate and the natural surroundings are rather Greek than Italian. Terracina was, indeed, once a Greek city, and in the asphodel meadow above the town the traveler might easily imagine that he was in one of those Homeric scenes which are so common in the islands of the Ionian Sea.

But we have not far to go from Terracina in order to get upon the track of the Homeric hero. A drive of ten miles over the plain and among the smouldering fires of the charcoal burners takes us to the foot of the enchantress Circe's fabled home, now no longer an island though it seems so from afar. Among the herds of black pigs which thrive on the mountain there may be descendants of the unhappy mortals whom the cunning witch converted into animals, and her name still lingers on in that of this lofty and isolated rock—Monte Circeo.

There is nowadays a greater air of prosperity about Terracina and its neighborhood than might have been expected. Living is cheap there; fish, fruit and vegetables are abundant, and the people seem to live well. Certainly they are not tempted by the distractions of the capital; for there are few who care to take the five hours' journey to Rome behind one of the "coffee-pots," as they call the engines, which pant laboriously along the railway at a speed of fifteen miles an hour. Amid the orange groves and the lemon gardens of this old Volscian town men can cultivate that equanimity which Horace declared would secure happiness even in the depths of the Pontine Marshes.

ARCHITECTS' CHARGES.

NOT long since, says *The Building News*, a well-known architect we knew had occasion to send a copy of the R.I.B.A. scale of charges to a client who was contemplating building. The client, who was a relative, replied as follows: "I note about costs and your anxiety not to depart from the R.I.B.A. scale. It is a laudable sentiment, but not always acted on by architects—in fact, I should say more honored in the breach than the observance—so don't unduly distress yourself if you should by accident charge me a trifle under full scale."

The same day this reply was received, information came through a reliable source that a traveler for a firm of building specialists was accustomed, when visiting certain architects who frequently specified their goods, to leave a small pile of sovereigns upon the table when the architect's back was turned.

A few weeks previously an architect had called, and had made the remark in conversation that until one was in such large practice as to be able to specify that, for instance, the sanitary work should be done by So-and-So, and to accept from that firm the 10 or 15 per cent. on the cost which they were prepared to pay, it was impossible to make a living by architecture.

These three incidents taken together indicate the present position of affairs tolerably well. There is a scale of charges which is recognized as customary, and which is clearly stated to denote the minimum rate at which payment should be made. In the eyes of the client, however, it represents the maximum, and he is frequently prepared to employ that architect who will base his charges upon a lower scale. When the rate of payment is already as low as is compatible with the earning of an honest livelihood, the natural result of such cutting down must be that some other means of recuperation are found. Of course, we all know that the acceptance of a commission from any one other than a client is illegal, unless it be done with the client's consent; but while there are firms which are prepared to pay an architect a commission in order to secure work, and to do it in such a way that it cannot be proved that they have done so, the temptation is great, and there is little wonder that some succumb.

Of all the evils which at present afflict the architectural profession this is unquestionably the greatest, but how it is to be met is, under present circumstances, a difficult problem. Proof is what is lacking, and the courage to act upon it upon the part of some recognized body, if it be forthcoming. The question arises under these circumstances whether the system of charging for his services now adopted by an architect is the best possible, and whether, indeed, it is well that there should be such a thing as a schedule of charges at all. Its effect is to bring all upon the same basis, giving the incompetent beginner the right to charge as much as the old and experienced practitioner. It is admitted, too, on all hands that the architect's services in connection with plain warehouse building are overpaid at 5 per cent. upon the cost, while the same

percentage is an extreme undercharge in the case of a small villa, or a church with elaborate detail. It may be argued that these things balance themselves, and that, taking the rough with the smooth, the result is fair. It may be so in the case of a general practitioner in a country town; but the man who is in a large manufacturing centre produces only large buildings, simple in their planning and construction, and with features repeated over and over again, soon becomes a wealthy man, while another architect with a European reputation for ecclesiastical work of the highest order only makes but the barest of livings. In all justice the one should charge less, and the other should charge more, than 5 per cent. on the cost. In practice the one insists upon the custom established by the schedule, or failing this, recoups himself by the illegitimate means already mentioned, while the other, by reason of the same custom, finds that he cannot charge more than the schedule rate, while his honesty forbids his accepting commissions behind his client's back.

Probably the best solution of the difficulty would be found by a return to the practice of other times and other countries, whereby the architect was the chief builder, employing his own workmen and purchasing his own materials, and not a mere supervisor and instructor of others. It is an ideal which many are seeking after, and is reached to a large extent by our cousins across the Atlantic by means of large firms who are architects, engineers, and contractors in one. As matters stand at the present in England, this sort of thing would probably be looked down upon, and no more can be done than to throw out the suggestion, as, indeed, we have done many times during the last fifty years, and to hope for what the future may bring. In the meantime the R.I.B.A. schedule of charges must be accepted until steps are taken for its amendment. It would probably be hopeless to enter upon a crusade for the entire abandonment of the schedule; but that it needs very considerable alteration is obvious to every thinking man. The only ground upon which it can be substantiated at law is that it represents the general custom of the profession, and even this seems to be doubtful. Whenever it can be done without giving offence, it is undoubtedly best to come to a definite understanding with a client upon the matter of charges before even the preliminary sketches are made. It is generally recommended that negotiations to this end should be opened by sending the client a copy of the schedule; but it must always be remembered that if this is done there is not the slightest prospect of afterward being able to charge any excess over schedule rates, however well such excess may be earned; while there is considerable probability of the client's attempting to make a bargain which is more to his advantage. In such a case it is generally the soundest policy to come to a definite lump-sum arrangement, to include all services except such as may be necessitated by a client's own desire for alterations as the work proceeds, and to stipulate for payment in instalments at the time when the contract is signed, and possibly afterward, as certificates are given to the builder.

Above all things, your architects should be warned against accepting payments at a rate so low as to leave them open to the temptation of recouping themselves by illegitimate means. Once an illicit commission is accepted, however carefully it be veiled in the form of a Christmas gift or the execution of some needed repair to his own house without charge, the architect will have lost his control over those who are employed under him, and will have sacrificed the self-respect of a man of honor.

ILLUSTRATIONS

FORTE COCHÈRE: HOUSE OF CAPT. LARZ ANDERSON, WASHINGTON, D. C. MESSRS. LITTLE & BROWNE, ARCHITECTS, BOSTON, MASS.

PIERCE PRIMARY SCHOOL, BROOKLINE, MASS. MR. J. A. SCHWEINFURTH, ARCHITECT, BOSTON, MASS.

HOUSE OF M. C. LEFFERTS, ESQ., CEDARHURST, LONG ISLAND, N. Y. MESSRS. LORD & HEWLETT, ARCHITECTS, NEW YORK, N. Y.

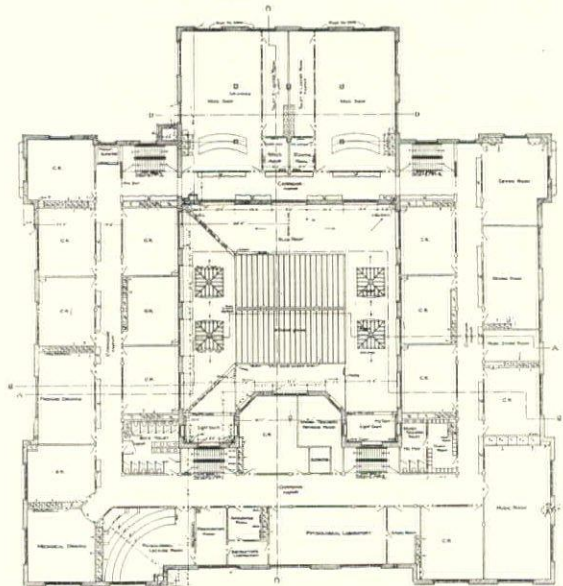
HOUSE OF JUDGE WM. H. MOORE, PRIDE'S CROSSING, EVERLY, MASS. MESSRS. LITTLE & BROWNE, ARCHITECTS, BOSTON, MASS.

CHURCH OF ST. MARY, IFFLEY, OXON., ENG.

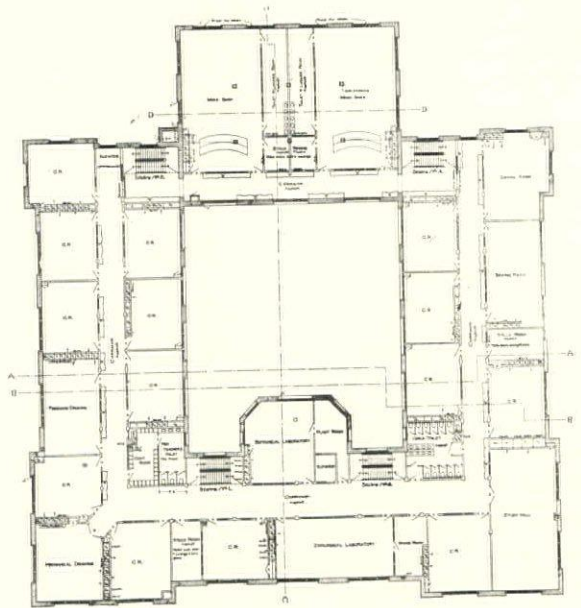
SOUTH DOORWAY AND INTERIOR OF THE SAME.

MANUAL TRAINING HIGH SCHOOL, SEVENTH AVE., BROOKLYN, N. Y. MR. C. B. J. SNYDER, ARCHITECT, NEW YORK, N. Y.

MAIN ENTRANCE TO THE SAME.



SECOND FLOOR PLAN



THIRD FLOOR PLAN

Additional Illustrations in the International Edition.

REAR VIEW: HOUSE OF WM. B. BOULTON, ESQ., CEDARHURST, LONG ISLAND, N. Y. MR. T. HARRY RANDALL, ARCHITECT.

NOTES AND CLIPPINGS.

MUSK-SCENTED MORTAR.—In considering statements made in regard to musk, we are reminded of a fact related by those who have visited the mosque of St. Sophia, at Constantinople. It is related that when the walls of the celebrated edifice were in process of construction, a large amount of musk, the contributions of hundreds of pious pilgrims, was mixed in with the mortar used in the masonry, and that after the lapse of a thousand and more years, the odor of the substance is yet plainly discernible. Especially is this the case with those to whom it is disagreeable, and to those who enter the building on a damp, "muggy" day.—*National Druggist*.

DISINFECTING DWELLING-HOUSES.—The inspector of the disinfection office of Turin has instituted an innovation in destroying germs in dwellings. He uses a 1 per cent. solution of sal soda for cleansing the floors, whereby the bacilli of diphtheritis and typhus are killed within one minute. The use of poisonous corrosive sublimate does not remove the dirt in which living bacilli are still found after disinfection.—*Richard Guenther, U. S. Consul-General*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, JULY 29, 1905.

No. 1544.

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FIVE or six years ago the city of New York awoke to the fact that, partly owing to natural causes and still more to the dereliction of officials, there were far from enough school-houses in the city to accommodate the school population and that the situation was rapidly becoming worse. Once awake to the situation fairly energetic steps were taken, although it was not found convenient to build at once the needed number of new school-houses that could accommodate the thousands of children who were forced to go either untaught or with the advantages of "half-time" schooling. The delay was caused partly by the difficulty of procuring sites in desirable proximity to the school population and partly by the inevitable slothfulness of all building operations, especially those which are paid for out of a public purse. The magnitude of the undertaking and the reality of the need for these new school-houses is shown by the fact that, even after several years of active building, there are at this time seventy-seven school-houses in various stages of completeness now in charge of the architect to the Department of Education, while contracts for twenty-four more will shortly be made. The contract-cost of these seventy-seven buildings is something over thirteen and three-quarters millions of dollars, or an average cost per building of more than one hundred and seventy-eight thousand dollars, an average which shows the buildings are neither small nor ephemeral in structure; while the fact that some of the high-school buildings cost half a million or so still further evidences the fact that New York is a good place to turn to just now for light on the difficult matter of building large and sanitary municipal school-houses. It is fair to speak of "large" school-houses for these seventy-seven new buildings are to accommodate one hundred and twenty-seven thousand pupils, an average, that is, of some sixteen hundred children to a building.

POSSIBLY it was not the best, probably it was not the most economical, certainly it was not the most expeditious way to have all the school-houses the city stood in such sore need of designed and built by the official architect to the Department of Education. But, since that method had to be followed, it is a matter of wonderful good fortune that the official architect chanced to be such a man as is Mr. C. B. J. Snyder, who not only at the outset showed distinct capacity for his task, but has proved himself a man able to grow as his opportunities opened before him. Mr. Wheelwright in Boston, Mr. Ittner in St. Louis, Mr. Mundie in Chicago, have done excellent service to their respective cities in the way of building school-houses that not only serve their purpose as such, but are also agreeable to the citizens at large as architectural accomplishments; but they have not had to do their work under the same sort of pressure that has been put upon Mr. Snyder, and they have not had to adapt their architectural treatment to as closely restricted sites. When first the New York school-house made its appearance in Gothic attire, it seemed as if a very doubtful experiment were being tried, but little by little the designer discovered new confidence in himself, and some of the later buildings are markedly successful as pieces of consistent and satisfying architectural composition.

THE Boston *Herald* is so unkind as to let its readers learn, what a good many other people already knew, that there had been a good deal of high-sounding emptiness about the past career of the undertakings that have finally resulted in the creation of the American Academy at Rome, and evidently entertains doubts as to the real usefulness of the newer institution, if its affairs are to be directed, or misdirected, in the future as they certainly have been in the past. During the eight or ten years that the Roman experiment has been going on at the Villa Aurora, one would think that something definite might have been accomplished or at least some certain aims definitely formulated which should be generally known to and understood by those who might be expected to have an interest in such undertakings, but we believe that very little is known to and still less understood by outsiders. The little information in the way of circular or report that has come in our way has always seemed to be particularly vague and formless, the outgivings of promoters who were beginning to acknowledge to themselves that there were unforeseen difficulties in the way of producing out-of-hand a well-grown and fully matured Minerva, or creating with the stroke of a pen a body of forty "immortals." It does not seem likely that an endowment of a million dollars could have been procured unless some sort of a definite programme had been presented to the subscribers, so we may hope that presently the interested public may be taken into the confidence of the promoters.

IT is the general supposition that the Villa Mirafiori will play for art in the United States the same important part that the Villa Medici has played for French

art, and that to ensure such an outcome it will be only needful to imitate the methods in vogue at the older institution. If this is really the hope and expectation, we feel quite sure it is to meet with almost immediate denial. As we understand the situation, the Villa Mirafiori and what it stands for are considered the ultimate goal, while the Villa Medici is but a stepping-stone. French students, we are speaking, of course, wholly of architectural students, are willing to sacrifice the time needed to win the Prix de Rome and a position at the Villa Medici, because they have the assurance of a governmental position and a living salary later when they return to France, and unless something of the same sort can be established for Americans, say by persuading the forty-odd State Legislatures to establish each the office of State Architect, to be filled only by those who hold the diploma of the American Academy at Rome, we feel that it will be very difficult to maintain vitality in the Roman undertaking, so far as its architectural side is concerned. It is against the genius of the American nature that young men should spend four years on a college education, another four on the technical education which will enable them to earn the scholarship or fellowship which assures entrance to the American Academy, and then another two, three or four years at Rome, only to find at the end of that long time they have to begin their real life-work and really are no better fitted to make a living than the young men who have stayed at home. After all, is there any discernible difference in architectural worth between the work now done by the earlier holders of, say, the Rotch Travelling Scholarships and by their contemporaries? Is not as good work done in France by non-winners of the coveted Prix de Rome as by those who succeeded in winning it? Is there much, if any, real advantage, in the proper valuing of life's achievements, in the years spent in Rome, save that, in the case of Frenchmen, they do open to them a definite career? Is it likely that, lacking a substantially similar reward, young Americans will be found ready to make the very real sacrifices that must be made if the American Academy at Rome is to keep the semblance of a living, even if not fructifying, force? It is all the more desirable to consider these questions, because during the last year the advisability of abandoning the French School at Rome, with all its past history of accomplished good and actual performance, was very seriously discussed in France.

ONCE more the necessity is impressed on the profession of an architect's knowing whether the public agent with whom he is in treaty is fully empowered to act and capable of making a binding contract. In Haverhill, Mass., two of the wards of the city needed new school-houses, and separate special committees of the City Council were appointed to secure plans and erect the buildings. The committee for Ward 5 decided on a brick building, while that for Ward 7 accepted the designs for a wooden school-house presented by Messrs. Perkins & Bancroft. But when the citizens of the latter ward learned of the decision they declared that their school-house, too, must be built of brick. Accordingly the committee rescinded its action and then adopted the design

for a brick school-house presented by Mr. C. W. Damon, and naturally the original architects feel aggrieved and intend to sue. Unfortunately for them the City Solicitor is able to point out that the special committee for Ward 7, in first deciding in favor of a wooden building, exceeded their delegated powers, since the City Council's vote instructed both its special committees to procure designs for brick school-houses. The moral is, simply, that in dealing with committees of all kinds, whether public or private, architects will be wise not to expend their time and effort until they have been furnished with an attested copy of the vote of the delegating body under which the committee professes to act. If the committee is found to have full powers and the architect can later secure his contract under seal, he should have no occasion to waste his substance in lawsuits.

THE recent political upheaval in Philadelphia incidentally reminds people of the scandal in which the building of the State-house at Harrisburg has been involved, for, when it was suggested that a special session of the legislature might be desirable, the present architect of that building, Mr. Joseph M. Houston, said that, if it should be attempted to hold sessions in the new building, it would so delay operations as to prevent its completion within the contract period and cause the bringing of lawsuits by or against the contractors. It is pleasurable to find ground for believing that in its later stages this particular job is being carried out with some decent regard for the law.

AS promised to be very likely to happen, the city of Boston has decided not to accept the verdict as amended by Judge Schofield in the "Westminster Chambers" case, but has elected to carry the case before the Supreme Court of the State on exceptions to the judge's rulings. Quite apart from the natural unwillingness to pay heavy damages, even if they were assessed with unquestionable propriety, we fancy that one of the real motives inciting to delay is the feeling of irritation that the right of local self-government was violated by the Legislature when it enacted the height-limit law and at the same time gave the aggrieved owners of the affected buildings the right to collect damages from the city of Boston, if they could. The same sort of tactics, presumably, would be followed by New York City in case the "hayseed" legislators at Albany should pass a similar law affecting the metropolis.

IN answer to inquiries, we will say that some ten days ago our representative called on Mr. A. Van Karnebeek, president of the Peace Palace Association, at The Hague, and ascertained that as yet no formal invitation to architects to submit competitive designs for the Peace Palace had been issued, nor had the terms of the programme or the number and value of the prizes been definitely decided upon. The present intention seemed to be that the competition shall be of the "mixed" class, thus allowing uninvited architects to submit designs in competition with those well-known practitioners in different parts of the world who may be especially invited.

HEATING AND VENTILATION.—XII.¹

OFFICE-BUILDINGS.

OFFICE buildings are satisfactorily warmed by direct steam, hot-water, and in some cases by the fan system. Probably direct steam is used more frequently for this purpose than any other method. The so-called vacuum systems, to be described later, are well adapted to this class of work and are quite extensively used.

As most modern office-buildings have their own power and lighting plant, arrangements should be made for utilizing the exhaust steam for heating purposes. Steam after being used in an engine contains the greater part of its heat and, if not condensed or used for other purposes, can usually be employed for heating without affecting to any great extent the power of the engines.

The exhaust steam discharged from non-condensing engines contains from 20 to 30 per cent. of water and considerable oil or greasy matter which has been employed for lubrication.

About 1-5 of the exhaust steam may be used in heating the feed-water for the boilers, which leaves from 60 to 65 per cent. of the steam delivered to the engines available for heating purposes.

When an engine is exhausting into the air, the pressure in the exhaust pipe is but slightly above that due to the atmosphere. The effect of passing the exhaust through the pipes and radiators of a heating system is to raise the pressure somewhat, but in a well designed system of piping this need not be over 1 or 2 pounds and can be easily offset by raising the boiler pressure or slightly increasing the cut-off of the engine.

As an engine does not deliver steam continuously but at regular intervals, at the end of each stroke, the amount is likely to vary with the work done, since the governor is adjusted to admit steam in such a quantity as is required to maintain a uniform speed. If the work is light, very little steam will be admitted to the engine and for this reason the supply available for heating may vary somewhat, depending upon the use made of the power delivered by the engine. In mills and factories the amount of exhaust steam is practically constant, while in office-buildings where power is used for lights and elevator service the variation is greater.

The general requirements for a system of exhaust-steam heating include a system of piping so designed that only a slight increase in back pressure will be thrown upon the engine; a connection which shall automatically supply live steam at a reduced pressure as needed; provision for removing the oil from the exhaust steam; a relief or back-pressure valve arranged to prevent any sudden increase in back pressure on the engine, and an automatic return system for returning the water of condensation back to the boilers against a higher pressure. These requirements may be met in various ways depending upon actual conditions found in different cases. Any of the systems of piping already described may be used, but the pipes should be of good size in order to reduce the pressure required to produce a good circulation of steam through the radiators. In computing the pipe-sizes, a drop in pressure of not more than $\frac{1}{4}$ pound in 200 feet length of run may be assumed in buildings ten or twelve stories in height.

One of the best systems of piping for buildings of this class is the overhead distribution where a single large supply riser is carried to the roof space where it branches and drops to the basement. In this arrangement the flow of both steam and condensation is downward and if the single-pipe method of radiator connection is employed much smaller pipes may be used than if the pipes ran upward from the basement and the flow of steam and water were in opposite directions. When exhaust steam is used for heating purposes it must first be passed through some form of separator or extractor for removing the oil, especially if the condensation is to be returned to the boilers. The separation of the oil from the steam is usually accomplished by introducing a series of baffling-plates in the path of the steam; the particles of oil striking these are stopped and thus separated from the steam. The oil drops into a receiver provided for this purpose and is discharged through a trap to the sewer. In other forms the steam is given a whirling motion and the heavier particles of oil are thrown outward and separated from the steam by the action of centrifugal force. There are still other forms where the steam is passed through a porous bed of coke or coarse gravel or pebbles and the oil separated by coating the pieces of coke or stone.

Other accessories such as pressure-reducing valves, back-pres-

sure valves, return pumps, pump governors, etc., are the same as have already been described for school-house and hospital work.

The method of making the pipe connections in any particular case will depend upon the general arrangement of the apparatus and the various existing conditions. Figure 50 illustrates the

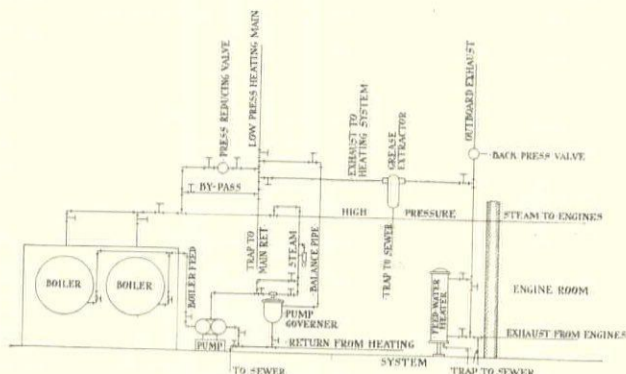


FIG. 50.

general principles to be followed, and by suitable changes may be used as a guide in the design of new systems. Steam first passes from the boilers into a drum or header; from this a valved main is carried to the engine-room. Branches are taken from this for running the boiler feed-pump and for supplying the heating system through a reducing valve. The exhaust-pipe from the engines is connected and valved so that the exhaust steam can be passed through a feed-water heater, thrown outboard, or turned into the heating system after first passing through a grease extractor. The outboard exhaust pipe is provided with a back-pressure valve which opens when the pressure in the heating system reaches the desired maximum. When the quantity of exhaust is not sufficient for heating purposes the reducing valve opens automatically and admits live steam as needed to bring the pressure up to the desired point. The connections between the mains and radiators are made in the usual way and the main return is carried back to the return pump along the floor, as shown. A water-seal is obtained by elevating the pump governor as already described. An equalizing or balance pipe connects the top of the governor with the low-pressure heating-main, and high-pressure steam is supplied to the pump, as shown. A sight-feed lubricator should be placed in this pipe above the automatic valve, and a valved by-pass should be placed around the governor for running the pump in case of accident or repairs.

The grease-extractor should be drained through a special oil trap to a catch-basin or to the sewer. The steam-drum, the bottom of the main heating riser and any other low points in the steam piping should be dripped, and the condensation trapped to the main return near its connection with the pump. The bottom of the exhaust riser, the feed-water heater and any other low points in the exhaust system should be drained and trapped to the sewer, as the condensation from these pipes contains oil and should not be returned to the boilers.

The return pump should always be duplicated in a plant of any size as a safeguard against accident, and the two pumps should be run alternately to make sure that one is always in working order. If all of the exhaust steam is used for heating so that the amount of cold water required for feeding the boilers is small it may be fed directly into the main return without passing through the feed-water heater. In summer time, however, when the heating-plant is not in use, a feed-water heater is necessary, as a large amount of heat which would otherwise be wasted may be saved in this way. The connections will depend somewhat upon the form of heater used, but in general a single connection is all that is necessary. In Figure 50 the connections are made so that all of the steam may be forced through the heater, or by opening all three valves a circulation of steam will be maintained in the heater and the surplus steam which is not condensed will pass on to the heating system.

CHARLES L. HUBBARD.

(To be Continued.)

REINFORCED PILING.

M R. A. R. GALBRAITH, A.M. Inst. C.E., reading a paper on reinforced piling before the Incorporated Association of Municipal and County Engineers [English], said that, in addition to the usual advantages that were associated with the

¹Continued from page 30, No. 1542.

adoption of these constructions—for instance, fire-resistance, durability, homogeneity, economy, etc.—the use of these piles in submarine work insured immunity from the dreaded attacks of the teredo navalis and other boring pests that destroyed timber piles, and there was no serious oxidation of the metal to be feared, as in steel piles. One of their most important advantages was that, owing to their impermeability when properly constructed, they were equally durable in dry or wet soils, whereas in order to preserve timber piles they must be constantly submerged. Unlike timber and steel piles, they could be easily lengthened, shortened, jointed, altered or repaired (the last being seldom necessary), and there were virtually no maintenance expenses, such as were connected with their timber or steel prototypes. Their most serious disadvantage was their first cost, although under favorable circumstances they would be found nearly as cheap as timber ones, and a great deal more economical than those of steel. Pile for pile, the cost would generally exceed that of timber; but often, however, their adoption would mean a saving in the ultimate cost of the work, especially in foundations, owing to the piles not having to be cut off below ground-water level, and the reduction of the excavation and in the volume of masonry. The concrete pile had also a much greater bearing capacity than the wooden one. In strata where a wooden pile 20 feet long, 12½ inches in diameter at the top and 10 inches at the bottom would carry 17,000 pounds, a concrete pile 20 inches at the top and 6 inches at the bottom would carry 65,000 pounds. This was for plain concrete, and when to this the resistance of the reinforcement in the reinforced concrete pile had to be added, it would be at once perceived that the bearing capacity was considerably in excess of that of the ordinary timber one. They were also as elastic and as resilient as timber, a pile 14 inches square, 43 feet long, suspended in the middle, giving a deflection of from 3½ to 4 inches; and they could be used for driving through strata of the most formidable character, standing a punishment that would absolutely wreck a timber pile. The ease and efficiency with which they could be connected to the reinforced concrete or other superstructure they had to support, and their freedom from vibration, owing to their monolithic nature, rendered them peculiarly adaptable for the foundations of piers and bridges, locks of docks and other structures of a similar description, eliminating the heavy expenditure for cylinders, and, in the case of masonry piers, the indispensable, but expensive, coffer-dams and pumping. In short, these piles comprised the advantages of timber piles, with some of the advantages of masonry piers, and the busy engineer would find by their adoption the solution of many problems not so easily or cheaply solved by the ordinary methods. Last, but not least, should be mentioned the facility with which the component materials could be procured or transported, and the economy of space when these piles were used for docks, quay and wharf walls, together with the ease with which such structures could be suitably anchored by means of connecting tie-rods to anchor piles driven in the adjacent strata beyond the line of pressure of the superimposed filling.

POSSIBILITIES IN HEATING WITH HOT AIR.¹

IN heating with hot air the air is heated by contact with hot surfaces in a central heating apparatus, and is then conveyed to the rooms. In heating with hot water or steam the water is heated in the heating apparatus, conveyed to the rooms and there used to heat the iron of the radiators, which in turn heats the air. The difference between the two systems is, therefore, practically that in the hot-air system, the air is heated by one central plant, while with hot water and steam, the air is heated by a separate plant or sub-station in each room, which sub-station is heated from a central station.

It is not my purpose to disparage the system of heating the air by individual heating plants, but to show some of the possibilities in heating the air by a central plant, a system which, in my judgment, has been largely left to incompetent men, and has not received the attention and scientific study which it deserves. That this system has been in a large proportion of cases unsatisfactory I freely admit, but believe that the failures have been due to errors in construction or operation and not to any inherent defect in the principle.

Heating the air by a central plant involves less expense in the installation, and this is a matter which demands the consideration of a practical engineer. Economy in first cost is not everything, but it is something, and, with probably ninety-nine out of

one hundred people who have homes to heat, a very vital something. While a really first-class hot-air plant cannot be installed at the prices commonly charged for inferior and inefficient ones, yet even such a plant costs less than a hot-water or steam system. Economy of first cost is, therefore, a possibility in heating with hot air.

But economy of operation is no less important. The plant is paid for once, the fuel bill is a continuing expense and frequently amounts to more in a few years than the first cost of the plant. No system is economical which involves a continuous useless expense. What are the specific facts in regard to cost of operation in heating with hot air? A given amount of fuel will in perfect combustion set free a given amount of heat, no more and no less. The heat is in the fuel, not in furnace or boilers. No heating apparatus can add a single unit. The theoretically perfect plant would be one in which there was absolutely perfect combustion of the fuel and complete utilization of the heat released by this combustion, and on these two points depends the comparative economy of operation.

On the first point, completeness of combustion, while there is large difference in different apparatus, there is no essential difference between the two systems. The fuel can be burned as perfectly, and as large a proportion of the heat units contained in it be released, with one system as with the other. The issue is, therefore, narrowed to what becomes of the heat after it is released from the fuel.

Heat cannot be destroyed. Once produced it must either be transformed into some other form of energy or continue as heat. In house-heating it may be practically said that all the heat released by combustion either goes toward heating the house—that is, to replacing that which has been lost by radiation and leakage through walls and windows, or escapes up the chimney having performed no more useful function than the creation of a draught.

The extent to which the heat produced is utilized can, therefore, be practically determined by ascertaining the per cent. which escapes to the chimney. The lower the temperature at which the waste products of combustion escape to the chimney (velocity of current being the same) the larger will be the per cent. utilized for heating the house and consequently the greater the economy of operation. In other words, the extent to which the cooling of the products of combustion can be carried is the measure of the efficiency of any heating apparatus.

Let us see the theoretical limit to which the cooling can be carried, keeping in mind the fact that the theoretical limit can never be reached, much less passed, in practice.

The products of combustion are cooled by contact with metal which is cooled by contact with water or air. The theoretical limit of cooling is, therefore, the temperature of the air or water by which this cooling is accomplished. With live steam the possible minimum is the temperature of water boiling under normal atmospheric pressure, or 212°. With hot water the possible minimum is the temperature of the water as it returns to the boiler from the radiators, usually 140° to 170°. With hot air the possible minimum is the temperature of the cold air entering the furnace, anywhere from below zero to 70°.

The theoretical limit of cooling and consequent theoretical economy in operation is, therefore, lower with hot water than with steam, and lower with hot air than with either hot air or steam. It is therefore, possible, theoretically, to heat with hot air more economically than with any other system. But the advocates of the other systems will contend that while this may be so in theory, yet that in practice, owing to the greater power of water to absorb heat, it is otherwise, and that actually the exhaustion of the heat contained in the products of combustion is carried much farther in both steam and hot-water heating than it is in hot-air heating.

In many cases, I admit the contention, but in turn I contend that the reason is to be found in the construction of the apparatus and not in the principle, and that it is entirely possible to so construct hot-air apparatus that the same difference in its favor, as compared with hot water and steam, will exist in practice as is shown in theory.

In heating with hot air, however, there is an expenditure of heat which may perhaps be called waste—namely, the heat contained in the air which is forced out of the building by the pressure of the warm air that is being poured in. But this loss of heat is due to the necessity for ventilation. A given amount of ventilation will involve the same loss of B. T. U. whatever the heating system may be. It is true, with hot-water or steam heat, it is possible to reduce the ventilation below the proper ratio and

¹A paper by R. S. Thompson, presented at the Chicago meeting of the American Society of Heating and Ventilating Engineers.

thus save heat; but this is equally possible with hot air, if the plant is so constructed that the amount of ventilation can be controlled.

It is true that with hot-air heating ventilation can be carried to a point which will involve large loss, as I shall show hereafter. The same is true with hot water and steam. You can open the windows and crowd the fire. But in either case the loss is to be charged up to ventilation, or bad management, and not to the system of heating, and can be as well controlled under one system as another.

It is a possibility in heating with hot air to heat all the rooms in a house at the same time. I am compelled to admit that this is not always done in practice. I could not even dispute the statement that it is not often done, but I can demonstrate both theoretically and practically that it can be done, and that which can be done is a possibility.

If the amount of cold air that is supplied to the furnace is equal to the amount that can be forced through all the hot-air pipes; if the construction of the furnace is such that this amount of air can pass through the casing and reach the hot-air pipes, with velocity unretarded by friction; if the furnace has the necessary surface and the necessary arrangement of surface to heat all this air; if the size and form of the hot-air pipes is such as will permit the passage of the required amount of air to each room, and if there is no serious "back pressure" in any room, the furnace will heat them all at the same time. For if enough air is being pressed through the furnace to supply all that can be carried by all the pipes, the pressure in the furnace will force this air through all these pipes, if the resistance due to friction and back pressure in the rooms is less than the pressure in the furnace. That is a simple matter of mathematical demonstrations.

There are a great many "ifs" in that claim? Certainly. And it is the business of the heating engineer to look after those "ifs." If he can't do it, he has not yet mastered his profession. These "ifs" cannot be met either by guesswork or by a set of hard-and-fast rules. They require a thorough scientific knowledge of the principles involved, a considerable amount of practical experience and a liberal use of "horse sense."

Air is compressible and elastic. It is subject to friction, inertia and momentum. The fact that two pipes have the same area is not proof that the same pressure will force the same amount of air through each. To get proportions correct, is not a simple or easy matter, but requires the exercise of brains and judgment. It is possible in heating with hot-air to heat those rooms which are most exposed to the wind, or the windward side of large rooms. The course of heated air is subject to definite laws, and by the use of these laws it can be controlled. But the man who would control it must make himself familiar with these laws and not content himself with a lot of empirical formulas.

The cause of trouble in heating rooms exposed to the wind is that the air pressure on the outside by leakage produces air pressure in the room, and if the pressure in the room is greater than the pressure in the pipe, the greater will overcome the less. If the pressure of air on the outside is so great that the pressure of air in the pipe cannot force air out through the crevices around windows, and there is no outlet for the air, it will be impossible to force air into the room and consequently impossible to heat that room. But the difficulty can be overcome by providing a proper outlet of the proper size and in the proper location.

Nothing has done so much to injure heating with hot air as the common idea that neither skill nor scientific knowledge is needed in connection with it. The system has been neglected by scientific men, and the work is frequently turned over to common mechanics. In many places the carpenter is given the job of having the house piped, and he turns it over to whoever gets the contract for roofing and spouting. The average man who would not think of laying out a shoe-closet in the house he is building without consulting an architect, will give all the directions for putting in a furnace, determine its size, its location, the pipes and the registers. Then he expects the "furnace man" to put in the furnace on plans of the builder's selection, and guarantees the working of the plant. And, strangest of all, there are plenty of "furnace men" who will do it. No wonder guarantees on the working of hot-air furnaces are worth but little.

There is one point in connection with heating with hot air to which I have already referred, in which there is a possibility of great waste of heat. This is over-ventilation. Take a house in which the loss by radiation from walls is 80,000 B. T. U. per hour in zero weather. To maintain the temperature by replacing this loss will require the use of 62,857 cubic feet of air per hour at a temperature of 140°.

Supposing the family consists of six persons, the maximum requirement for ventilation would be 11,800 cubic feet per hour. In this case we are using 51,057 cubic feet of air per hour in excess of the amount required for ventilation. If this air escapes at 70° and has been heated from zero, it represents a loss of 64,963 B. T. U., or about 8 pounds of coal per hour. In my judgment the remedy for this is to make provision for recirculating this excess of air.

EXPERTS IN FINE ART.

PROPOS of the blunders of experts in matters of Fine Arts, M. Marcel Prévost writes in *Le Figaro* as follows: Do experts honestly believe themselves infallible? If they do, they are certainly not wanting in audacity, for scarce a week goes by without some occurrence that shows their "béjaune," as our fathers used to say when they spoke of the gullible. And at this present moment a deliciously comic performance is going on in the Tenth Chamber—the terrified judges are witnessing a tourney between experts upon painting who contradict one another with shameless effrontery. Yet the faith of these tribunals, and especially that of the public, refuses to be shaken by such a significant state of things. The minds of art-lovers still remain so naive that they accept the decisions of these excited augurs as implicitly as if they were oracles. Hence a psychological problem to which I dearly wish some of our philosophers would devote a little study. But this much is beyond question: In any order of knowledge you may choose to name, the world is agreed upon crediting certain persons with infallible diagnostic powers, provided only that they call themselves experts. Neither the raillery of the press nor the lesson of experience can alter the case in the least.

This confidence in the oracle reaches its highest pitch of rashness when, as happens nine times out of ten, the expert called upon to settle a question of art is devoid of the very rudiments of technical education. Now, to detect an artist's "manner"—a painter's, for instance—you must not only have very keen sensibilities, but a profound knowledge of the methods by which a painting is executed. A painter who has done nothing for several years but copy Rembrandts might possibly succeed in fathoming some of that master's secrets, but he would not on that account be any the cleverer at distinguishing a true Corot from a false one. No such difficulties block the path of the omniscient expert; he declares himself qualified to pronounce upon the authenticity of all the pictures in the world, no matter of what school or of what epoch. His hand has never held a brush; he is therefore ignorant of the only indices that can guide a technician. He has acquired his intellectual baggage at second-hand by talking with picture-dealers and with other experts; he has in his head a certain number of empirical formulas, which he erects into principles. With no better furnishing than this, he declares himself incapable of error, and the world takes him at his own valuation. So with the expert in furniture, the expert in old faïences, the expert in bronzes and in Renaissance medals. From handling and scrutinizing a large number of pieces a man of intelligence will naturally cultivate more or less judgment, which he may possibly use to good purpose; but he can never acquire a faculty for inerrant diagnosis, and inerrancy is the only thing we are looking for when we call in the expert.

Another thing. Buttonhole any serious expert, ply him with questions, make him give you the reasons on which he bases his conclusions regarding the origin and value of a certain work of art, and you will always see him entrench himself after a little behind other authorities, other experts. Confronted by an object whose history he doesn't know—an object, let us say, that has been presented to him impromptu—the expert will be found very sensitive to teasing, and the teasing soon forces him to betray the extreme weakness of his means of diagnosis and his total unfitness for scientific procedure.

The facts have proved this over and over again. If the Louvre broke the record for comicality in the famous tiara affair, it is none the less true that the museums of other countries are stuffed with humbug objects of art and falsely attributed canvases. Every little while somebody denounces these humbugs and these erroneous attributions; the interested museum protests, and since it is extremely difficult to prove either contention, nothing is done. But men of sound judgment, highly cultured and broadly informed concerning art matters, hold that the catalogues of the treasures in our museums deceive the visitor in the majority of cases.

When uncertainty and unauthenticity are the rule in official collections, what must be thought of the presumption of honest private individuals who firmly believe in the authenticity of certain canvases they have collected and of the antique furniture with which their domestic interiors are decorated? Everybody in these days boasts the possession of a "*mobilier artistique*," paintings by great masters, old tapestries. To sell personal erudition, backed up by a rather blind confidence in certain picture-dealers and in certain experts. Fancy what a collection of humbugs such collaboration contrives to get together. The dealer's cleverness speculates on this taste for the historic in furniture, the antique in bibelots; and from this fertile soil spring up a thousand old-curiosity shops. Until you have visited one of them you can have no idea how hard the salesman escapes to guile the innocent purchaser. Don't imagine you can escape being swindled by this or that practical test you have discovered or have got at second hand; the swindler is as well informed as you, and from the first he undertook to provide you the very marks of authenticity you are looking for. This species of fraud is so profitable that those who practice it spare no pains. Outside Paris and Europe an immense new market is open to-day for sham treasures. America never sticks at the price, and America will buy anything. The imagination balks at counting the fraudulent Louis XV. and Louis XVI. furniture, the false Rembrandts, the sham La Tours, the fabricated Henners, and the humbug Harpignies that cross the Atlantic every year. Naturally, every bit of this falsity is declared genuine by the experts; it is easier to find experts than masterpieces or even good works of art.

But what, let me ask, can the poor, unarmed amateur do against this flood of fraudulent products? Look around you, good reader, in your little parlor, with its lovingly selected adornments—in your study, with its patiently gathered bibelots. I'll wager a hundred to one that not a single thing you have put there is genuine, especially if you have bought of dealers, and even if those dealers have meant to treat you fairly. Extremely lovely bits are particularly open to suspicion, for the wages of fraud are in such cases enormous. If there is authenticity anywhere, it is infinitely probable that it is linked with much that is not genuine. Finally, your dates are wrong. From one end of the nineteenth century to the other the furniture of the two preceding centuries was repaired and copied. Time and use at last gave these pieces of furniture the aspect and color of age. So that, except regarding things picked up in the provinces and in families where their history is known (and even then you may make mistakes) you can reach no precise conclusion regarding genuineness. The reasonable presumption is always on the side of sham, for there's no blinking the fact that it takes a very rare combination of circumstances to allow anything made of wood or wool or silk to last three hundred or even two hundred years. Already we find every evidence of the antique in objects turned out under Louis-Philippe and Napoleon III. What will be left of them after another century?

The best counsel that can therefore be given those who, at cost of great effort, have gathered about them a collection of things that give them pleasure and that seem to them genuine is to imitate philosophically minded husbands and not to question the virtues of their collections too scrupulously; otherwise they will surely meet with some painful surprises. As for those who are tormented by the fear of being duped, their best course is to free their minds forthwith of their prejudices in behalf of the authentic. Let a man say to himself: "I shall have sham antique furniture, sham old masters, sham ancient tapestries—I take that for granted and I'm not going to let it bother me. But I shall do my best to choose what appeals to my taste and I shall arrange my treasures harmoniously. If the experts want to read me a lesson and tell me that this possession of mine is good and this other mediocre, I shall laugh in their faces and point them to the Tenth Chamber, to the tiara, to the hundred and one blunders that have discredited them among all sensible people. My criterion is the pleasure I found in selecting these things and arranging them. This Trouillebert pleases me more than your Corot does. Shall I cease to enjoy it simply because it is signed Corot? You assure me that this little piece of furniture, with its dainty inlaid decoration, can't be more than twenty years old. Quite likely. Shall I love it the less? Plague take these experts! Even if they dealt in certainties I shouldn't particularly like them. But they're blundering all the while, like you and me. Deuce take it all, messieurs! Let me alone with my unauthenticity. Go convince the adventurous foreigners—and the courts."

HEATING AND DUST.*

ALL heating appliances depend upon the transference of heat from some source to the parts of the building it is intended to warm. This transfer can be effected in three ways: by the slow process of conduction, by the quicker process of convection, or by the swift process of radiation. In the case of hot-water pipes all three processes are at work, the heat is conducted through the iron pipes, which warm the room both by radiation and convection. In the case of an open fire, radiation is practically the only agent by which the heat is distributed to the persons in and to the walls of the room. As the air is almost as transparent to radiant heat as it is to light, the air of a room cannot be warmed by radiation, and hence our domestic open fire-grates warm the room indirectly by heating the floor, walls and furniture, and these absorbing the radiant heat warm the adjacent air by convection. This latter process consists in the transfer of heat by moving masses of the warmed air or other fluid, the motive force being gravity, the colder denser air displacing the lighter warm air. These currents are the means by which all fluids are heated, as both gases and liquids are very bad conductors of heat.

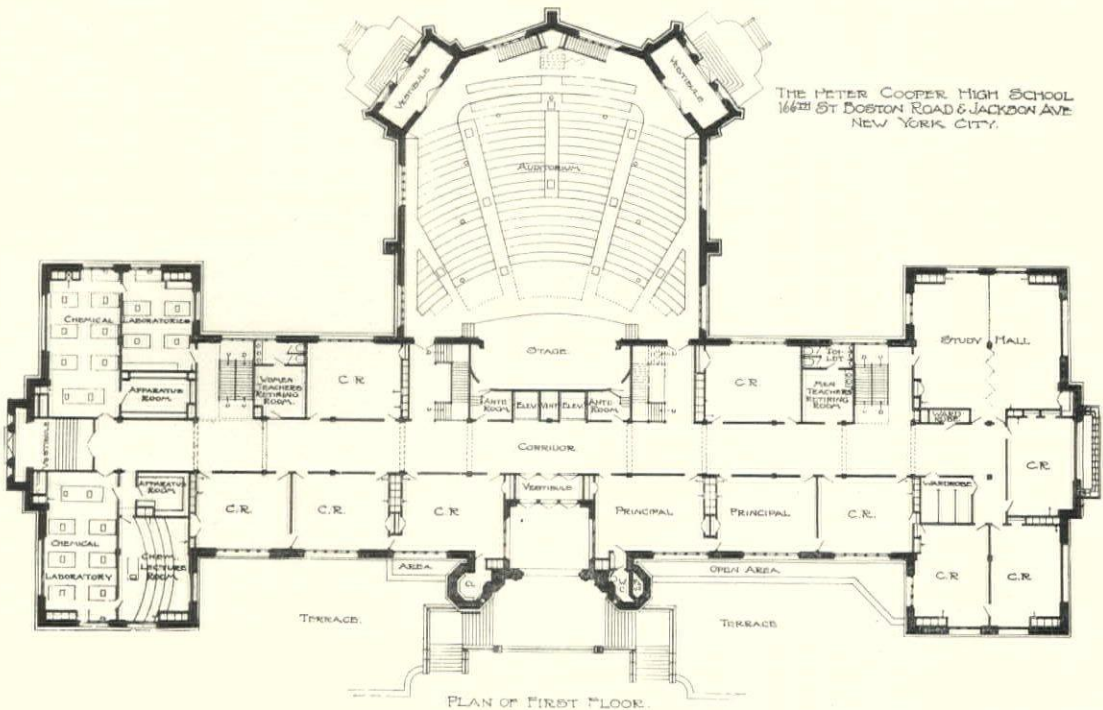
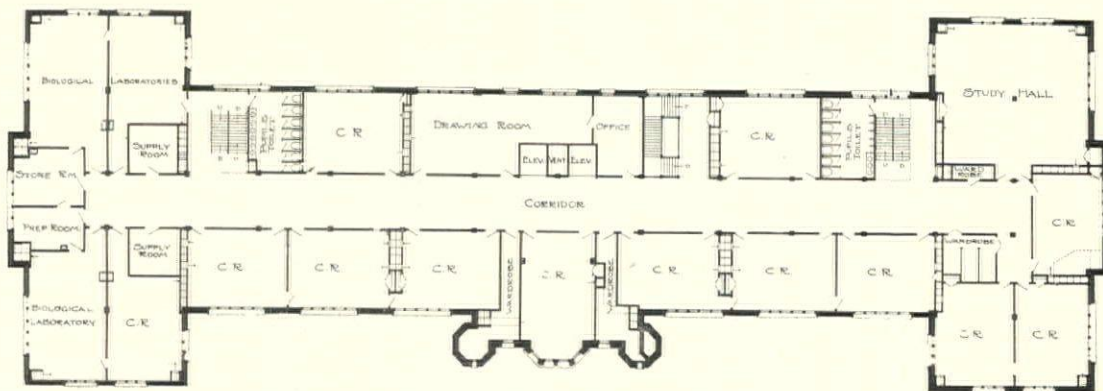
In all systems of heating by radiators the air is warmed; the walls of the room are therefore cooler than the air, and it is a matter of common observation that when this is the case the walls become rapidly covered with dust and dirt. On the other hand, when the room is warmed by an open fire the air is not heated by the radiation from the fire, but the walls are, and it is the warm walls which warm the room. When this is the case, the air being cooler than the walls, much less dust and smoke are deposited on the walls, which therefore remain cleaner much longer than in a room which is heated by warm air. This is notably seen in the difference between the wall-papers in a room heated by an open fire and a room heated by a stove; in this latter case the wall-papers become rapidly disfigured and dirty by an unsightly deposition of dust. Many are misled by the impression that this is due to the dust and dirt caused by the stove or the leakage of smoke through the joints in the stovepipes, but that this is not the case is seen from the fact that gas stoves give rise to precisely similar dirtying by hot air. In fact, every one must have noticed the upward stream of dust and dirt that attaches itself to the wall in the immediate neighborhood of a radiator, whether that radiator be warmed by hot water, steam or gas. So great and so constant is this disfigurement that it has been urged as an objection to the use of radiators and heating by hot-water pipes; and in some cases the radiators are placed in the middle of a room or far from the walls to get rid of this annoyance. The same thing may be noticed this wall gets blackened.

Clearly it cannot be due to any dust created by the radiators, for they are perfectly clean surfaces. It is, therefore, a matter of some importance to try and ascertain the cause, and then, if possible, remedy this defect in the use of all radiators. For this purpose we must turn to physics, and the investigations of Aitken in Scotland and Lodge in England on the phenomena of the deposition of dust have in recent years given us the solution.

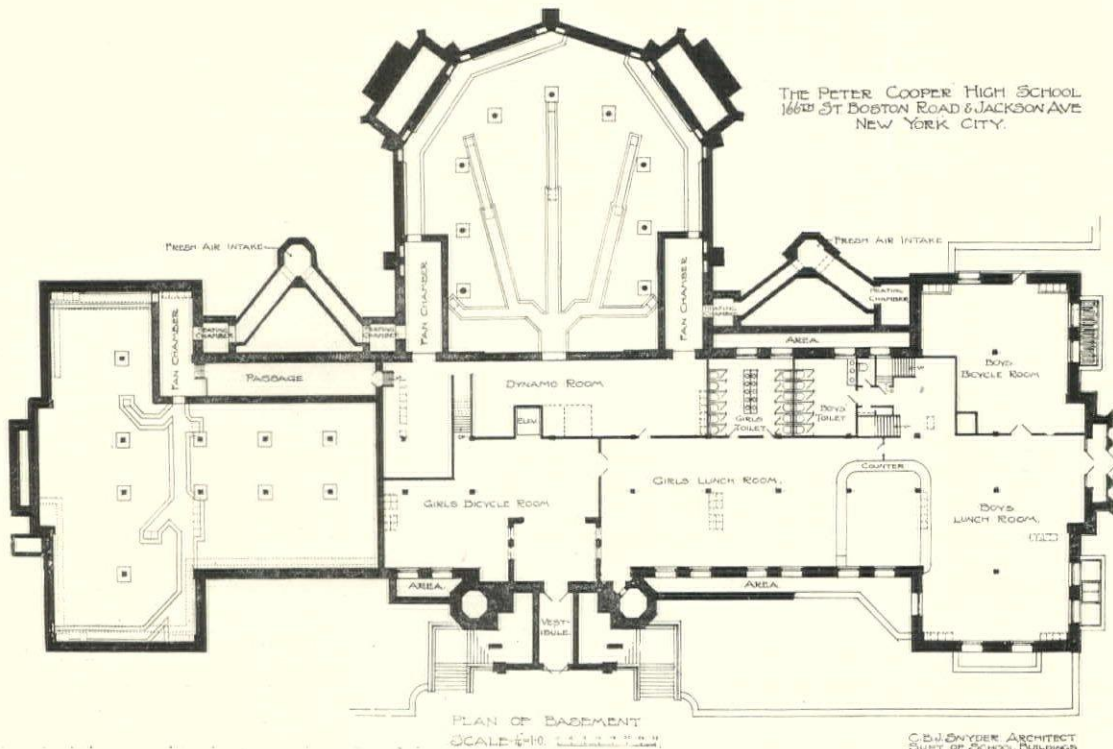
Many years ago Professor Tyndall noticed that when dusty air was strongly illuminated by a sunbeam or by the electric light there rose from the summit of any heated body placed within the dusty air a stream of dust-free air. This was rendered apparent by its not scattering the light; and hence a fine black stream was seen rising up from the hot body. Any one can see this by heating a wire or rod of metal and putting it in a glass vessel filled with smoke; upon brilliantly illuminating the smoke a sharp black line will be seen above the hot line or rod. Tyndall, Frankland and Lord Raleigh have given different explanations of this experiment, but none were satisfactory. Professor, now Sir, Oliver Lodge and his demonstrator, Mr. J. W. Clark, took up the matter and made numerous experiments. Almost simultaneously Mr. Aitken in Scotland began working at the matter and arrived at much the same explanation as Professor Lodge.

The general result of all these experiments showed that the invariable tendency of fine dust particles is to deposit themselves on any neighboring cold surface. The dust-free stream of air rising from a hot body is caused by the warm body being surrounded by a dust-free coating of air, and the ascending current of warm air carries this dust-free layer with it, giving rise to the dark stream line seen above the warm body.

* Summary of a paper by Prof. W. F. Barrett, F.R.S., M.I.E.E., read at the summer meeting of the Institution of Heating and Ventilating Engineers on June 20th.



THE PETER COOPER HIGH SCHOOL
166TH ST BOSTON ROAD & JACKSON AVE
NEW YORK CITY.



THE PETER COOPER HIGH SCHOOL
166TH ST BOSTON ROAD & JACKSON AVE
NEW YORK CITY.

PLANS: MORRIS HIGH SCHOOL, 166TH STREET AND BOSTON ROAD, NEW YORK, N. Y.

C. B. J. Snyder, Architect.

C. B. J. SNYDER ARCHITECT
SUITE OF SCHOOL BUILDINGS
PARK AVE. COR. 57th ST. N.Y.C.

Many striking experiments were made by Mr. Aitken to show the tendency of dust to leave a warm surface and attach itself to a cooler surface. Thus, if two mirrors, one hot and the other cold, are fixed face to face near to each other and placed for a few minutes in a vessel filled with a dense cloud of dust, formed by burning a little magnesium wire within the vessel, it will be found when the mirrors are removed that the warm mirror is perfectly clean, while the cold one is coated over with magnesia dust. Or, if two glass rods, one cold and the other hot, are dipped into some hot magnesia powder and then taken out, the warm rod will be found to come out quite clean, but the cold rod is thickly coated with powder.

But the most interesting illustration of the repulsion of dust from a warmer to a cooler surface is seen on partitions of timber-framing plastered and plastered ceilings. Wherever the wood framing or joists occur the wall is clean, whereas the rest of the surface is darkened by adherent dust. In fact, the wall or ceiling appears to become transparent, showing the wooden studs through the plaster. This is due to the fact that the wood, being a bad conductor of heat, remains warmer than the adjacent plaster, and hence the dust leaves the part where the wood is beneath and attaches to the cooler plaster.

It looks as if the old idea of a repulsive force produced by heat was, after all, correct. In fact, if we heat in a crucible any fine incombustible powder, such as magnesia or silica, we shall see the particles of the powder become self-repellant and mobile like a liquid. Heat, we know, does lessen the cohesion of bodies, making a rigid and brittle body like glass become ductile and viscous; it does drive the molecules of bodies farther apart, causing a cubic inch of water to become nearly a cubic foot of steam, or 273 cubic feet of air at the freezing point to become 373 cubic feet at the boiling point. But the expansion, and the change of state from solid to liquid and liquid to gas produced by heat, is due to the greater amplitude of vibration, the increased width of the swing, of the molecules of a body, and does not necessarily involve a repulsive force radiated from the hot body, though its kinetic energy is increased by heat.

Here we have a practical means of filtering air from dust; it is only necessary to have two concentric tubes, the inner one conveying steam and the outer one kept cold; any dusty air passed between the hot and cold tube will deposit its dust on the inner surface of the cold tube, and much finer dust or germs can be so deposited than can be stopped by filtering through ordinary screens.

ILLUSTRATIONS

MORRIS HIGH-SCHOOL, 166TH STREET AND BOSTON POST ROAD, BROUGH OF THE BRONX, NEW YORK, N. Y. MR. C. B. J. SNYDER, ARCHITECT, NEW YORK, N. Y.

THIS building, originally called the Peter Cooper School, occupies the block fronting on the northerly side of East 166th street, between the Boston Post Road and Jackson avenue. In style the building is designated as English Collegiate Gothic, adapted to modern uses and construction.

The exterior is gray brick, with gray stone and terra-cotta trimmings. The great central tower, nearly 50 feet square and about 189 feet in height, contains the large ventilating shafts, and, in one of the corner turrets, the boiler chimney, which could not well have been disposed of otherwise without disfiguring the appearance of the building. The upper floors of the tower have been designed to provide laboratories for the special work of the professors, a provision which, while badly needed, has often been overlooked in many high-school buildings.

Advantage was taken of the fact that the building was to occupy a plot which gave free access from Boston Post Road, to design the auditorium as a feature harmonious with the rest of the building, but marking strongly its purpose of use for the public as well as for the school by direct entrances thereto from the street. This auditorium seats 1,700 persons.

Above the basement are five stories of rooms for school work, seventy-one rooms in all, not counting those used for stores, toilets, preparation, lockers, teachers' and other purposes, all necessary in like modern structures. Of the seventy-one rooms, there are forty-six section-rooms of the usual size, but placed with the long side, of about 28 feet, to the light so that the shorter dimension of 21 feet is the depth of the room, bringing the farthest seats sufficiently near the light. Each room is amply lighted by a large window or rather a group of windows in a single opening, having as a minimum an area of 160 square feet.

In addition to the section-rooms there are twelve laboratories

for chemical, physiological, biological, physiographical and other purposes and three lecture-rooms to be used in connection therewith. Independent of the lecture-rooms there are provided four large study halls, one on each of the floors. A large library has been provided for the second floor and five other rooms to be assigned for special purposes. Separate gymnasiums have been provided for boys and girls, each with its running-track, shower-baths, locker-rooms, doctor's examination-room, etc.

The ventilating system will be that which is known as the "plenum"—so-called because a full supply of fresh air is forced by powerful fans into all the rooms, driving out, by pressure, the air that has become contaminated by use.

The lighting will be by electricity throughout, developed by a complete plant of dynamos and high-speed engines or obtained from one of the lighting companies.

In the basement provision is made for lunch-rooms for boys and girls; also for bicycle-rooms.

Contract price for the building, \$469,383, or, including heating, furnishing, etc., \$583,000. As the building measures 2,721,807 cubic feet, the cost per cubic foot, less rock excavation, is \$20.53. And as the building provides for 2,735 scholars, the cost per scholar is \$219.30.

ENTRANCE: MORRIS HIGH-SCHOOL, NEW YORK, N. Y.

THE TOWER: MORRIS HIGH-SCHOOL, NEW YORK, N. Y.

TRINITY BUILDING, 111 BROADWAY, NEW YORK, N. Y. MR. F. H. KIMBALL, ARCHITECT, NEW YORK, N. Y.

ENTRANCE: TRINITY BUILDING, 111 BROADWAY, NEW YORK, N. Y. MR. F. H. KIMBALL, ARCHITECT, NEW YORK, N. Y.

THE LYCEUM THEATRE, WEST 45TH STREET, NEW YORK, N. Y. MESSRS. HERTS & TALLANT, ARCHITECTS, NEW YORK, N. Y.

HOUSE OF E. C. SWIFT, ESQ., PRIDE'S CROSSING, BEVERLY, MASS. MESSRS. LITTLE & BROWNE, ARCHITECTS, BOSTON, MASS.

HOUSE OF MRS. H. H. PORTER, CEDARHURST, LONG ISLAND, N. Y. MESSRS. BARNEY & CHAPMAN, ARCHITECTS, NEW YORK, N. Y.

Additional Illustrations in the International Edition.

DETAIL OF SOUTH FLANK: TRINITY BUILDING, 111 BROADWAY, NEW YORK, N. Y. MR. F. H. KIMBALL, ARCHITECT, NEW YORK, N. Y.

NOTES AND CLIPPINGS.

THE FIRST WALL-PAPERS.—Though wall-hangings made of paper had been in use among the Chinese from very early times, they do not appear to have been adopted by the West until the middle of the sixteenth century, when they began to be imported by Spanish and Dutch merchants; but it was not before the end of the following century that this less costly substitute for the tapestries, silk and satin damasks, figured velvet, stamped leather painted and gilded, which formerly adorned the wall of the fortunate, found its way into our islands; it was a hundred years again, owing to the excessive tax which hampered the industry, before it became possible for their manufacture to be carried on at home on any considerable scale. The early experiments, says Mr. A. G. B. Russell in the *Burlington Magazine*, which preceded their introduction from the East were, as is naturally to be expected, of a purely imitative character, consisting of an endeavor to supply colorable reproductions of the fashionable hanging in a cheaper material. As is also to be expected, the result was possessed of little or no artistic merit. But there was one exception. About the time of the accession of William and Mary, a few years after the Chinese craze had invaded England, wall-papers designed and painted in China began to reach our shores. The *rapprochement* with Holland (whose Oriental trade had long ago provided this luxury for herself), consequent upon the arrival of the Dutch prince, was to some extent responsible for this; but our own East India Company, which had first touched China in 1637, had at this time a rapidly increasing traffic with the Far East. The coming of wall-papers to match the prevailing taste was joyfully welcomed in polite households, and though they were far from being cheap, they were widely employed both in England and France, and remained in fashion for at least a century and a half. A delightful wall-paper of Chinese origin has been hanging since the close of the seventeenth century on the parlor walls of a house, formerly in the possession of the Berkeley family, at Wotton-under-Edge, in Gloucestershire. It is thus one of the very first of the Chinese papers to have been put up in an English house.—*Builders' Journal*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, AUGUST 5, 1905.

No. 1545.

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A PECULIARLY special feeling of regret possesses us, whenever we have to chronicle the death of any of the architects with whom we first made acquaintance when this journal was founded thirty years ago, not so much because of the passing of old friends as because the record of their life's work must be, in most cases, so short-lived. Partly because the methods of construction employed by them did not conduce to the longevity of their work, and partly because the artistic worth of the work itself cannot compare with the work that can now be done by their better-trained successors, while it actually occupies sites worthy of better things, the buildings created by these men are doomed to disappear before they are worn out—torn down to be replaced by better work. In the nature of things, then, the work accomplished by Adolf Cluss, who died last week, in Washington, at the age of eighty, is doomed to disappear before long, all the more because it is mainly to be found in Washington and, for the most part, ill accords with the monumentally architectural character that that city is so rapidly acquiring. The most important building created by Mr. Cluss, owing to its size, character and position, is the National Museum, in the Mall at Washington, and, naturally, that will have to give way as the scheme of the Washington Improvement Commission takes on its proper development. Besides this, Mr. Cluss's important work at Washington includes the rebuilding of the Smithsonian Institution and of the interior of the Patent Office Building—after partial destruction by fire in each case—the Medical Library Museum and the Agricultural Department Building, upon all of which work he had the assistance of his partner, Mr. Paul Schulze, and all of which were, for their day and according to the building methods then in vogue, very carefully constructed buildings believed to be practically imperishable.

MR. CLUSS was born in Heilbronn, Würtemberg, in 1825, and came to this country at the age of eighteen, after having secured the benefit of a technical engineering education. His first employment was in the office of the United States Coast Survey, and he later found employment in the Treasury Department, the Naval

Department and wherever else there was a call for high technical ability. In 1872 he was appointed by President Grant a member of the Board of Public Works of the District of Columbia, another member of which was "Boss" Shepherd, once contemned of all men and now regarded with gratitude by the present generation of Washingtonians. For the many great improvements of an engineering character undertaken by this Board, Mr. Cluss was largely responsible, and his part in bringing about the beginning of the parking system and causing the setting out of 75,000 shade-trees along the streets of that sun-baked city would alone entitle him to a hold on the gratitude of his adopted fellow-citizens—for no small part of Washington's charm as a residential city is due directly to these two undertakings. It is interesting, too, to recall that in the unfortunate first competition for the monument to General Grant, in New York, Cluss & Schulze were awarded the first prize, but we cannot recall that they had any part in the second and better-managed competition.

AS was to be expected, the action of the French authorities in granting admission into the First Class at the Ecole des Beaux-Arts of the "Paris Prize" man of the Society of Beaux-Arts Architects has made this (the second) year's contest for the prize even more widely popular than it was last year. Mr. Carnegie is understood, this time, to have placed at the Society's disposal the sum that will be needed to maintain the prize-winner during a three years' stay in Paris, and it is hoped that other individual or joint subscriptions will in like manner provide for future successful contestants. The winner of the prize this year is Mr. John Wynkoop, who, since his graduation from Columbia University, has been practising design in the atelier of Mr. Donn Barber, who has proved unusually successful in grooming "youngsters" for these trials. Mr. Charles S. Cobb, a graduate of Cornell, was placed second in this trial to design the best "yacht-club and basin on the banks of the Hudson," even though two months of steady work had to be sacrificed to making the drawings.

EVIDENTLY the real worth that lies in the law of opposition and contrast is not accepted by Messrs. Rankin, Kellogg & Crane, the architects of the Government's new Post-Office building at Indianapolis, since they have lodged with the Secretary of the Treasury a protest against the monument to the late President Benjamin Harrison, which is to be erected in front of it. It appears that the architects of the Post-Office fear that the exedra-like treatment which Mr. Henry Bacon has given to the pedestal for the statue modeled by Mr. Niehaus will not be in keeping with the more classic severity of their own design, and they seemingly object to their efforts serving only as a background to a frivolous and minor creation, however graceful and well-designed it may be. It is very unusual to find one architect registering a protest against the work of a fellow-architect, and one cannot imagine the curious predicaments that might be created—since the right of protest is, of course, reciprocal—if the fashion

now set should prove catching, unavailing as the protest probably will be. We have heard of a Maiden Lane jeweler protesting against the owner of a building opposite his shop because of painting the former structure a brilliant red—or yellow—which quite killed the color of the jeweler's gems through the action of reflected light, and we recall that Mrs. Clark endeavored to prevent the erection of the Soldiers' and Sailors' Monument on Riverside Drive, New York; but her objection was that her rights of ancient light and view over the Hudson would be interrupted by the monument, which she did not specifically condemn as not being to her taste. These and others like them we can recall, but we can think of no precedent in support of the protest filed by Messrs. Rankin, Kellogg & Crane, which seems to rest purely on a difference of taste.

THE passage of time brings its revenges, and it is amusing to find the *Boston Transcript* recently re-pining because the Rotch & Tilden scheme for the improvement of Copley Square in that city had never been carried out, the fact being that the *Transcript* was in opposition during the long struggle of the Boston Society of Architects to bring about the adoption of the plan in question. It is not generally known how nearly the fight was won and that the acceptance of the scheme by the city was unintentionally prevented by the introduction at the final hearing of a modification of the scheme, which the Society's committee was quite willing to adopt, but which they knew if produced at the hearing could but confuse the Street Commissioners who were holding the hearing and give them the impression that there was a division of counsel amongst the advocates of the improvement scheme, whereas the strongest argument that the Society had to adduce was that the Rotch & Tilden scheme had the unanimous support of the Society. Unfortunately the deviser of the improvement—and it was an improvement—could not be persuaded to wait until the city officials had voted to "relocate Copley Square," the essential initial step, and then bring in his scheme as an amendment; he wanted the greater glory of original adoption and the result was just what the Society's committee foresaw. The evidence that the members of the Society were not unanimous was all that was needed to induce the politicians, who from the start favored the real-estate opposition, to vote against the adoption of the Rotch & Tilden sunken-garden design.

IT is not possible for people to feel that they belong to a civilized community or have any right to prate about "the city beautiful," when all day long, whenever they glance out of the window, the eye is offended by barren, gaunt and jagged party-walls upreared against the sky to every height, in every width, with every disposition of mass and ending in a roof-line which is not an honest horizontal nor yet a virtuous line of beauty of any discernible pitch. The party-wall itself is not so offensive: there can be a satisfying dignity in a piece of plain walling; but it is the way this wall finishes that constitutes the horror of it, the raw edge made by the intersection of wall and roof, a blatant advertisement of the selfish sanctity of private rights. It should be possible

to create some legal way in which, without regard to the unused rights of the adjacent owner, the lateral cornice of a building not only may but must be treated so as not to constitute an architectural crime committed against the entire community. Sometimes by private agreement between adjacent owners the higher building is given proper lateral treatment; sometimes, as in the case of the Ames Building, in Boston, the proper treatment is given without the neighborly consultation, only to result in the work being undone under the law's compulsion, even though, owing to the enactment of a later height-limit law, the adjacent building can never equal the stature of its neighbor and so require the removal of the party-wall cornice. Ordinarily the objection to aerial encroachment over the party-line is purely sentimental and legal, but now and then it has a practical justification, as is brought out in a suit now pending in New York. It seems that the proprietors of the Progress Club, in Central Park West, have fitted up a roof-garden on top of their structure, a resort which has been much frequented of late. It appears, too, that the recent refreshing showers have brought to the attention of the frequenters of these cool heights that the drippings, and consequent splatterings, from the lateral cornice of a dominant apartment-house on one side make a large section of their own premises unusable, save by those who attend in bathing clothes. As a demand for the abatement of this nuisance has been denied, a suit to compel the removal of the offending cornice now results.

A VERY singular and extremely immoral exercise of official power, countenanced by a professed reverence for the letter of the law, transpired in New York recently. It seems that a certain tenement-house on Fourteenth Street was erected in something like three months, and as soon as completed was occupied by twenty families who, doubtless, then felt themselves happy beyond the fate of other homeless ones. But no sooner had they fairly got settled down in their new quarters than they were forced by the officials of the Tenement-House Department to vacate them and transfer themselves and their household goods to the sidewalk, as is the fashion with dispossessed tenants. It seems that, as was natural with a building run up at racing speed, the Building Department had filed several complaints against the structure during its erection, and, though the defects complained of had been remedied more or less effectively, the owners had neglected to have a final inspection made and a tenement-house permit issued to them. It is alleged that the owners had been notified that a fine of two hundred and fifty dollars must be paid because of their negligence, and because they had not paid it the Commissioner chose to visit vicarious punishment on them by ordering twenty innocent families into the street! Once the building was empty, an inspector walked through it, reported that no defects existed and, after payment of the fine by the owner, the tenants were allowed to go back. The explanation of this brutally unnecessary performance is that the Tenement-House Department is just now very seriously "under fire," but it can hardly be imagined that this sudden display of zeal will reconcile the public to its grosser acts of omission and commission.

THE GREAT CATHEDRALS—I.

SANTA MARIA DEL FIORE, FLORENCE.

THE history of architecture has been recast in our days. In Italy, what Vasari (1511-1574) wrote in his celebrated biographs of artists was once considered gospel truth, but research and modern study have demonstrated that his sources of information were somewhat impure; and, although many corrections and additions have been made to Vasari's biographies, the work of purification is not yet finished.

The most incomplete side of these biographies is that which relates to the Middle Ages. Vasari did not know, or knew only imperfectly, the artists of those times; he sought much of his information in the commentaries of Lorenzo Ghiberti, which themselves are very defective; so the history of the art of the Middle Ages must be sought from other sources than the work of the Plutarch of Italian artists.

For this reason, no one should be surprised at learning that there is not a single Italian mediæval building of first-rate importance whose history does not need to be rewritten. The cathedral at Florence, Sta. Maria del Fiore, the Church of St. Francis at Assisi, the cathedrals at Sienna, Orvieto and Milan, of S. Petronio at Bologna, are monuments whose history is being rewritten from foundation to roof, and researches judiciously pursued have brought about the discovery of artists of great ability whose very names before now were unknown. These monuments belong to the Gothic style, and the Gothic was for a long time disliked everywhere in Italy, where the worship of the Greeks and the Romans was enthusiastically revived with an exaggeration which has been pointed out by several writers. Even down to our own days, people thought the Gothic style was of German origin, and that the architect of each Italian Gothic building must necessarily have been a German. Vasari so said, and those who have followed him have gone on repeating the story.

We will try, nevertheless, not to follow bad examples; and being about to speak of the cathedral at Florence, we will ascend to the source. My aim here is to reconstruct on a solid base before the eyes of my American readers the real truth as to the most Italian of all the Gothic churches in Italy, the one which has given rise to many discussions and enriched the ranks of Italian artists with a certain number of architects and sculptors whose importance does the greatest honor to our country. The group of the church and campanile of Sta. Maria del Fiore, if it is not the most picturesque, nevertheless, one of the most striking upon the peninsula; and the church, covered by its enormous dome, the most celebrated in Italy, after that of St. Peter's at Rome, is the least Gothic among the churches of our style, precisely because the cathedral at Florence is the most Italian of our Gothic churches. The very union of the dome with the pointed arch at Florence, just as would be the case at St. Peter's at Rome, or in St. Paul's in London, is a fact which touches on the incongruous. Well, this gives special interest to our monument. Add, furthermore, that Sta. Maria del Fiore has full-centred arches outside and pointed arches inside; but interior arches that are such in spite of themselves; from these things it results that a stranger enjoying a certain amount of general knowledge as to styles who finds himself before the cathedral and the campanile of Florence may find himself out of soundings, as it were.

Arnolfo da Lapo, according to tradition, is the architect of the church, but this tradition contains two errors. In the first place

Arnolfo came from Cambio, not from Lapo, and next Arnolfo's name is properly attached to a very small and modest portion of the actual building. These great monuments whose structure was to endure a long time frequently changed architect and sculptor, and these changes naturally led to new ideas, replacing the older ones. So the statement that these ancient buildings were due to a company of architects and not merely to a single architect is in a sense correct.

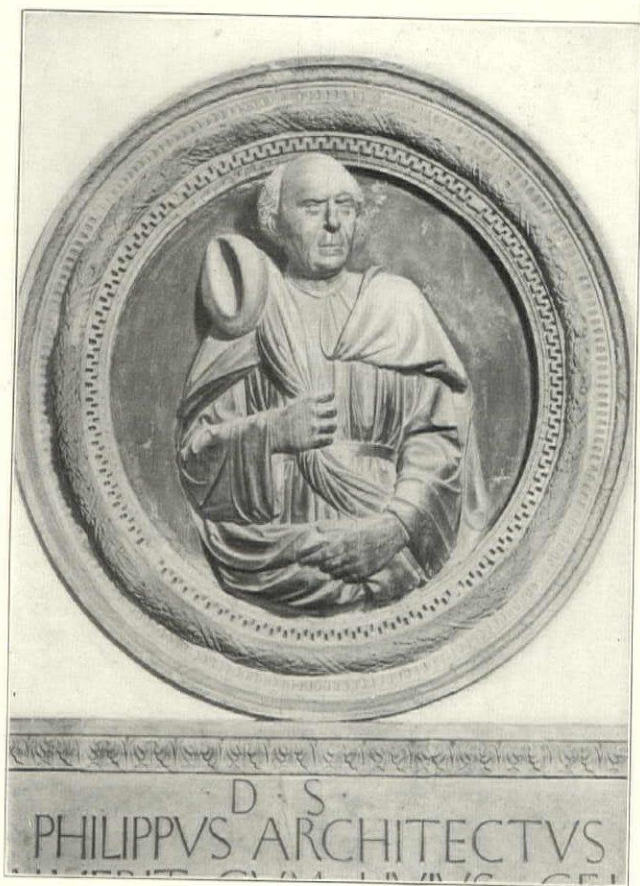
A decree of the city, worthy from every point of view of a great people, may have accompanied the commencement of our cathedral. The decree expresses the hope that the church may be of a magnificence than which it is impossible to imagine a higher. Doubts have, nevertheless, been raised against the authenticity of the decree which seems an invention of a relatively modern day. However that may be, it is certain that the actual church of Sta. Maria del Fiore is erected partly on the site of a more ancient structure dedicated to Saint Salvator. About 1229 the cathedral itself changed its name to that of Santa Reparata and had to be renewed, as it no longer corresponded to the prosperous state of Florence.

The year in which the first stone of the new cathedral was laid is uncertain; it was somewhere, probably, between 1294 and 1298. Arnolfo had charge of the church in (?) and in 1299, and to recompense him he was exempted from taxation. Unfortunately, he died in 1301, and from that time began the interruptions in the building.

Vasari, who indicates portions of the work executed by Arnolfo, believes that the master founded the cathedral and built the three main tribunes under the dome; but this statement is not exact, for more than fifty years afterward Francesco Talenti, an artist of exceptional talent, although being little known, was intrusted with the task of designing the tribunes that Vasari assigns to Arnolfo. Are we to understand that Arnolfo's work had been destroyed? There are no reasons for believing so, and it is certain that in 1356 the tribunes were built after the designs of Talenti. In this way begins a new period of activity in the cathedral of Florence, a period in which everything, or almost everything, is going to be done over again.

On the 19th of June, 1357, the foundations of a new Sta. Maria del Fiore were begun and the new church is the church of Ar-

no, Of the old plan there is kept only the width of the long arm of the church, while the side where the dome is to rise changed its dimensions. They would have us believe that Arnolfo's design was reproduced by a Siense painter of the fourteenth century, in the "Cappellone degli Spagnoli," in Sta. Maria; but this belief is not well founded. According to my idea, this is an architectural composition quite in the Tuscan taste, which merely recalls Sta. Maria del Fiore and Sta. Croce, especially the latter church. So the artist's study has a very modest bearing upon our researches. Any reader who will take the trouble to consider the illustrations will appreciate that the cathedral is not the result of a single design—in fact, a serious alteration began at the very beginning of actual construction. The motive of the first bay at the side of the campanile is very different from the motive of the other divisions. At the side of the campanile we see, also, certain windows whose voids have been filled, and this closure has its reason in the organization of the structure, since here the windows do not correspond to any internal divisions. In short, the present cathedral at Florence is different from that originally conceived by Arnolfo, and one cannot assign to this architect and sculptor the honor of being the author of Sta. Maria



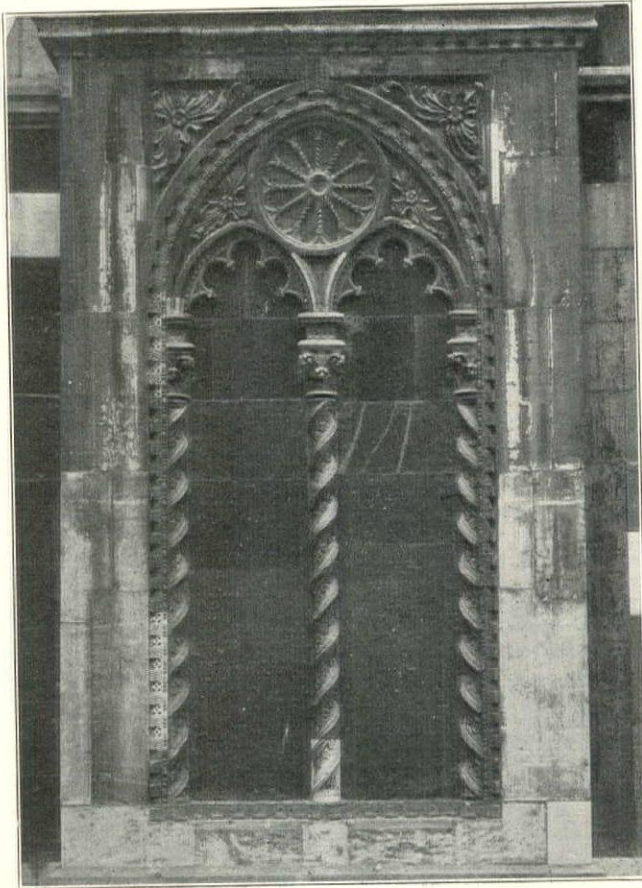
FILIPPO BRUNELLESCHI, IL BUGGIANO, SCULPTOR.

del Fiore, although an inscription, "istud ab Arnulfo templum fecit edificatum," attempts to establish that he was. We insist on this truth, although it runs contrary to ancient tradition, and are going to restore to Francesco Talenti the principal rôle in the building of the cathedral at Florence.

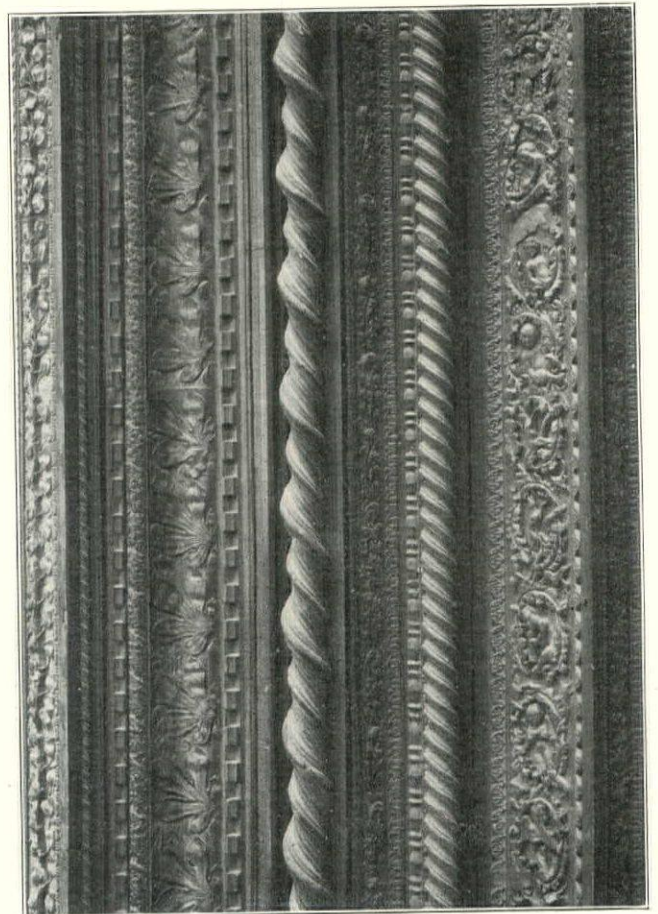
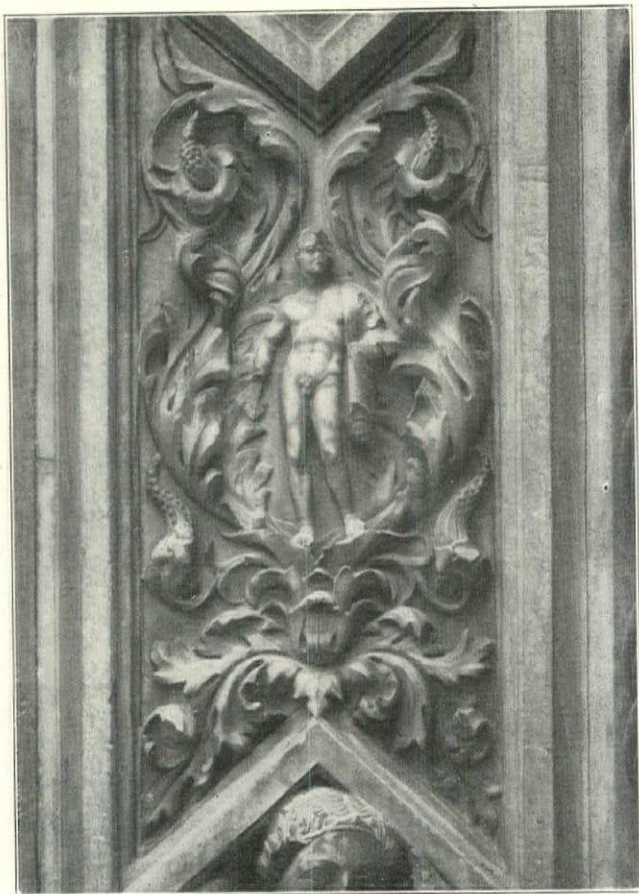
Documents favor this contention, and by these documents we know the state and condition of our architect who was of Tuscan descent, just as was Arnolfo. The latter came from Colle, Valle d'Elsa, in the ancient province of Siena. Talenti, with his family, came to Florence from Nipozzano, near Ponteassieve (province of Florence). On the records of Sta. Maria del Fiore, Talenti is designated as "principalem magistrum operis" and as artist to the cathedral, having even a considerable hand in the campanile, and we know of him that in 1351 he was chief of construction (*capomaestro*) of the campanile; that in 1355 he offered in competition with Andrea di Cione Orcagna (1308-1368) a design for a pier, success resting first with Orcagna and later with Talenti, who produced a new design. At the same time Talenti was given the charge of the capital of the first pier toward the campanile; that in 1359, associated with Alberto Arnoldi, he was busy with the arch of the main doorway; that in 1364 he left the service of the church and a year afterward was readmitted in quality of chief. Finally, that in 1366 he was interested in the construction of

the campanile—in short, that the importance of the rôle filled from 1351 to 1374 by Talenti is here attested. At the same time with Talenti several other masters of good repute played a considerable part at Sta. Maria del Fiore, who should not be overlooked even in such a sketch as this. There are, besides Orcagna already mentioned, an artist of encyclopedic worth, Benci di Cione (1388), Giovanni di Lapo Ghini (who flourished in 1387), chief of the church works together with Talenti in 1357 and in 1364, Simone Talenti (who flourished from 1369 to 1376), son and pupil of Francesco; Taddeo di Ristoro (who flourished about 1374); Giovanni di Francesco di Fetto who flourished in 1377; Giovanni di Stefano (who flourished in 1378), etc. These artists, playing different rôles, contributed to the creation of the cathedral of Florence, but amongst them none had the right to occupy the place of Francesco Talenti, who, because of his talent, activity and continuous service on the works of Sta. Maria del Fiore and its campanile, must be considered one of the most famous artists of the Middle Ages.

I mentioned the be-garlanded crowning of the cathedral and the campanile, since the importance of this crowning is very considerable, even from the point of view of Florentine architecture in general. I must mention that the creator of this decorative element, once believed to be Orcagna, is, in very fact, our Francesco Talenti.



FENESTRAL TREATMENT OF BUTTRESS FACE.



DETAILS FROM SECOND DOORWAY ON SOUTH SIDE.

the "anditum super becchattelos," the superb and be-garlanded crowning element characteristic of the cathedral of Florence and of

It will be also interesting to learn that the flanks of the cathedral were intended to receive a crowning of triangular pediments

such as exist at Sta. Croce; and this idea had a beginning, but after much discussion the treatment that we admire was adopted—a treatment that exists only at Florence, and even there only on the cathedral, the Loggia on the Piazza della Signoria and on Orsammichle.

One thing of much importance is the composition of the doorways of the cathedral of Florence; the most important is that called "de la Mandorla," or Doorway of the Almond, the second one to the right looking toward the façade. Here we have the real type of Florentine door of Gothic style, and although the pediment does not have the pleasing lines of the door called "de Canonice," or Door of the Canons, of which the model is here reproduced in the side doorway of the modern façade, the work of Emiliis De Fabris, who died in 1883, yet the door "de la Mandorla" exemplifies all the delicacy of the Florentine taste.

For my part, I want here to point out particularly the beauty and importance of the sculptures. It is for this reason that there are found amongst my illustrations details which are taken from the "Mandorla." It is curious to see naturalism here associated with the most pronounced imitation of classic models, and it increases one's pleasure that this door has brought to light another of the Tuscan artists, who, almost unknown till to-day, must henceforth find his place in the lime-light of our history. Another Tuscan artist, Pietro di Giovanni, who flourished from 1386 to 1402, was one of the mas-

can be compared with the exterior decoration of our cathedral. From base to summit an incrustation of marbles covers the entire surface of the building, and white and green and red are associated in a harmony which, while somewhat obscuring some of the architectural lines, creates an ensemble of touching picturesqueness. This kind of incrustation does not always meet with favorable criticism. It appears more suited to a piece of furniture

than to a building. However this may be, there is about it a real Florentine character, local in every way, which must arouse the interest of architects. Italy, especially Tuscany, for a long time previously was familiar with the incrustation of marbles. The Roman marble-workers, the so-called Cosmati, had made large use of it, but only on small monuments, and the important thing to know at present is that the exterior of Sta. Maria del Fiore carried to the extreme the practice of incrusting surfaces with marbles.

The interior of the church, far from having the richness of French Gothic churches, with their brilliant stained-glass windows, is as empty as de Musset's "Assan":

"Comme un mur d'église,
Comme le discours d'un académicien."

It is difficult to believe that the interior of Sta. Maria del Fiore was conceived at the beginning such as it is now. The country of Giotto, Orcagna, Masaccio, Lippi, Ghirlandajo, those celebrated *affrescanti*, ought to have afforded inspiration for paintings on vault and wall of our cathedral. In fact, color did lend its aid



CHERUB HEAD IN THE NEW SACRISTY: ATTRIBUTED TO DONATELLO.



ST. JAMES THE APOSTLE; SANSOVINO, SCULPTOR.



ST. JOHN THE EVANGELIST; DONATELLO, SCULPTOR.

ters who collaborated on the door which we admire, but the most remarkable was Niccola di Pietro Lamberti, surnamed Pela (died 1420), who here gave a fair idea of the value of his talent.

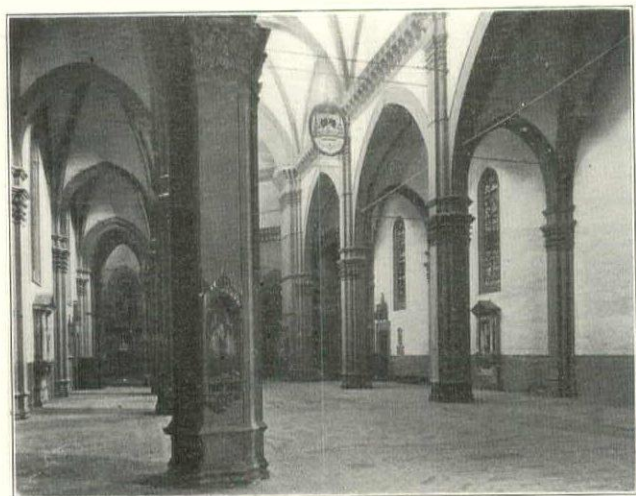
But I must halt only over the exceptional portions of the monument, so I now beg my reader to be good enough to turn his attention to the decorative system of Sta. Maria del Fiore. Italy does not possess a single monument which in this particular

to the interior decorative effect; but all this has lost value in the passage of time.

Formerly, Sta. Maria del Fiore was ornamented with the cantorias of Donatello and Luca della Robbia, which were left in the church until 1688, but are now to be found in the cathedral's museum. They ought to be restored to the positions for which they were designed and once occupied.

Even to-day, the cathedral contains beauties worth pointing out, so I have not forgotten to include amongst my illustrations the majestic statue of "St. John the Baptist," a chef d'œuvre of Donatello's and father of Michael Angelo's "Moses," and also the powerful image of "St. James the Apostle," by Jacopo Sansovino; there should be mentioned, too, the graceful little holy-water stoup and also the medallion portrait of Filippo Brunelleschi (1379-1446), by Buggiano, a very perfect likeness, since it was based on his death-mask.

This leads me to speak of the dome or *cupolone*, the history of



INTERIOR OF STA. MARIA DEL FIORE.

which has been in our own day reconstructed on sound foundations. The problem of the dome was one of capital importance to be confronted in 1418. The bold conception was the outcome of a competition, in which were entered, associated (and this is a new point), Brunelleschi, Donatello and Nanni di Banco. These artists proposed to build a dome with double walls on a system that avoided the use of scaffolding—an idea which in the fifteenth century was as attractive as it was bold. Work began August 7, 1420, and history purified from tradition shows that Brunelleschi was not alone the author of the idea, but that the master had for his daring scheme of construction the advice and support of Donatello and Nanni di Banco, who were named in certain documents as "*socii*" [*socii*] of Brunelleschi. The latter also had at his side another well-known artist, Lorenzo Ghiberti, to whom the accepted history of the building assigned the rôle of a mere trouble-maker, jealously intriguing against Brunelleschi, a characterization which is not supported by recent study of the evidence. Yet although Brunelleschi is rightfully considered as deserving the main credit for the dome, if for no other reason than the continuity of his connection with it, his associates, who gave him the benefit of their advice, should not be denied their share of fame.

The dome was finished and enclosed in 1434—a century and a half before it was imitated in St. Peter's at Rome—and in 1445 work began on Brunelleschi's lantern, which the master did not have the satisfaction of seeing entirely finished, as he died in 1446, while the last stone of the lantern was not laid until 1461.

For the exterior decoration of the dome Brunelleschi had designed a gallery; but the treatment actually carried out was devised in 1507 by Simone Pollaiuolo [Il Cronaca], Giuliano da Sangallo, Baccio d'Agnolo and Antonio Manetti.

Public opinion being against it and Michael Angelo having declared that it looked like a monkey-cage, work upon it was discontinued. There are those of our day, however, who would like to see it completed.

I must speak briefly of the modern façade in the Gothic style designed by De Fabris, who died in 1875 before his façade was finished, although this sort of imitation of an antique style is not calculated to give high æsthetic satisfaction. In general, however, the façade is judged favorably, and its unveiling, May 12, 1881, was the occasion of memorable festivities. The three bronze doors were executed after the completion of the façade and are less admirable than one could wish. Alas! over against them in the Baptistery hang the bronze doors by Andrea da Pontedera¹ and Lorenzo Ghiberti. This makes it impossible to admire these imitations, empty of sentiment and poor of form. The authors were unable to withstand the influence of the great masters of the past! Oh! how droll is all this copying of the work of past-ages!

¹This Andrea da Pontedera is the same as Andrea Pisano; he was born at Pontedera, near Pisa, in 1270, and died in 1348.

The campanile, intimately connected with the cathedral, draws the attention far more than does the latter's façade. Formerly the two structures were actually connected, but since 1431 they have been isolated one from the other, and the entrance to the campanile is from the Piazza through a small door on the east side.

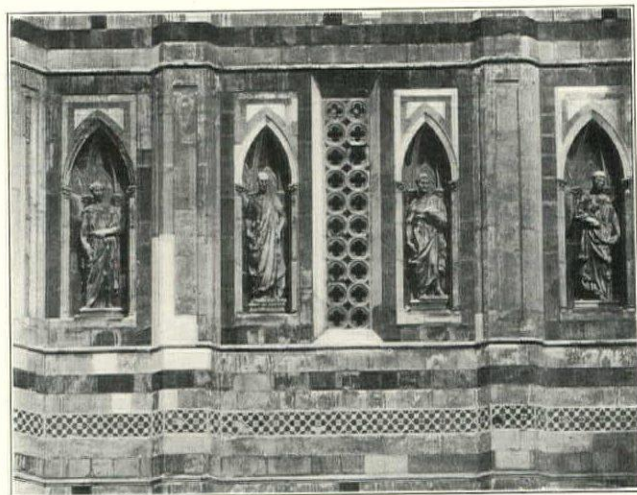
Giotto was entrusted with the task of building a campanile in the place of the tower of Sta. Reparata, which was burned down in 1333. In fact, Giotto did provide the design; but quite the same thing befell Giotto that happened to Arnolfo, so one cannot really call Giotto the architect of the campanile of Sta. Maria del Fiore; and though tradition, with its wonted obstinacy, continues to speak of the great revivifier of Italian painting as the author of the campanile, we must correct tradition and render unto Cæsar the things that are Cæsar's.

Certain verses by Pucci, a fourteenth-century writer, author of a famous manuscript, the "*Centiloquio*," gave the true history of the campanile, and yet, in spite of the knowledge of these verses, Giotto continued to be credited as author of the tower. As my readers doubtless prefer the truth, they can read with confidence what follows relating to one of the most beautiful monuments in the world, one which is even more extraordinary because of its sculpture, due to the chisels of Andrea da Pontedera, Donatello and Luca della Robbia.

The truth is that Giotto made the design and built the lowermost part of the base and then was replaced by other masters. Andrea da Pontedera, between 1337 and 1349 (the foundations were begun in 1334), carried the work up to the cornice above the range of statues, and finally Francesco Talenti took charge and imported into the work very much the same sort of modification that he had already introduced in the cathedral designed by Arnolfo. So Talenti is the author of the graceful double and triple windows in the upper stories which are models of delicacy and beauty. To Talenti, also, is due the treatment of the tower's crowning feature, which was carried out in 1353-58. "Giotto's Campanile" should, then, rather be read "Talenti's Campanile."

For those who are curious in dates, here are some more accurate details. In 1351 they were at work on the last windows; in 1358 the bells were hung and in 1387 the roof was finished. But was this horizontal roof really the one the campanile was intended to have? Researches have been made on this point, and there are some persons who believe the tower was to have a cuspidal termination; but the sobriety of the horizontal treatment better accords with Florentine taste.

As to Giotto's original design, it appears that there is such a thing, on parchment, in the museum of the Metropolitan of Siena. I have closely studied this parchment and have carefully compared it with the executed work, especially its relation with the basement



STATUES BY DONATELLO AND IL ROSSO ON THE WEST SIDE OF THE CAMPANILE.

treatment, and I can only say I am satisfied as to Talenti's connection with the work. I have written at some length of the Cathedral of Florence and its campanile, and yet I have had to abridge and even suppress matter ready to my hand. The fact is that these monuments which represent the workings of many minds, striving through generations even, are boundless in their eloquent suggestiveness and urge one to pass from the precision of historic prose to the more fanciful flights of poetry.

ALFREDO MELANI.

BOOKS AND PAPERS

ENGLAND, no less than Ireland, was called the "Island of Saints," as to which her many "Holy" places and the renown of her shrines testify. Holy Island, Holy wells innumerable, Holyhead were all sanctified by the relics of saints and relics required dwelling-places. These were often architecturally beautiful. Sometimes small feretories, that the French call *châsses*, were placed upon the altars; sometimes the altar itself was the repository of the relic; sometimes large "thrones" were erected with canopies, under which the smaller feretory or portable coffer was placed.

At Canterbury the shrine of S. Thomas was a most magnificent erection; at Westminster we still have the remains of S. Edward's tomb, a marvel of beauty in its prime, and even now, in spite of the thefts of pieces of mosaic, probably by the pious devotees as much as by the greedy professional kingly thieves, we can admire the beauty of the design and of the ornament. S. Albans was another celebrated shrine and has been restored to us quite recently. The original had been replaced and built more and more sumptuously at various times—the last time being in 1302-8, when Abbot John erected a magnificent shrine at a cost of 820 marks. This was broken up and lost in the 16th Century and no representation had been left of it. But after 300 years, in 1847, "the rector had certain walled-up arches and windows reopened, and among the débris were found many fragments of beautifully wrought Purbeck marble. These were carefully preserved, and when, in 1872, a great number of corresponding pieces were discovered, Mr. J. T. Micklethwaite, assisted by the foreman of the works, patiently fitted together over 2,000 fragments of marble and clunch—a veritable work of love, which restored the greater part of the substructure whereon the feretory had rested."

This shrine is 8 feet 4 inches high, has a paneled base with canopied niches, and a background of thin plates of colored clunch, much of the color remaining—vermilion and blue emblazoned with the lions of England, the fleur-de-lys of France and stars, all in gold. It is a marvelous piece of rebuilding, for restoration is scarcely the term to use, as the amount of new stone is infinitesimal. Some fragments of the shrine of S. Alban's martyred companion, S. Amphibalus, were found about the same time and rebuilt. It is not so large nor so much decorated as S. Alban's.

The value of the ornament of the shrines and coffers was enormous and very often served as a bank, upon which necessitous kings drew when they required funds for wars and other extravagances. Thus François I. of France took enormous quantities of precious stones and gold and silver in the form of angels, statuettes of saints, altar vessels, candlesticks, etc., etc., from Laon, and even Henry III. of England, when in want of cash, pawned much of the treasury of the Confessor's tomb, which he had erected. The value of the feretory of this shrine was in modern money £29,630.

Another shrine which still, probably, contains the relics of the saint for which it was erected is S. David's, in South Wales. At Chester the shrine of S. Werburgh and at Oxford, that of S. Frideswide in the cathedral of Christ Church, have also been successfully re-erected by putting together countless fragments.

The remains of many British saints are to be found in reliquaries on the Continent, notably the relics of S. Edmund, Archbishop of Canterbury, at Pontigny. The author does not mention the traditional burial of S. Edward, king and martyr, who was slain by his mother-in-law or step-mother at Corfe Castle. A chapel off the chancel of S. Mary's Church at Warehaur still bearing the king's name, was built in the 13th-14th centuries over an earlier one; but Shaftesbury Abbey possessed a splendid shrine of his relics, and probably this was one of the many instances where the body of a saint was distributed among several churches, as, notably, the body of S. Louis, which was taken to S. Denis after his death at Tunis, his heart being left at Monreale, in Sicily. This latter was presented by the Italian Government some years ago to Cardinal Lavigerie to adorn the altar of his new cathedral at Carthage.

A NEW review has appeared at Tunis which is an interesting contribution to Moorish art and likely to prove useful to students and architects—*La Renaissance Nord-Africaine*. It is published monthly by Amico at 1 fr. 50 c. The

¹"Shrines of British Saints," by J. C. Wall. Illustrated. London: Methuen & Co. 7/6.

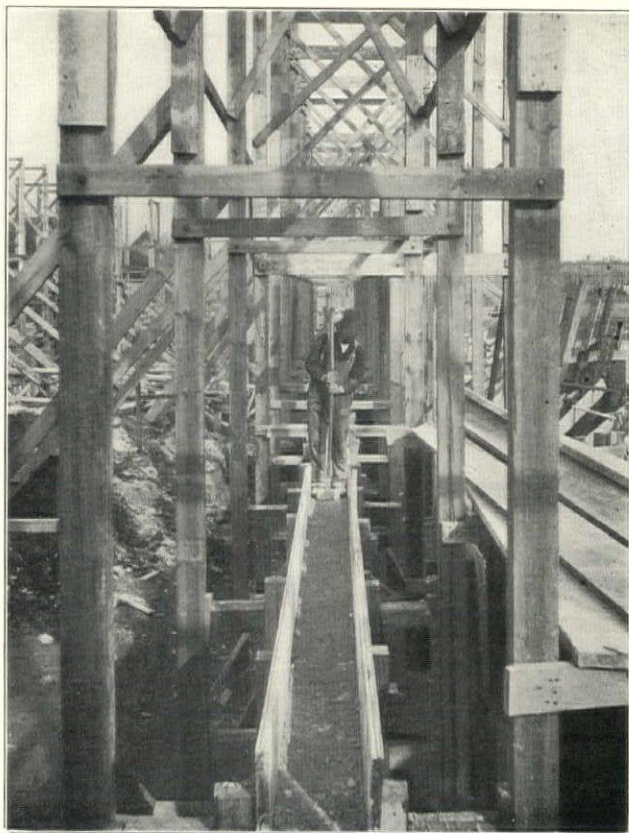
summary of some of the contents of the first number will give some idea of its scope. *Deux Poème d'Afrique, La Musique arabe, Feminisme et Islam, Les édifices religieux de l'Islam, Une Conferance arabe, Les écrivains modernes d'Islam*. The writers are French and native Tunisians or Algerians.

ILLUSTRATIONS

SOUTH PARK FIELD-HOUSE, CHICAGO, ILL. MESSRS. D. H. BURNHAM & CO., ARCHITECTS, CHICAGO, ILL.

THE South Park system of Chicago has during the past two years purchased numerous sites for small parks in the thickly populated sections of the south side of the city, for the purpose of affording that part of the public living a considerable distance from the larger parks more frequent opportunities for recreation and outdoor amusements. On these sites are being constructed "Field-Houses" or "Neighborhood Assembly Buildings," consisting of a main or assembly-hall building, men's and women's gymnasiums, plunges, swimming-pools, wading-pools for children, etc.

The rapidly increasing application of concrete for building construction, and the amply-demonstrated practicability and durability of such construction, also as this material was peculiarly



adapted for the buildings as designed, induced the South Park Commissioners to let contracts for buildings of this construction at some eleven or twelve different parks to the Rudolph S. Blome Company, who have now completed seven of these buildings, which are entirely of concrete, including walls, columns, partitions, lockers, conduits, etc.

The accompanying are views of the buildings erected at Park No. 3, located at 33d Street and Shields Avenue, and covering a ground space 180 feet square, the total cost aggregating \$100,000.

To determine the most satisfactory materials for the aggregate, it was found, after numerous experiments had been made, that to produce the uniformity of color desired and for compactness a mixture of one part of fresh limestone screenings, free from dust, with two parts of one-quarter inch crushed stone with a certain proportion of coarser crushed stone, brought about the best results, and no sand was used above the ground level. The concrete was mixed in the proportions of one part "Vulcanite" cement, two parts limestone screenings, and four parts of a mixture of the one-quarter inch and the larger crushed stone.

No mortar facing was applied anywhere, but dressed-and-matched lumber was used for the forms, the concrete mixed fairly dry, and carefully tamped uniformly compact.

As the first floor level of the building is some 4 feet above sidewalk level, no water-proofing was necessary. There are no basements except a boiler-room where no water was encountered, thus making unnecessary any special water-proofing except a coat of cement mortar on outside of walls.

The exterior and interior faces of the walls present a uniform, "grainy" appearance, the exterior simply being calcimined in various tints, and no plastering done anywhere.

In cases where concrete is to be subjected to considerable compression and tensile strain, it is desirable to use fairly wet concrete, but in the case of these buildings, where no plastering was to be applied to the work, a uniformity of appearance was a great object, and a wet mixture would have been out of question, as the mortar would have run down the face of the walls in streaks. What is meant by "fairly dry" is that only enough water was used to permit of thoroughly compacting the concrete in the forms without causing oozing of mortar. The color effect of the concrete, relieved by the ornamentation and also the tile roofing is an unexpectedly pleasant one, the concrete being so compact that the color is somewhat like that of Bedford stone, of course not as smooth or lined off to imitate sections of stone.

The ornamental work was cast in special moulds and then set in position.

A greater part of the floors are finished cement floors laid on the ground, then also wood floors laid on ground, wood floor construction in second story, and plain concrete arched floor without reinforcements for the boiler-room.

The swimming-pools were constructed in rather an unusual manner, by another contractor, by building an exterior surrounding wall, then a 12 inch thick concrete bottom, then one inch of rock asphalt, both on the bottom and vertically on the walls, then another 6-inch thick wall, and 6-inch thick bottom, then another horizontal and vertical course of one-inch thick asphalt, and finally another 6-inch thick wall and floor, both with cement finished surfaces. While this is a more or less costly construction it has resulted in an absolutely water tight pool.

DOORWAYS IN THE NEW FACADE: STA. MARIA DEL FIORE, FLORENCE, ITALY. EMILIO DE FABRIS, ARCHITECT.

For description, see article, "The Great Cathedrals," elsewhere in this issue.

SIDE DOORWAYS: STA. MARIA DEL FIORE, FLORENCE, ITALY.

FRONT SIDE AND REAR ELEVATIONS: FEDERAL PALACE, MEXICO, MEXICO. M. E. BENARD, ARCHITECT, PARIS, FRANCE.

The illustrations exhibit the building according to the latest studies. The material of which the Palace is to be built is a native white marble, though the sculptured figures in the attic will be cut in Carrara marble, while the friezes of the lateral porticos will be either of colored marble or of polished granite, and the plaques for inscriptions on the attic will also be of polished granite with the inscriptions in gilded bronze lettering.

While the shafts of the Ionic columns are to be monoliths of native granite with bases and capitals of gilded bronze, the shafts, bases and capitals of the Corinthian columns are to be of bronze, the bases and capitals being gilded. In like manner the cymatium and corona of the main cornice and pediment are to be of bronze picked out with gilding, while bronze is to be used for the corona of the lateral cornices, with gilding applied to the leaf mouldings.

LONGITUDINAL AND TRANSVERSE SECTIONS: FEDERAL PALACE, MEXICO, MEXICO.

FIRST AND SECOND FLOOR PLANS: FEDERAL PALACE, MEXICO, MEXICO.

Additional Illustrations in the International Edition.

ENTRANCE DETAIL: HOUSE OF MRS. H. H. PORTER, CEDARHURST, LONG ISLAND, N. Y. MESSRS. BARNEY & CHAPMAN, ARCHITECTS, NEW YORK, N. Y.

NOTES AND CLIPPINGS.

OLD LAMPS FOR NEW.—After having wasted £900 in taking away the fine old lamps which formerly stood on Waterloo Bridge, and replacing them with some spidery erections bearing large electric-light lanterns, the Bridges Committee of the Lon-

don County Council now proposes to put back the old lamps at an additional expense of £650. This is a death-bed repentance, and rate-payers will not be pleased at such utter squandering of money; but for artistic reasons we shall be very glad to see the old lamps back again, as they are really fine examples of design in bronze.—*Builders' Journal*.

WREN'S TOWERS.—The walls of Wren's towers vary from 5 feet to 7 feet in thickness, and are of solid masonry, sometimes backed up with brick, but generally with stone of a rougher description. The stone is Portland, the timber oak, and the lead must have weighed at least 10 pounds to the foot superficial. The floors in nearly all the towers are carried upon corbels, a preferable mode to inserting the ends of the beams in the walls, as the floors are not so liable to be injured by fire or strains. The towers have in nearly every instance convenient access to the belfry or parapet by circular stone staircases; and it is worthy of notice that the front line of the steps run to the center and not to the face of the newel, as is usual in Gothic staircases; this perhaps occasions a little more work, but gives a much better tread. The block cornices and enriched parapets, which are so frequently imitated in the more modern parts of the metropolis, were first used by Wren.—*The Architect*.

AN ECHO OF THE TARRANT FIRE.—An important decision was recently given by the Supreme Court in the case of Eppens, Smith & Wiemann against the Hartford Fire Insurance Company. The plaintiff's claim of \$5,000 was denied by the insurance company, whose contention was that the machinery and fixtures contained in a building on the south side of Warren street, Manhattan, New York, and slightly to the west of the Tarrant building, on the northwest side of the street, were damaged by the explosion in February, 1901, in that building, and that a substantial part of the building in which was the property ruined when the Tarrant fire took place fell before that property was finally consumed. On the first trial of the case, Supreme Court Judge Amend decided against the claimants. A new trial was granted, which lasted nearly a week. Many firemen, including Chief Croker, a deputy and battalion chiefs, testified that the explosion in the Tarrant building had blown down the front wall of the building containing the insured property before that building caught fire. Against these many witnesses all business people in the locality and familiar with the premises in question, gave evidence that the building was burned down, with all its contents, and that it was not damaged by the explosion. As the jury disagreed and was evenly divided, counsel on both sides agreed to leave the decision to Judge Dowling, who decided as follows: (1) That the plaintiff's property covered by the policy of insurance in question was destroyed by fire and not by explosion, and (2) that no substantial part of the building containing the property so insured fell prior to the destruction of such property by fire. The burden of proof to the contrary lay upon the defendant, who failed in establishing his case, while the plaintiff was successful, and this quite apart from the admission of the defendant that the loss "occurred during the life of the policy. The testimony of the plaintiff witnesses, who were in the 'coffee-house' building, as to the conditions therein, and the testimony of those persons residing in the neighborhood as to the time when various portions of the walls of said building fell (adds the opinion of Judge Dowling), corroborated as the latter proof is by the photograph received in evidence without objection, showing the condition of the walls on the afternoon of the day following the fire, are, in my opinion, decisive of the issue. While the firemen and policemen produced on defendant's behalf were undoubtedly giving their honest recollection of the conditions they saw, their testimony cannot weigh for much when the photograph, taken on the afternoon of the following day, shows three walls of the building still standing, which had been described by them as being in various degrees of greater demolition on the day of the fire. When they were so obviously and indisputably in error as to three of the walls, their description of the condition of the front wall cannot carry much conviction, especially against the weight of testimony from those more familiar with the normal appearance of the front of this building. It is quite possible that the large amount of glass in the front of the 'coffee-house' building may have created an impression of complete vacancy, where only the glass was gone from the window frames. But, whatever the reason for the discrepancies in the testimony, the photograph has resolved any doubt in favor of the plaintiff on that issue. Judgment for plaintiff in the sum of \$5,000, with interest from February 19, 1901, and an extra allowance of 5 per cent."—*Fire and Water Engineering*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, AUGUST 12, 1905.

No. 1546.

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THE department-store catastrophe has at last befallen, but in a rather different form from that we have been watching for during many years. In place of a holocaust of "holiday season" shoppers, or a heap of victims crushed during a needless panic, we have at Albany, N. Y., this week an even more impressive disaster, so instantaneous was it and so nullifying of all personal endeavor on the part of a victim to save herself, for, as must always be the case in an accident in such a place, the victims were mainly girls and women. The successful derring-do with which American building-movers shore, underpin and move about heavy buildings of all kinds have blunted our perception of the dangerous possibilities connected with their operations. But in the collapse of the Meyer's department-store at Albany on Monday last, by which a hundred or more persons were buried in the wreckage of five stories, we have proof of the criminality of allowing to be undertaken in an occupied building any alteration or repairs that at any period of the work are likely to affect, even momentarily, the integrity of the structure. The criminality lies in keeping the building open for business far more than in the stupid undermining of a pier in the basement. Fortunately, the collapse came early in the morning, before many customers were present, and the three hundred employes in the building furnished the greater part of the victims.

NEW YORK could better have spared a score of its younger fellows than that St. Thomas's Church on Fifth Avenue should be completely wrecked by fire on Tuesday, thus destroying not only one of the best pieces of ecclesiastical architecture in the city, the work of the elder Richard Upjohn, but interior decoration of unusual interest and value. Although it is a real loss, of course, that La Farge's fine mural decorations—amongst the earlier as well as the best of his efforts in that direction—and St. Gaudens's bronze bas-relief, "the Adoration

of the Cross," should be annihilated, the loss will be less acutely felt, for the reason that the church was so badly lighted that these works of art could not really be seen and enjoyed as they deserved to be. The burning of a church in midsummer is an unusual event, but as mechanics had been employed about the building the day before the cause is easily discernible in some piece of possibly excusable forgetfulness. As St. Thomas was already built at the time this journal was founded, it happens that we have published only an incidental view of the building, in our issue for April 16, 1887, and it chanced that our photographer was under instructions, at the time of the fire, to make a series of views of the church—a commission that now must remain unexecuted.

MESSRS. RANKIN, KELLOGG & CRANE, believing that we were "under a misapprehension as to the facts" in connection with their protest against the design of the pedestal for the Harrison statue—a quite erroneous assumption—have written to explain that they feel it was as much their "right and duty to take such position as if it were proposed to place an unsuitable tower upon the building itself," and say further that they cannot believe that we would "question the right of architects to control, within reasonable limits, the design of sculpture coming in connection with their work." In the first place, pointing out that last week we merely recorded the facts connected with the incident without expressing any opinion as to the propriety of the action, we will now say that we feel that architects of the Government building have not only adopted an unusual course, but one that is, under the particular circumstances, of doubtful propriety. If it were the aim to procure and apply to the Post Office building sculptural decorations, of which the prime intention was to decorate that building, any protest from the architects of that building would fall well within those "reasonable limits" to which they refer. In like way they could properly protest, if it should be proposed to wholly replace or add decorations to the balustrading they have placed about their building by applying a whole series of statues, even if they represented the Presidents of the United States. But that is not quite the situation in this case: The Harrison statue is not designed as and intended to be a sculptural accessory of the Post Office building: it is a self-contained and isolated work of art. Moreover, it is a work that, in intention, is of capital significance, as important in its way as the structure in which the National Government houses a great mercantile establishment. The Harrison statue is erected by the people of a sovereign State to the honor of one of its sons who has held the highest office in the gift of the entire nation, and being such it is difficult to conceive of anything that is, or might be, of greater capital significance, and because of this it should have a right to any site, the surroundings of which did not injure its own effect. Hence, as we hinted, the right of protest in this particular case is to a large degree equal and reciprocal. But this very quality makes the harmonizing of opposing views all the more desirable, and if, after a quiet discussion between the several designers, the deadlock should still continue, the matter should be referred for arbitration to some competent

body. It is in just situations as this that the working value of an Art Commission declares itself, and it is to be regretted that Indianapolis has no such body.

IF there is any one thing connected with architectural practice that is definitely fixed and decided, it is that the contract between architect and client, whether expressed or understood, is purely a personal contract and cannot be transferred by a living architect or administered by the heirs and assigns of a dead one. That this should be the case with an architectural practice, while, in England, it is a matter of every-day traffic for a medical practitioner to sell his practice, including his connection and acquired patients, is merely curious and shows how much greater regard men have for the dollars they create than for the lives which they do not. Ordinarily, when an architect dies, it causes a good deal of trouble to his clients because of the personal nature of the contract, and unless the clients are willing to have their jobs carried on by the deceased architect's assistants they have to seek out new architects and enter on new personal contracts with them. A case has recently come up in Stamford, Conn., where the client does not seem to have had knowledge of this relation between architect and client and because of this is involved in avoidable difficulties. Having to build a school-house, the selectmen employed an architect, and then, in place of putting the work in the hands of a general contractor, made separate contracts for the different portions of the work, the usual delays and annoyances resulting, in the midst of which the architect himself died before the job was half finished. Instead of seeking a new architect, the selectmen seem to have imagined that the deceased architect's heirs and assigns would in some way care for the execution of the contract. But as no one put in an appearance, Mr. John Ennis, the contractor for the carpentry work, voluntarily assumed the rôle of architect and completed the building to his own pleasure and, apparently, without too-careful regard for specifications and detail-drawings. A new board of selectmen, when they came into power, discovered certain omissions and discrepancies, and on refusing to pay Mr. Ennis's claim are now being sued by him. The Ennis contract was for \$5,350.00; he has received \$3,000 on account, now claims \$5,346.60 and is suing to recover \$7,000.00 "damages," in which elastic term could possibly be discerned a one and a half per cent. commission for "supervision" as acting architect.

STIMULATED perhaps by the protest in favor of the employment of local talent recently promulgated by the Cleveland Chapter, A. I. A., the Ontario Association of Architects has invited the Province of Quebec Association of Architects to unite with it in procuring the enactment of laws which shall make it more difficult, if not wholly impossible, for buildings designed by American architects to be erected in the Dominion of Canada. This movement, in view of the tariff legislation that has been built up between the two countries, is more reasonable and justifiable than the action taken by the Ohio architects, and presently we may learn how and to what height the tariff wall has been raised. Canada has long levied a

tax on drawings imported from the United States, but as the highest valuation could not exceed the architect's expected commission, a percentage on this did not materially increase the owner's expense, and so, although it did add a modicum of income to the public treasury, it did practically nothing to protect local architects. Now it seems to be the hope that duty may in some way be assessed on the cost of the buildings, not merely upon the value of the drawings. As Canada has proved an apt pupil of our own tariff vagaries, has enacted an alien-labor law which allows it to deport not only mechanics but civil engineers filling high offices in railroad employ, doubtless her lawmakers will find themselves able to accomplish the new task that is now foreshadowed.

ANY one who glances at the series of cuts with which a recent issue of the *Scientific American* illustrates its description of the new filtering-plant at Washington, D. C., cannot but notice their close resemblance to photographs showing the results of archaeological excavations in different parts of the world. On a single page we have grouped views which recall excavations at Pompeii, the hippostyle hall at Karnak and the Roman bath at Nimes, and they inevitably suggest the possibility that some of the remains of many-pillard halls that come to light now and then may be but the relics of elder filtering-plants. The ancients were better engineers and hygienists than we imagine, as is shown by the discoveries at the site of Sumere in Babylonia of a system of house-drainage, which included vertical leaching cesspools made of perforated cylindrical tile, to which horizontal tile drains led the overflow from baths, and so on. If men who lived forty-five hundred years ago were civilized enough to do such things, they may not impossibly have understood the virtues of filter-chambers.

A WRITER in *Great Thoughts*, who takes the ground that, in England at least, engineering has to a great extent taken the place of architecture, declares that what is needed now is a genius who will "deal artistically with iron, making it as beautiful as the architects have made stone beautiful in the past," and asks "Why not dot the country with poems in iron?" The same aspiration is often expressed, the same question asked, and the same explanation will serve in both cases. The satisfactoriness, the beauty of architecture in stone rests in a very large degree on the assurance it gives of steadfast everlastingness, as, sensibly, stone is imperishable while iron, as everyone knows, is rapidly perishable, and sensible people do not care to spend time and money in dotting the country with perishable records of their artistic capacity when they can as easily create imperishable ones. When a writer, using the imagery of his craft, wishes to picture imperishable records he refers to them as written in the "sands of time" and properly, since in the last analysis sand is but disintegrated rock, and so is less perishable than was the rock from which it was formed. The believers in concrete architecture, plain or reinforced, can safely argue that as concrete consists mainly of sand, it is essentially imperishable, and that if any "dotting" is to be done, why, concrete is the proper material to be used.

REINFORCED CONCRETE CHAPEL BUILDING, U. S. NAVAL ACADEMY, ANNAPOLIS, MD.

NOTABLE example of the bold use of reinforced concrete, says *Engineering News*, is furnished by the new chapel building now being built for the U. S. Naval Academy at Annapolis. As will be seen, it consists of a circular structure flanked by four wings 90 degrees apart, and surmounted by a lofty dome and cupola. The dome shells, the arched roofs of the wings, the supporting piers and columns, the interior bracing and the floors and their supports are all reinforced concrete. This concrete skeleton is, however, completely concealed by a covering of granite, white brick, and terra-cotta masonry on the outside, and on the inside by the interior finish and decoration. The present description covers the reinforced concrete work.

As will be seen the main supports of the building are eight piers arranged in pairs 90 degrees apart, around the periphery of a circle 83 feet 4 inches in diameter. These columns are vertical to a height of 35 feet, then they corbel radially inward until the distance between inside faces of diametrically opposite columns is reduced from 83 feet 4 inches to 72 feet 10 inches. The corbelled tops of the columns are surmounted and connected by a circular girder, which is a ring cut from a hollow cone and has an inside diameter at the bottom of 72 feet 10 inches and at the top of 69 feet 8 inches. On top of this circular girder are spaced 24 columns,

legs set into the main dome shell near its bottom. There is also a system of struts between the piers, as indicated in Figure 1.

The four wings of the building form transepts to the main auditorium, and each is roofed by a segmental arch, supported at its four corners by the main piers and by two separate columns. As these roof arches carry no load except their roof covering, the thrust on the columns is readily taken up by a tie across the front of the arch. Figure 1 shows this arrangement

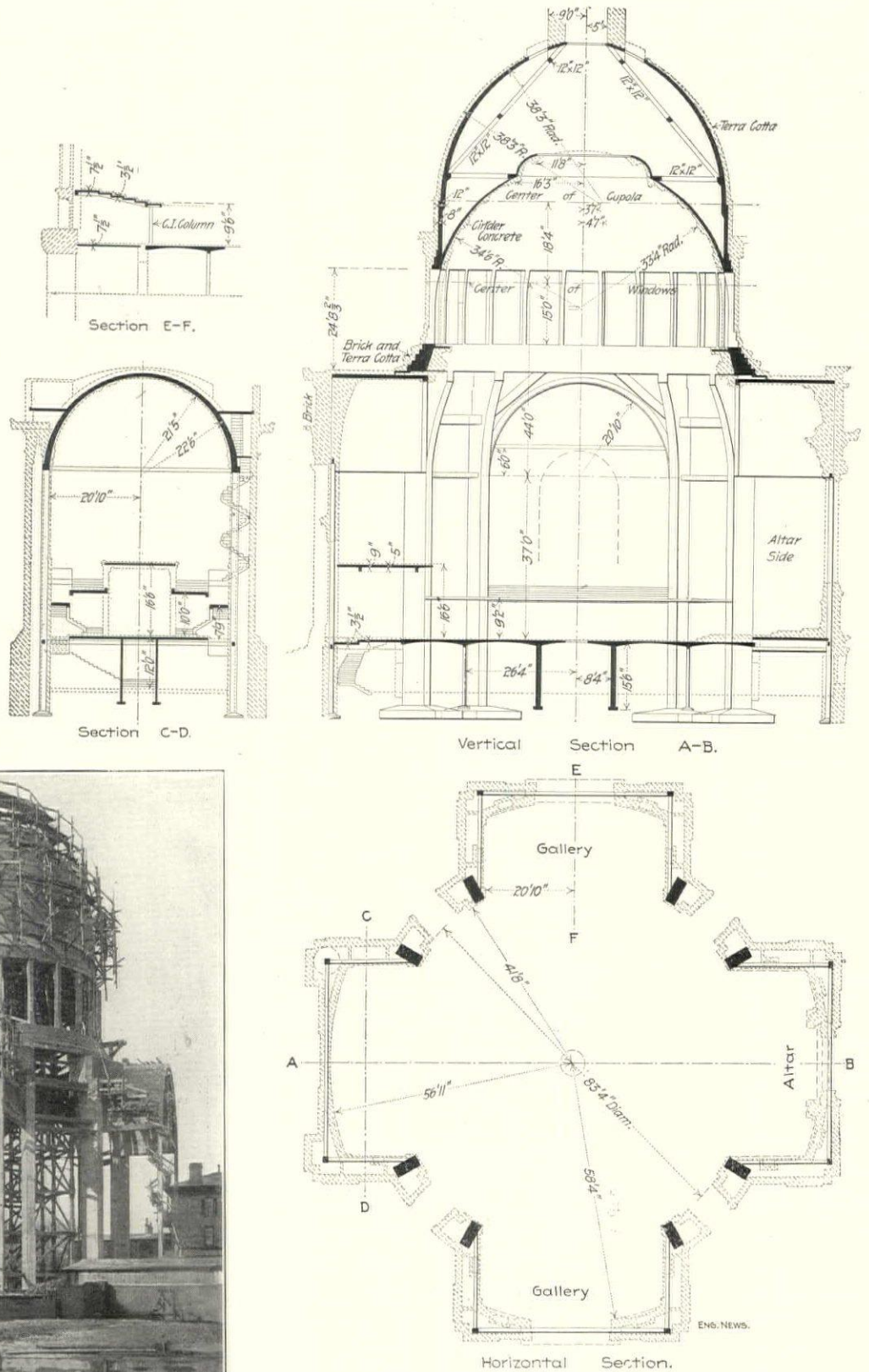


FIG. 6.

which corbel inward like the main piers and carry a second circular girder similar to the first. This last girder carries the shells forming the main dome and the ceiling dome. The lantern is carried by a pyramidal framework, whose spreading

clearly. The remaining structural framework of the building, all of which is of reinforced concrete, comprises the main and gallery floors, and is clearly indicated by the same.

It will readily be seen from the preceding general description

FIG. 1.

that the main problem in the design was due to the fact that the dome, being of smaller diameter than the circular main structure, had to be carried in cantilever over its supports. As stated above, the piers are rectangular and vertical to a height of 55 feet above

Figure 2, and braces were therefore introduced, reaching diagonally from the piers to the girder. The thrust of these brackets against the piers was transmitted to the companion piers of each pair by a horizontal strut, and it is important to note the interlocking of the strut and brace reinforcement, and the bonding of the brace reinforcement into the girder.

The 24 columns supporting the dome take footing at equidistant intervals around the circular girder, and are bonded into this girder by their reinforcement, as shown in Figure 3. These columns are corbelled inward like the main piers and carry a circular ring, on which the shells of the dome rest. The columns are bonded into the dome ring in much the same way that the main piers are bonded into the large circular girder.

The dome proper of the building, as shown in Figure 1, consists of two shells, both of which are carried by the circular ring. Figures 4 and 5 show the details of the shell construction. It is to be noted first that the inner and outer shells are braced together by a system of radial struts, and that the outer shell is stiffened by a pyramidal framework which takes the weight of the lantern off the crown portion of the shell and carries it to points low down on the haunches. The detailing of this framework and of the various parts of the shells is clearly shown by the cut and need not be

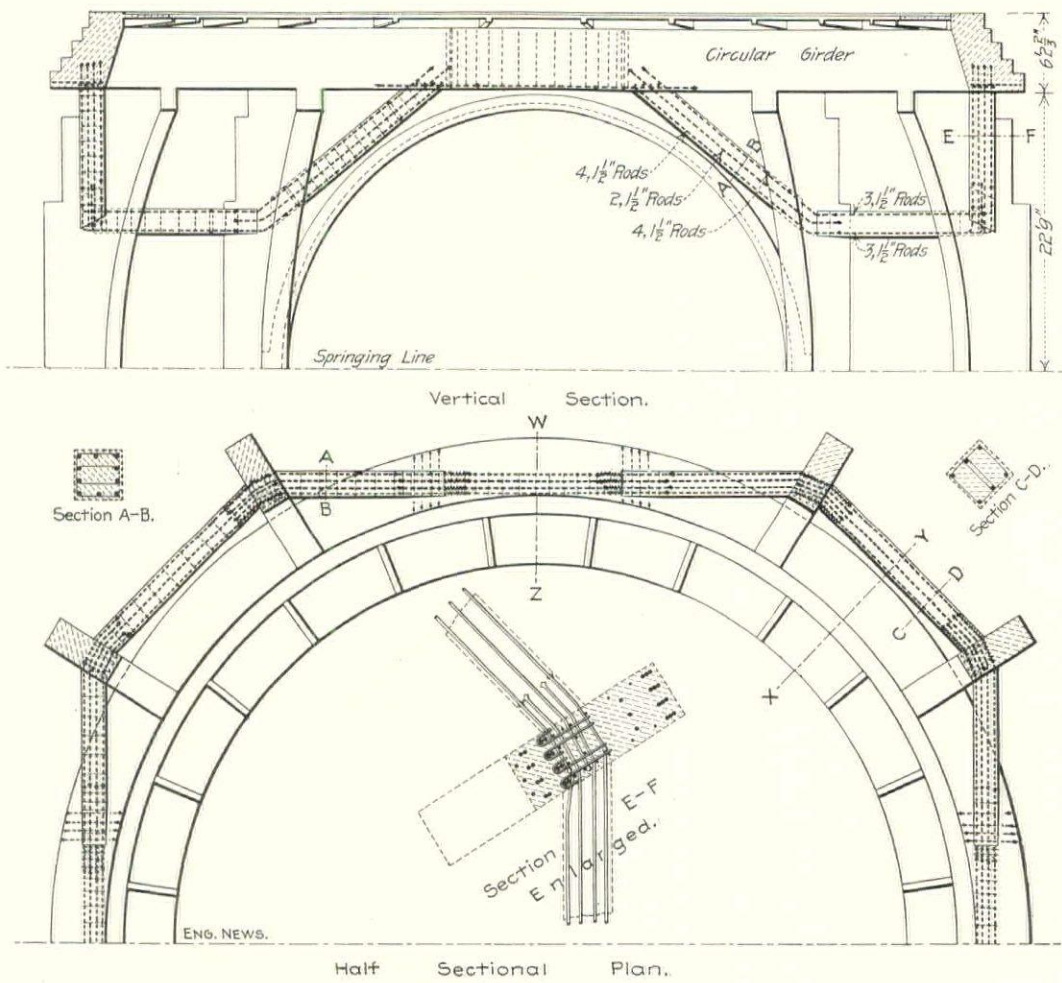


FIG. 2.

the footings and then corbel radially inward toward the center of the building. The eccentricity of the loading, due to the corbeling, made it necessary to reinforce the outer face of the column to take tension and the inner face to take compression. The compression bars had butt joints enclosed in steel sleeves. All the vertical bars were tied together at intervals by horizontal peripheral hoops of 1/4-inch rods. The piers are founded on concrete footings, 13 1/2 x 16 1/2 feet in plan, which bring a load of about four tons per square foot on the soil.

The architect's plan required the dome to be carried on 24 columns. To connect these with the supporting piers the tops of the latter were bridged by a circular girder, on which the dome columns took footing. A half plan and diametrical vertical section of this girder are shown in Figure 2. Figure 3 shows radial sections of the girder at two points. It will be noticed that the girder is corbelled inward and carries a gallery in cantilever. These eight points of support alone, however, left a considerable span of girder unsupported, as shown by the plan,

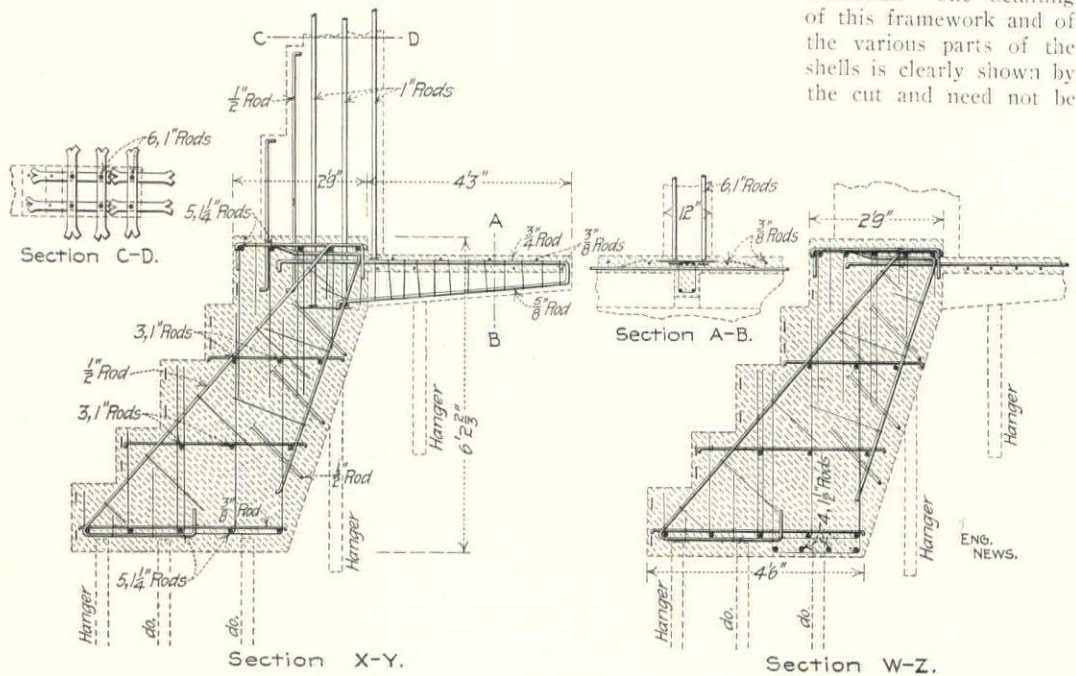


FIG. 3.

elaborated here. It is important to note the boldness of the design providing for a dome shell 69 feet in interior diameter and only 8 inches thick at the thickest part.

The lantern which crowns the dome is of terra-cotta and weighs 120 tons. It is anchored to the outer dome shell to resist wind strains, but its weight is relieved from the shell by the pyramidal

framework previously mentioned. It was impracticable to make the shell strong enough to carry the cupola because of the series of skylight openings at the crown.

north wing and enclosed in the curtain walls, as shown by the plan, Figure 1, gives access to the roof. This stairway is also reinforced concrete.

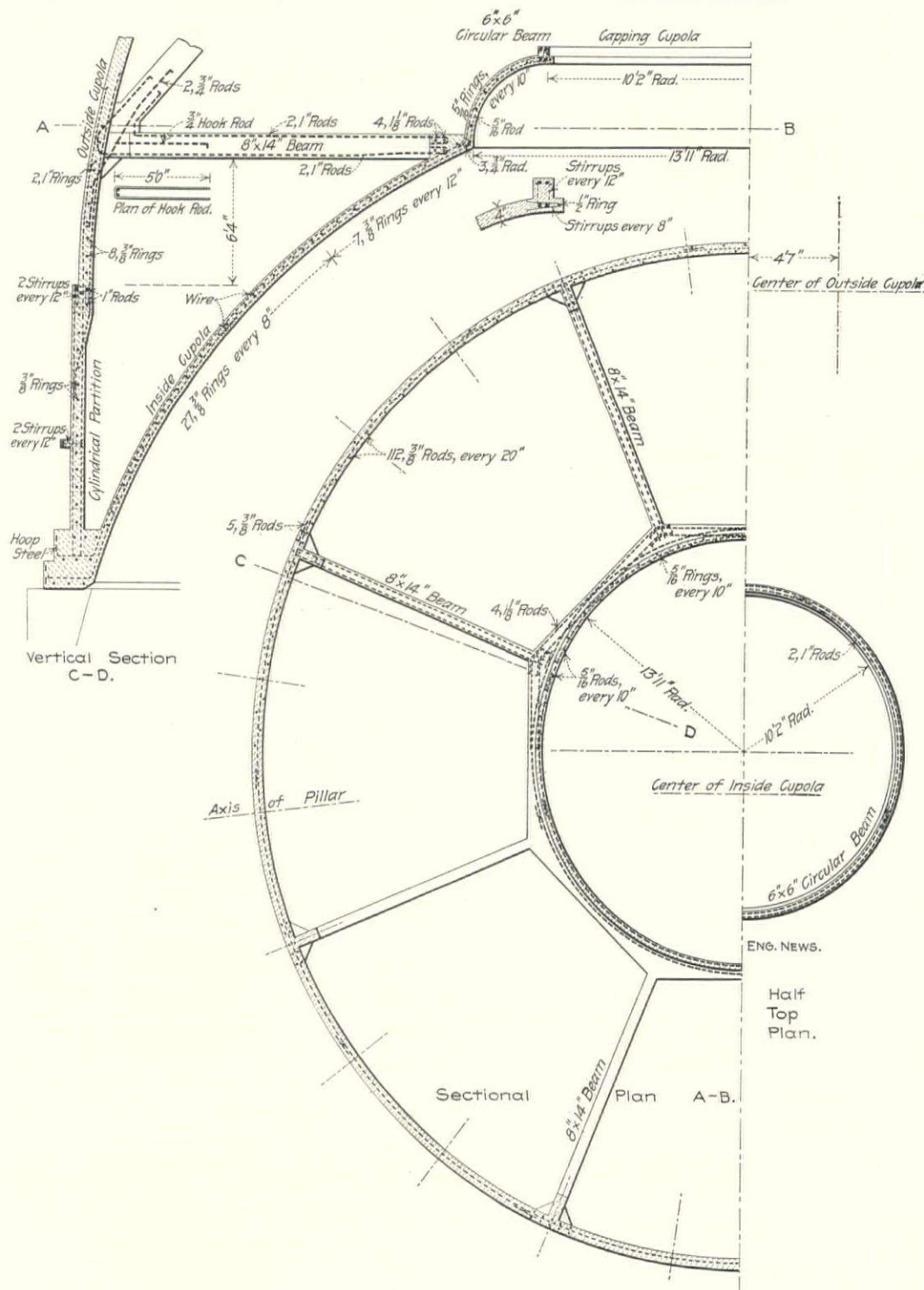


FIG. 4.

The only parts of the wings that call for attention are the roof arches and their supports. The arches are semi-circular segments, with a clear span of 42 feet 10 inches, a crown thickness of 8 inches and a thickness at skew-backs of 14 inches. This circular shell connects into the main piers at its inner end and is carried on two columns at its outer end. To prevent these isolated columns from spreading under the arch thrust, a tie is carried across the arch at this point. The columns are rectangular, with a vertical bar at each corner and hoops connecting these bars at smaller intervals vertically.

The main floor of the chapel is composed of thin flat-top concrete arches carried by the main piers, a circular row of concrete posts and a circular concrete wall. This construction is clearly indicated by Figure 1, which also shows clearly the gallery floors and those of the altar and organ loft. The stairways from the crypt to the main floor and from this floor to the galleries and lofts are all straight-run stairs of reinforced concrete. A spiral stairway around one of the columns carrying the arch roof of the

To insure clearness the preceding description has been held closely to a bare statement of the structural parts of the chapel as shown by the drawings, and needs to be supplemented by further explanation of the conditions influencing the design and other general aspects of the work. It is important to explain at the outset that the original plans of the architect called for a solid concrete construction for the walls, and this concrete was to be faced with brick, granite, terra-cotta, etc. Bids were asked on these plans, and when received were found to be above the amount appropriated for the chapel building. Contractors were then asked to propose designs of their own, on the condition that the architectural lines of the building be respected. The Noel Construction Co., of Baltimore, Md., proposed a design, made by the Baltimore Ferro-Concrete Co., and were awarded the contract. Compared with the original design for solid concrete walls, dome and roof arches, the new design first decreases the load by substituting reinforced concrete for the dome shells and roof arches, and then carries this load to the foundations by piers instead of by the building walls. This made it possible to enclose the building with hollow walls and thus materially cheapen the construction.

The substitution of the new design involved several structural difficulties. As has been noted in the preceding description the diameter of the dome is 69 feet, while the piers which support it are set with their inner faces on the circumference of a circle 83 feet 4 inches in diameter. The eccentricity of the dome shell with respect to its main supports is thus 7 feet 2 inches, and this eccentricity had to be provided for by corbelling inward the whole structure supporting the dome, so that a cantilever construction was demanded in the main piers, the circular girder and the dome columns. This explains the complexity of the reinforcement and the intimate bonding of the several connections. In this last respect of the close bonding of the connections this structure is quite unique among American examples of reinforced-concrete work. It should be noted also that the reinforcement consists entirely of round rods.

Measured from the ground level, the chapel building is 64 feet high to the top of the wings, 143 feet 7 inches high to the top of the dome, and 192 feet 3 inches high to the finial of the cupola. The main building has a clear inside diameter of 83 feet 4 inches, and each of the four transepts is 41 feet 8 inches wide and 16 feet 8 inches deep. The height from the main floor to the top of the circular girder is 66 feet and to the top of the ceiling dome is 110 feet. The dome is 69 feet in

diameter at the bottom. Exteriously each wing has a width of 60 feet 2 inches, and the total outside diameter of the building through the wings is 130 feet.

The view, Figure 6, shows the chapel building in course of erection. There was little that was unusual in the work until the roof arches and the dome shell came to be erected. Considering the outer dome shell first, it may be noted that the lower and practically cylindrical portion was constructed exactly as a circular tank would be. When the shell began to curve inward use was made of a mould. This mould and its supporting frame was built upward as the work progressed, without support, except the part of concrete erected before. The roof arches were built in a similar manner to the dome shell.

The building is a part of the new Naval Academy buildings now being constructed at Annapolis, Md., by the United States Government at a cost of \$15,000,000. The architect of the new academy, and, therefore, of course, of the chapel building, is Mr. Ernest Flagg, of New York City. The contractors for the chapel are the Noel Construction Co., of Baltimore, Md., who sublet the design and construction of the reinforced concrete work to the Baltimore Ferro-Concrete Co., of Baltimore, Md. We are indebted to the publishers of the *Engineering News* for the loan of the cuts and permission to reprint this detailed description of an interesting building.

THIS YEAR'S ENVOIS FROM THE VILLA MEDICI.

THE annual exhibition of the *Envois de Rome*, closing in Paris, July 15, was very interesting, by far the most clever work in architecture being that by M. Prost, the second-year man at Rome. Apart from this work of Prost's, little of unusual merit was presented, and as to this exhibition the fourth-year man sent nothing, the architectural end of this year's display would have been very weak had it not been for the saving excellence of M. Prost's water-colors. These consisted of a measured drawing, in a rich blue tint, of faïences from a Mirhab at Karaman, Vilavet of Konia, in Asia Minor, Mosque Ibrahim, actually at the Museum of Constantinople, and of two water-colors of the tombs of Innocent VIII. and Sixtus IV., in the Vatican at Rome. These two latter sheets were treated in a rich dark neutral tint, handled with far more of the technique of the painter than of the architect, furnishing works of true artistic merit, as well as true records of architectural value. In addition, Mr. Prost sent scale drawings of the Column of Trajan at Rome.

M. Jaussely, the first-year student, sent three scale drawings of Trajan's Column, and also three sheets of the Ara Pacis of Augustus.

M. Hulot, representing the third-year, sent a few of his interesting water-colors, sketches made at Venice, Girgenti, Cefalu, and Taormina. To these were added restorations of Selinuntum, Sicily, consisting of two plans of the Acropolis, two water-color views, a colored detail, and three other stretchers of drawings in india ink.

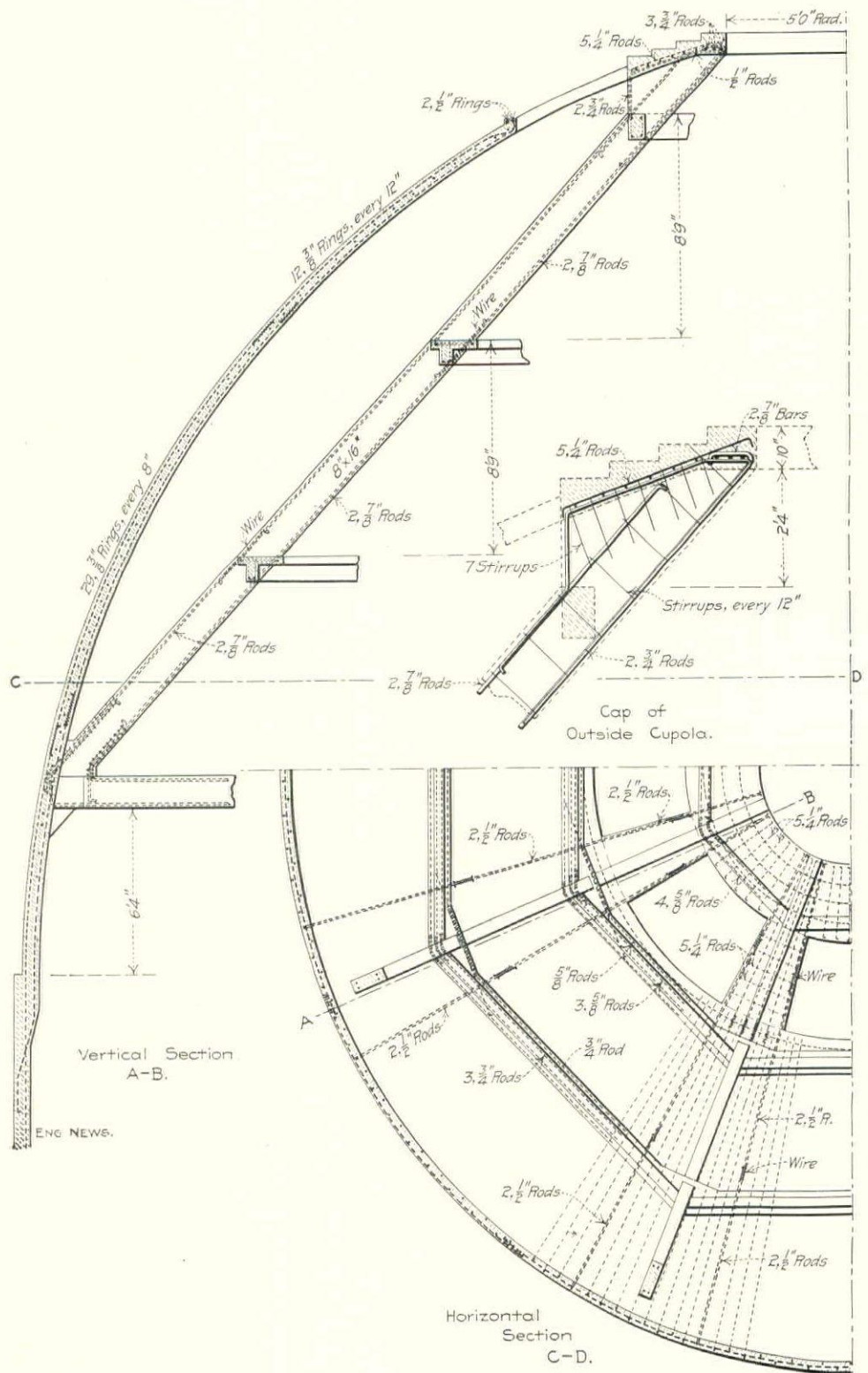


FIG. 5.

M. Bigot, the fourth-year representative at the French school, is engaged upon a large clay model, a restoration of the Colosseum and its surroundings in ancient Rome. The model occupies a pavilion in the garden of the Villa Medici at Rome, and measures some fifteen feet square, the Colosseum itself being about two feet in length. This large model is made in sections, supported upon movable wooden horses, that it may be easily handled, and M. Bigot expects to complete the work at the close of his fifth year in Rome, which has been granted to him for the purpose.

FRANK E. PERKINS.

PETERS ON HILPRECHT.

THE following, says the *Boston Transcript*, are the most important sections of Rev. Dr. John P. Peters's open letter of protest to the provost of the University of Pennsylvania on the findings of the committee appointed to investigate

the charges against Professor Hilprecht of that university:

"Inasmuch as the report submitted to the trustees of the University of Pennsylvania by the committee appointed by them to investigate the charges against Professor Hilprecht has been given to the press in its main results, and inasmuch as the whole subject is designated by the committee in its official report as 'the Peters-Hilprecht controversy,' it is not improper that I should make some response to the report of the committee, calling attention to the 'charges' on which Dr. Hilprecht is exonerated, and the method by which the committee has reached its results. The accompanying offprint of a paper read by me before the Oriental Society sets forth the facts with regard to Professor Hilprecht's publications and our present state of knowledge about the 'Library' at Nippur.

"In brief the report of the committee consists in a complete exoneration of Professor Hilprecht on (1) the charge of literary dishonesty; (2) the charge of improperly retaining property belonging to the University of Pennsylvania; (3) the charge that what was found at Nippur has no just claim to be called a temple library. Instead of taking the attitude of a board of inquiry or a grand jury, the committee from the outset regarded itself as a court or a petit jury.

"It endeavored to place all witnesses who came before it in the position of presenting charges. It laid the burden of coming before it and of prosecution upon the witnesses, instead of undertaking itself to probe the matters at issue. The witnesses were treated in a hostile manner, with a system of cross-questioning which was always pettifoggling and sometimes insulting. The committee made no endeavor to secure witnesses by consulting their convenience of attendance, but arbitrarily appointed dates, giving witnesses very brief notice of the same, thus making it difficult and at times impossible to attend. The committee further limited by resolution the scope of its inquiry to exclude all matter which had not been mentioned in writing before it began its sessions, thus shutting out some of the most important evidence. Whether through failure to appreciate what should have been investigated, or whether of intention, it so handled the subject in general as not to call or to exclude important witnesses and essential material; in other words, it refused to probe the matters at issue, and conducted a partial investigation.

"The titles of the charges are the work of the committee. Under 'literary dishonesty' is meant the charge that Professor Hilprecht published as illustrations of the temple library objects which were not found in that library at all. The committee in its report mentions only three tablets as so used, and excuses their use as illustrations on what would probably be generally regarded as a legal quibble. The report says nothing at all about the larger number of cases of which information was obtained only after the sessions of the committee began, partly through the testimony of Dr. Hilprecht himself, evidence concerning which was offered to the committee. Especially there is no mention in the report of a most direct and flagrant case of falsification testified to by Mr. C. S. Fisher, architect of the expedition, and Mrs. J. H. Haynes, wife of the field director. The committee seems to have excluded this material on the ground that it had not been mentioned in writing before the sessions of the committee began. If the exoneration by the committee on the charge of 'literary dishonesty' has any value, that value applies only to the cases mentioned by the committee in its report, and not to the still larger number of cases, including the case referred to above, which were presented to the committee after the sessions had begun.

"As to the charge of improperly retaining property belonging to the University of Pennsylvania, in this form certainly the charge did not come from me, as your committee intimates in its report, and with its conclusions I have no quarrel.

"According to the committee, the third charge on which Professor Hilprecht is exonerated is the charge that what was found at Nippur had no just claim to be called a temple library. No such charge was made by any of those who appeared before the committee, although the committee attempted to make individuals make such a charge. The statement made by me and by others was that the sometimes contradictory and sometimes apparently false statements made by Professor Hilprecht with regard to the 'library,' the publication by him as specimens of the contents of the 'library' of objects proved not to have been found in the 'library,' and the failure to publish anything certainly from the 'library' itself, rendered it impossible to determine what were the facts, and tended to create suspicion that there was no such library. We pointed out the desirability of putting the whole matter beyond question by opening the unpacked boxes in the

museum of the University of Pennsylvania and examining the labels and the contents of the tablets, the labels to determine the precise locality in which each tablet was found, and the contents to see whether those which were shown by their labels to have come from what was claimed to be a library were actually library material.

"The University of Pennsylvania had at its disposal in its own museum men abundantly capable of making such an examination in connection with Professor Hilprecht. The committee did not call these men, nor did it call any of the well-known and competent scholars holding responsible positions in neighboring universities, to make this examination. The committee's own report of the examination gives no evidence whatever that the tablets examined were found in the 'library,' or that their contents proved them to have constituted a library. The committee was incompetent, without expert assistance, to determine such a question; and, in fact, from the report, it would appear that it did not comprehend the question at issue.

"The report in general avoids and evades the issues raised, and cannot be counted as anything else than what is in popular language designated as 'whitewash.' It is to be hoped that the trustees of the University will find some suitable method of putting before the world the testimony taken before this committee, on which the findings of the committee were based."

JUSTICE TO ARCHITECTS A CENTURY AGO.

AN extract from the Law Reports of the *Times* of July 10, 1803, reproduced in Monday's issue of that journal, is interesting, as it reminds us that architects had not then the restricted rôle now associated with the profession, but were frequently also builders, or even, as in this case, paperhangers. It also suggests the shameful license allowed to counsel a century ago.

COURT OF KING'S BENCH, JULY 9.
KING V. SURR.

Robert Anthony Lawrie said, he was by profession an architect, and deposed to the facts stated by the Learned Counsel in the opening. He was endeavoring to quit the shop, when the defendant seized him violently, and dragged him back. It was in vain that he tried to escape, and receiving a severe blow on the leg, he called out murder. The outcry occasioned a man to enter the house, who appeared to be a constable. The defendant and this person then hurried him to the watch-house.

Cross-examined by Mr. Erskine.

Q. "Swearing by the card will not serve you in the day of trouble. Who and what, in God's name, are you?" The witness gave his name, his address, and his profession.

Q. "Robert Anthony Lawrie, of Moulton St., Esq., architect by profession, of what celebrated Palladio did you acquire the knowledge of your art?"—A. "My father instructed me in the rudiments of architecture."

Q. "Admitting your theory to be excellent, where do you practice?"—A. "My capital does not enable me to embark to the extent I wish."

Q. "But, sir, in what splendid edifices may you have been concerned?"—A. "My eyesight prevents me from speculating practically."

Q. "It is singular that your eyesight should prevent you from *speculating*, since that organ, with the rest of mankind, was alone intended for *speculation*. But I thought just now it was your capital. It may perhaps be a *capital* defect in your eye; and as nature has placed the seat of vision in the *head*, any defect there must be capital."

As the learned counsel was proceeding, the witness changed color, was seized with a paroxysm, and by order of the judge, was carried out of court. During his absence, one of the jury very humanely interposed, and said he was perfectly acquainted with the witness, who, from a situation of affluence, had been reduced to poverty, and, to procure subsistence, had condescended to the humble labors of a journeyman paperhanger. When he returned,

Lord Ellenborough (addressing Mr. Erskine) said, "I do not think, if you press this further, it will be of any advantage to your client. The man brings a stamped measure, shows the deficiency in the liquor, and exposes the proceeding to the observation of the by-standers, and for this offence to the keeper of a gin-shop he is taken to the watch-house and imprisoned."

Mr. Erskine: "I mean to prove, my Lord, that the prosecutor committed an assault upon the defendant."

Lord Ellenborough: "If an attempt of this kind be made the

court will visit it very severely. It is evident the charge of an assault is an afterthought. It is both my wish and my duty as much as possible to prevent crime; and if there be perjury employed in support of this feeble case, it will be succeeded by much danger and mischief to the parties. But [to Mr. Erskine] proceed."

Mr. Erskine continued his cross-examination.

Q. "I think you are wrongly charged with being a common informer, for you are a very uncommon one. If you were a common informer, you would give us a little information. How do you live? How do you find your way into court?"

The witness seemed quite unmanned by this style of interrogation, and the paroxysm was again returning, when the counsel for the prosecution interposed.

Mr. Garrow: "You may as well call him a common bawd, as a common informer."

Mr. Erskine: "He is a non-descript."

Lord Ellenborough: "He need not be ashamed of his misfortunes; adversity is the lot of the wisest and the best men."

Q. "How do you live?"—A. "I live by my industry."

Q. "The Chevalier d'Industrie is a character well known; I want to learn where you exhibit?"

It was in vain to press the witness; and the learned counsel declined any further examination. . . . *The Defendant was found guilty.*

ILLUSTRATIONS

THE GRAND STAIRCASE: FEDERAL PALACE, MEXICO, MEXICO. M. E. BÉNARD, ARCHITECT, PARIS, FRANCE.

SECTION THROUGH THE SALLE DES PAS-PERDUS: FEDERAL PALACE, MEXICO.

THE DOME: FEDERAL PALACE, MEXICO.

VIEW IN THE GRAND PATIO: FEDERAL PALACE, MEXICO.

PRIMARY SCHOOL, LEWIS DISTRICT, BOSTON, MASS. MESSRS. J. A. SCHWEINFURTH AND J. J. CRAIG, ARCHITECTS, BOSTON, MASS.

Additional Illustrations in the International Edition.

VIEW ACROSS FORE-COURT: ESTATE OF FRANK SQUIER, ESQ., BELLEHAVEN, GREENWICH, CONN. MR. WILSON EYRE, ARCHITECT, PHILADELPHIA, PA.

VERANDA PORCH: HOUSE OF FRANK SQUIER, ESQ., BELLEHAVEN, GREENWICH, CONN.

NOTES AND CLIPPINGS.

ELECTRIC LAMPS AND FIRE RISKS.—At a time when colliery disasters are so unhappily prominent, attention may appropriately be called to the necessity for exercising great care in the use of incandescent lamps. It is common knowledge that the bulbs of such lamps become distinctly hot after the current has been switched on for a short time, but comparatively few are aware of the fact that the heat developed is sufficient to cause the ignition of inflammable substances in contact with the glass. A fire that took place at a colliery in the North of England some time ago was finally traced to a 16-candle-power lamp, which had been placed upon a heap of coal dust in one of the workings, and only a few days back a serious explosion of fire-damp at a colliery in Belgium was caused by the bursting of a similar lamp. Mr. Henry Hall, one of H. M. Inspectors of Mines, has recently placed on record the result of some experiments bearing upon this subject. In one case he found that a 16-candle-power lamp, with a thin covering of coal dust, acquired the temperature of 370 degrees F. in two minutes, and exploded at the temperature of 450 degrees F. in four minutes; and a noteworthy fact revealed by the experiments is that, after a certain temperature has been reached, the process of spontaneous combustion is commenced, and temperature continues until the material bursts into flame, even in the absence of the original source of heat. The subject of this note possesses practical interest to architects, because inflammable materials in dwelling-houses and other buildings may conceivably be set on fire by contact with incandescent lamps for a sufficient period of time.—*The Builder.*

height of any public building or specially fitted private house may be increased 3 to 6 feet by a special permit from the city authorities. The particular reason for placing the foregoing limits on the height of buildings is not given, but the ordinance fixing them is dated January 1, 1894.—FRANK DYER CHESTER, U. S. Consul-General, Budapest, Hungary.

THE CATHEDRAL OF BAZAS.—A few miles from Langon, in the South of France, is the town of Bazas, the cathedral of which is deserving of more attention than it has received. It is of mixed styles, but chiefly of the thirteenth century. The plan is oblong, with aisles and an apse, no distinction between the nave and choir, but the apse is surrounded by an aisle and chapels, and there are low chapels between the buttresses of the nave. The work seems to have been carried on for a long period; part is late in the thirteenth, and another part early in the fourteenth century, but it has been a good deal modernized in the seventeenth, and the date of 1675 is painted on a base at the east end. The west front is very fine and rich, the arches and tympanums fitted with sculpture, among which are the signs of the zodiac, with the operations of each month corresponding. But four large paneled buttresses have been introduced in the seventeenth century, and two of the months are destroyed. The nave has the pillars chiefly rebuilt or refaced after the mutilation by the Huguenots, and the vault is also modern, but the side walls with the shafts attached and the vaults of the aisles are original, with some of the windows. In the north aisle is a tomb of the end of the twelfth century, with a canopy, on which are some curious incipient crockets. The rest of the work is chiefly of the Flamboyant style. The tower which stands on the north side of the west front is a fine specimen of that style, with a rich crocketed spire, and there is a good Flamboyant round window in the west front. The upper part of the front is, however, modernized. Nothing certain appears to be known about the history of the cathedral, which was founded at a very early period, and was formerly much more important than it is at present, the bishopric being now united to that of Bordeaux.—*The Architect.*

A CONCRETE CHIMNEY-STACK.—Tacoma, Wash., claims to include among its objects of interest the loftiest concrete chimney in the world. It belongs to the Tacoma Smelter Company, and has just been completed. From the base of the foundation to the top of the chimney is 307 feet 6¾ inches, and the cost was \$28,000. The stack was built to carry away the poisonous fumes from the smelting works at Tacoma. In its construction 1,225 barrels of cement were used, in addition to which the structure contains 105,000 pounds of T-iron, 705 cubic yards of sand, and 231 cubic yards of gravel. Towering more than one hundred yards from the earth, and without a single supporting gty, this chimney, because of its relatively narrow base, presents a very striking appearance. The concrete foundation of the chimney is 36½ feet square and 6 feet thick. For the chimney proper the mixture was one part cement and three parts sand. The chimney is constructed in two parts. From the foundation up to a height of 90 feet there are two distinct shells—one built within the other, while for the rest of its height it is built with a single shell. The purpose of the double shell is to protect the structure from cracks and strains, due to extreme variations of temperature. The inner shell, which is separated from the outer one by an air-space of 5 inches, is designed to shield the outer shell from the direct effect of the intense heat at the base of the chimney, while the outer serves as a like protection to the inner shell, by shielding it from cold weather, which might cause it to crack by cooling too suddenly. The outer shell also takes up the heavy bending stresses caused by wind pressure. Not only are ordinary conditions guarded against, but the chimney is expected to withstand a tornado. Circulation of air between the shells is secured by the provision of small openings at the bottom. The entire chimney was built in 3-foot sections, and an average of 3 feet a day was made in the construction of the double section and 6 feet per day on the single or upper section. Sectional moulds were used, and the entire work was handled from the inside, a scaffolding being built up with the chimney. All materials were raised by means of a cable attached to the drum of the engine that operated the concrete-mixer. The inside diameter of the chimney is 18 feet and the outside 21 feet. From base to apex the chimney is reinforced with T-iron, according to the Weber system.—*Scientific American.*

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, AUGUST 19, 1905.

No. 1547.

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THE very unusual degree of friendly feeling and mutual regard that exists amongst and between the architects of Boston is due very largely to the example of those two exponents of the Golden Rule, the first two presidents of the Boston Society of Architects, the late Edward Clarke Cabot and Charles Amos Cummings, who, we regret to announce, died last week in the seventy-second year of his age. It is due to the precept and example of these two men, who, like the late Edward H. Kendall, of New York, impressed every one brought in contact with them as being always and under all circumstances the perfect gentleman, that the Boston Society of Architects is not only the largest, but the most harmonious, most influential and most considerate of the constituent associations that are comprised within the American Institute of Architects. Those who were interested in the salvation of the "Bulfinch front" of the Massachusetts State House, a few years ago, rejoiced that the conduct of the case rested so largely in the hands of Mr. Cummings, who knew to a nicety when to be simply calmly logical and when to advance his plea with fiery eloquence. In like way his conduct of the long, but unsuccessful, struggle to bring about the remodeling of Copley Square, Boston, exhibited his patient tact, while his firmness was shown by his action as one of the Art Commissioners in bringing about the rejection of Macmonnies's "Bacchante," because of its unsuitability as a decorative adjunct of the Boston Public Library.

MR. CUMMINGS was born in Boston in 1833 and, we believe, secured his technical training at the Troy Polytechnic Institute, followed later by travel and study in Europe. His early professional experience was acquired in the office of Mr. Gridley J. F. Bryant, who at that time had the largest practice in Boston, but very shortly afterward he entered on private practice, forming a partnership with Mr. Willard T. Sears, which remained unbroken until, some dozen years ago, Mr. Cummings

decided to retire and devote his time to literary work. During this period he not only contributed, as before, to magazines and periodicals, but wrote certain important articles in Mr. Longfellow's "*Cyclopadia of Architecture in Italy, Greece and the Levant*" and in Mr. Sturgis's "*Dictionary of Architecture and Building*," in both cases going over, in parts, the ground he was at the same time covering in his own "*History of Architecture in Italy*," a work which reveals the accuracy of the scholar, the polish of the writer and the delicate perceptiveness of the artist. During this same time he had to undergo the chagrin of seeing a large part of his life work as an architect abolished, not because it was not good, for it was better than the work of most of his contemporaries, not because there was a demand for better and larger buildings, but simply because he could not foresee the cheapening of plate-glass, and so had designed his commercial buildings in the Florentine and Venetian Gothic he understood so well. Here and there about the city there are still a few of these beautiful buildings unchanged as to their upper portions, but with the marble-work of the lower stories now replaced with thin sheets of plate-glass. One might almost say that of the many examples of the work of this unusually capable and artistic designer all that now remains unchanged in Boston are his own house on Clarendon street and the New Old South Church, a pistol-shot away.

THE burning of St. Thomas's Church in New York calling to mind the career of its designer at the same time suggests that the American Institute of Architects has not taken occasion to inaugurate the custom that obtains in the Architects' Union of Berlin in the way of celebrating, or rather observing, the centenaries of the births of Prussian architects who have made their mark on their own and succeeding times. We do not particularly care for or value such commemorative observances carried out in cold blood, as a mere matter of course. But the facts that Richard Upjohn, who was born in 1802, was the first President of the American Institute of Architects and was a man of rare force are significant enough to have deserved commemoration at the hands of the association he so long presided over. Since Mr. Upjohn's centenary was not observed, it is of less moment that the corresponding anniversary of the Institute's second President, Thomas U. Walter, who was born in 1804, also passed unnoted.

WHEN Mr. Cutler turned from his architectural practice long enough to invent and perfect the mail-chute, we wonder whether he faintly perceived the real good he was doing to his fellow-beings, morally, intellectually and physically. In the latter particular alone he should have earned goodly reward through indirectly saving the lives of countless office-boys and stenographers, once much given to running out improperly clad to mail a letter at the nearest street letter-box. The mail-chute has become such a common-place equipment of modern business buildings that the public feels it has a right to find it in all buildings, forgetting that, besides

the owner, the Post-office authorities have something to say in the premises, as the multiplication of foci of collection adds to operating expenses. Because of the demand for the mail-chute and the tendency to install them in apartment-houses and other buildings serving only a small population, the Postmaster-General has just issued a set of rules governing the installation of mail-chutes. Naturally no mail-chute can be installed except with the approval of the Postmaster-General, and all receiving-boxes must be at the ground level, not more than fifty feet from the main entrance to the building. Further, the chute must not be placed within an elevator-screen nor be run through any part of the building not accessible to the public. Next, while the chute may be placed in office-buildings not less than four stories high, hotels, public buildings and railroad stations must have at least five stories before they can enjoy the privilege. As for apartment-houses, only those containing at least fifty residential apartments can have the benefit of this form of mail service and so be considered fully equipped and up to date. Architects will do well to keep these simple rules in mind.

ONE would think it must be the most readily accepted precept of the law that the obligations of an illegal contract must not be enforced by a court, yet Justice Buffington, of the United States Circuit Court, sitting at Pittsburgh, in an opinion recently handed down, seems to rather applaud himself because he found himself unable to decide in favor of enforcing such an immoral compact. The case was a matter of collusive bidding such as, under the name of "balanced bids," once gave much trouble to the Supervising Architect's office—in Mr. Hill's time, we think it was. The Pittsburgh case arose between two dredging concerns who were asked to put in bids for dredging from the Monongahela River certain deposits of slag, dumped there by the Jones & Laughlin Steel Co., which the United States engineer in charge of the district said must be removed from the bed of the navigable stream. The two contracting firms met and, in writing, agreed to put in bids, one at \$1.60 per cubic yard, the other at \$1.70, on the understanding that whichever bid might be accepted each concern should do half the work and eventually have half the payment therefor. The bids submitted in accord with this understanding were, however, both rejected, and one of the dredging companies later put in a bid at \$1.25 per cubic yard, secured the contract, did the work and collected payment. But when the other dredging company asked for its share of the profit, it was told by the successful bidder that, as there had been a new letting under revised conditions, the old agreement between the two concerns was no longer binding upon either of them. A suit was the natural result, but what we think was very unnatural was that, although the written collusive contract was produced in court, the aggrieved plaintiff got a verdict in its favor, subject to a decision of a higher court as to whether an action could be maintained on an agreement whose obvious purpose it was to deceive the steel company by giving it the idea that competitive bids were actually proffered. The award of damages by the lower court seems extraordinary. Judge Buffington, however, reverses the verdict, declaring that in the

case of all collusive bidding "the law should adjudge such agreements void on the broad ground of public policy" which we venture to think is a very weak sort of utterance for a justice of the United States Circuit Court.

AT a recent meeting of the American Society for Testing Materials, Mr. Louis H. Barker gave some account of the experiments made, during a dozen years, to discover a satisfactory protective paint for metalwork. During this period he tested most of the paints on the market, but found none of them satisfactory, because of the fact that all paints are pervious to moisture. This led him to believe that what was needed was an impervious coating that would protect the paint itself, and after various experiments decided that the thing to use was the common thin paraffin paper of commerce. His method is to first apply to the metal work, after that has been thoroughly cleaned with wire brushes, a coat of a certain tacky paint and to this sticky surface apply the paraffin paper, lapping edges and forcing the paper to follow the contour of the member under treatment. When the papering process is completed the entire work is given a final coating of paint, apparently any good paint being satisfactory. Tests, carried over a period of three years, of metalwork protected in this way show that the outer coating, the paraffin paper, the tacky under coat—which still remains tacky—and the metal surface are all in practically unaltered condition, and it seems as if Mr. Barker had found at least one solution of an important problem. But when one imagines a gang of housesmiths slowly pasting paraffin paper onto the sticky surfaces of some gigantic steel skeleton, it does not look as if this solution had a real working value. It is possible, however, that paraffin in liquid form could be applied with a paint-brush and so provide in practical form the interjected impervious coating which is proved to be so advantageous.

IT is a very common thing for the managers of periodicals of one kind or another to offer to pay—and actually to pay—cash prizes to the most successful designer of a three or five thousand dollar house, a class of structure for which there is always an active practical demand. It is still more common for those who attempt to build in accordance with one of the prize designs to find wholly vain their attempts to keep the actual from largely exceeding the alleged cost. We commend, therefore, to promoters of similar competitions the course adopted, without warning, by the Board of Park Commissioners of Swope Park, Kansas City, Mo., who, after deciding that the design for a five-thousand-dollar cottage presented by Mr. Louis Curtiss was better than any of its competitors, and as such deserving of the hundred-dollar prize, informed him he could collect the money as soon as he could bring them a contract from some builder to erect the cottage for five thousand dollars or less—Mr. Curtiss's own estimate of cost being \$4,917.00. As the successful design was to be carried out in stone, it is likely that it will be some time before Mr. Curtiss can collect his prize. It is fair to the promoters to explain that their object was not to save their money, but to establish the *bona fides*, as it were, of the prize design.

THE NEW BASILICA CHURCH AT PARKSTONE,
ENGLAND.

AN effort has lately been made in Dorsetshire to introduce a new style, or rather a very old, although unfamiliar, style of architecture into church building—namely, the ancient Christian basilica.

There are many objections to this style. First, how can a building, which was devised to keep out sun and heat, be suitable for a damp, dull, cold and sunless winter climate? Moreover, in England, eight months out of the twelve may be described as dull and sunless; secondly, cost comes in. An Early English brick church can be built for half the cost of a basilica, simply because the style in itself is decorative; whereas the plain walls of the latter require either mosaic or fresco decoration. Take away the marbles (which are mostly antique, robbed from older buildings), the mosaics, the sculptured bas-reliefs, and what beauty remains in the churches of Ravenna, for example? The plain brick or stone exteriors are ugly, and the interiors are not much less so, except for their good proportions and grandeur of design.

Such are some of the principal objections to the basilican style of architecture. It was a style adopted by the early builders as being an imitation of the old Roman edifices which the Christians had adapted to their needs; but, as soon as the builders exercised some individuality in their work they realized the inappropriateness, or the extreme ugliness, of the exteriors of these churches, and invented a style which developed into perfect examples of Pointed architecture, such as the cathedrals of Rheims and Chartres and the abbey churches of Westminster and S. Denis.

In a certain way the new church of S. Osmund, Parkstone, may be said to be a success—its acoustic properties are excellent; whether they will remain so when the temporary nave (three square walls) gives place to the permanent three-aisled nave, it is impossible to say; but so far, every one can hear in every part of the building. For this no one can be too thankful, for is it not a fact that in most churches one hears nothing, partly, no doubt, owing to the theological principles of the younger ritualistic clergy who think mumbling reverent for prayers and bawling appropriate to preaching. Result: Absolute impossibility for the laity to attend to either.

The architect of the church is Mr. G. A. Bligh Livesay, F.R.I.B.A. The plan is cruciform, with shallow transepts, the crossing to be surmounted by a dome. This, like the terra-cotta angels, which unite the capitals of the pilasters of the central piers, is an innovation. As to the winged things, the less said the better; they are essentially modern in design, in their situation, and their inappropriateness. The capitals are Corinthian, and there is no reason why they should not have been united at the corners in the usual manner. The chancel terminates in an apse with a semi-domed vault, surrounded by an ambulatory, and divided from it by a colonnade of red terra-cotta fluted Ionic columns. Eight steps lead to the chancel, bounded by a semi-circular balustrade, upon which are the two ambos. Over the altar is a baldachino of a greenish-blue white, with gilt capitals, the whole a reproduction (?), or at all events, an imitation of the not very beautiful one at San Clemente, Rome. At S. Osmund it is a regrettable incident, inasmuch as it hides the beautiful colonnade and is completely out of harmony as regards color, all the walls of the chancel being warm dull red and yellow, what we may call "light red" and "yellow ochre." The apse is to have a hemicycle of seats around it for the clergy, basilica-fashion, but the church being oriented in the usual way, the old custom of celebrating, from the western side of the altar facing east and the congregation, cannot be followed. In the true basilican churches the apse (unless there were two) and altar were at the west end. Another objection to the baldachino is that it hides the fine seventeenth-century iron railings which came from a City of London church. May we ask why it was turned out?

It seems a pity that in our new churches certain things are introduced which are no longer of any sense, as for example the baldachino or ciborium, as it is called in Rome. The idea of a covering to the altar was, of course, to protect the Blessed Sacrament. The reason for hanging one or seven lamps before the altar is that the Blessed Sacrament is reserved. But reservation is illegal in the English church. Why, then, have a tabernacle or lamps? They are undoubtedly pretty and decorative; but the argument that, because seven lamps are described in the Book of the Revelations, as burning before the throne, we should also have them before our altars is delusive, because *He sat upon the throne*, and the lamps burned before Him. The altars in the Eng-

lish churches are empty except at celebrations—then the legal two lights are burning behind the altar; but there being no reservation, the lamps always burning are senseless and, again, a modern innovation of the extreme Ritualists. It is a pity that it should be so, but it is not rare either in religious or in secular matters for the shell to be preserved after the kernel is gone.

The flooring of the chancel is of marble mosaic. The church is built of terra-cotta bricks over a foundation of steel, which, it is hoped, may be a successful arrangement; but as this style of building has not been tested anywhere, I think, for durability, being a new invention, there may reasonably be a doubt whether such a method may be enduring. Ten or twelve hundred years is not much for a religious building; many that we still possess whole, or in part, are double that age. Will S. Osmund be standing when horses are rarities and all our present houses are merely dust or ashes under a substratum of many feet of novelties? At all events we know for certain that good, honest stone endures for centuries, so it seems a pity in church building not to employ a well attested and absolutely safe method. Nor do I think that a system which is not what it pretends to be is fitting in a place for religious worship. Steel covered with stone or terra-cotta is a sham, and nothing but honest and first-rate work should be offered to God. His house should be perfectly good and true, whether it be a small-priced or a high-priced building. The general effect of S. Osmund is certainly dignified, and the coloring is harmonious; but the proportions of the Doric columns, the frieze, and the semi-dome are not quite happy; the pillars seem small and short, an error pointed out by Ferguson as peculiar to the old basilican churches. However, if the frieze and the semi-dome should be some day a blaze of gold mosaic, the effect will be fine. The mistake seems to be in having commenced a building which, in a small place, cannot possibly be finished until long after the present generation has disappeared. As it is, the nave is intentionally temporary, erected at considerable cost, only to be pulled down when sufficient funds are collected to build the permanent nave, aisles and transept, to say nothing of a tower; and even then the exterior will be ugly and incongruous, surrounded as it is by the cheapest and commonest red brick cottages for workmen—the sort of hideous, squalid erections to be seen all over this country. Fifteen or twenty thousand pounds is no small sum for a suburb of villas and cottages to provide. But in ecclesiastical matters the evangelical advice not to build until you have counted the cost, seems a dead letter. In private life we are admonished from the pulpits not to run into debt; but it is rare to hear of a church, or a church house, or schools, or anything connected with the church, being built *after* the money has been provided. "Start the fabric and the money is sure to come," seems to be the clerical system. Very often it does, but probably tradespeople, professional men and others suffer in consequence, for there must be a limit even to "giving" and "helping." Probably, had the lavish expenditure upon handsome churches and the restorations of old ones which was an enthusiasm and an ideal some fifty years ago been devoted to building decent houses for the poor, more conversions to Christianity from the "submerged tenth" might have taken place. The church, beautiful with marbles and mosaics or frescos, was the ideal wherewith to raise people from the Paganism of the slums to Christianity and its moral laws; but written religion nor morals can influence men and women who live the lives of the lowest classes in our great cities.

PENGUIN.

THE GALLERIA UMBERTO I. IN NAPLES.

PERHAPS the writer who first formulated the precept "See Naples and then die" meant the wonderful bay with its scintillating waters; perhaps the first view of the city; perhaps the churches, palaces, and other story-haunted spots that crowd on the eye and on the mind. Most likely he meant all together.

Every aspect of the historic city has been familiar to me from boyhood, and if this were the right time and occasion, I should be delighted to dwell on many of them, but, as an architect, it is not of the sorrows, the glories and the triumphs of Naples that I must write, but of its buildings—mechanically, so to speak.

I shall mention first King Humbert's Gallery (Galleria Umberto I). This beautiful building is placed in the central part of the city, opposite the San Carlo Theatre, not far from the Royal Palace. The gallery is a magnificent building five stories high, the first floor being occupied by a library, a branch post-office and many elegant stores; the other floors by banks and offices. The ground taken for the Galleria Umberto was once poor, wretched and unhygienic. Possibly it was these considera-

tions which induced the authorities to advertise for plans for an art-gallery, which would necessarily include considerations of cleanliness and sanitation in general.

Among the architects who offered plans for the gallery were Savini, Cottrau, Rocco and Cassitto-Pisanti; but the happiest solution was that of the Comm. Emmanuele Rocco, whose plans were approved by the Municipality and the Italian Government.

The working plans were prepared by the architect Cav. Ernesto De Mauro, who directed the works. Building operations were started on November 5, 1887, and finished after three years. The plan of the arcade is a cross with unequal arms. The principal elevation is opposite the Royal S. Carlo Theatre. In the middle the plan is octagonal, capped by a beautiful cupola. The sides of the cross have semi-circular roofs of glass on steel skeletons. The total surface of the occupied ground is 152,258 square feet, of which 39,493 square feet of the Arcade is covered with glass, the remainder is occupied by the lateral buildings and courts for light and ventilation.

Heights—from the first floor level:

- (a) Lateral buildings, 84 feet 4 inches.
- (b) Semi-circular glass roofs over the four sides of the cross, 112 feet 6 inches.
- (c) Summit of the central cupola, 196 feet 10 inches.

The material used for the outside is a special white calcareous stone found at Tivoli, near Rome, and called Travertino. No column inside of the walls; the roof trusses and cupola are supported by brick and stone work. Steel beams are used for fire-proof flooring. The floor of the gallery is in white and colored marbles arranged in mosaics.

The decoration is of the Italian Renaissance style. In the interior of the Arcade large piers of finest scagliola, with marble bases, support the first and second floors. All the upper part is decorated with elegant white plaster relief ornamentations with gold surface. The Palladian windows of the third floor are exceptionally beautiful.

The "Salone Margherita" is a small theatre (*café chantant*) below the first-floor level, and consists of a circular hall 65 feet 7 inches diameter, surrounded by a large corridor 14 feet 9 inches wide and communicating with the first floor by two staircases. The said circular hall has a small stage, an orchestra for the musicians, an auditorium, two tiers of boxes and an artistic vault decorated with fine pictures in the style of Raphael.

The plans and calculations were prepared and the work directed by Mr. Paolo Boubée, professor in the Royal School of Engineers in Naples, a man well known as one of the best European engineers.

The sides of the cross are each 49 feet 2 inches wide. Upon the sides of the octagon lie eight vertical steel arches of box section, 1 foot 7 11-16 inches high and 2 feet 11 7-16 inches breadth. The chord of each of the four arches that correspond to the side of the cross is 49 feet 2 9-16 inches, the chord of the others, corresponding to the buildings, is 42 feet 2 11-16 inches.

A big circular ring lies upon the said steel arches; it consists of web and flange plates riveted with four flange-angles 2 feet 7 1/2 inches high and with flanges 1 foot 5 3/4 inches wide. The inside diameter of the ring is 59 feet 4 inches. Upon this ring rest 16 big ribs that at the top are riveted to another ring whose inside diameter is 30 feet 10 1/2 inches. On this last ring rests the little lantern whose ribs, to the number of 16, are connected with another horizontal ring 2 feet 7 1/2 inches diameter. Eight of the sixteen cupola skeleton ribs are prolonged to the brick piers, to which they are fastened with a special anchorage system. The shape is beautiful and finely ornamental.

Between the big arches and the horizontal ring connecting the piers there are eight winged genii that sustain each a large arc lamp. The four arms of the gallery are covered by semi-circular latticed trusses placed 14 feet 9 inches on centres, connected by rafters and purlins, on which are set the panes of glasses.

Convenient openings for ventilation are provided in the cupola and roof. The glazing is colorless, which not only gives plenty of light to the Arcade, but produces a splendid effect, attractive alike to Neapolitans and foreigners.

N. SERRACINO, Architect.

LONDON AS A CENTRE FOR ARCHITECTURAL STUDY.¹

IT has been suggested that a short article on this subject might prove interesting to a good many to whom architecture and the study of old buildings are of increasing interest. London, of course, being dealt with, having special regard to the

¹A Paper by Mr. Banister Fletcher, F.R.I.B.A., in *University Extension* for June.

general student and amateur. Those professionally interested in architecture must look at old buildings from a slightly different standpoint, and with a more critical eye for their constructive qualities.

The connection between architecture and the humanities is an entrancing and interesting subject, inasmuch as throughout the ages architecture has been the mirror of the history of each period, and is an index to the religious and historical events which serve as landmarks in the history of mankind.

Architecture, when studied from the historical standpoint, has principles and special evidences of its own that enable one to interpret the moral, artistic and religious character of humanity, and indeed an insight into the characteristics of a people is to be obtained by a study of the buildings erected by them. Yet it is regrettable to realize how little the average Londoner knows of the architectural treasures which surround him—the heritage of past ages—and how much pleasure and interest he misses thereby. This loss of interest is, of course, largely due to the fact that there are no systematic courses of lectures on architectural history which deal sufficiently deeply with each period from the point of view of the general student.

The study of architecture seems, indeed, very necessary for every educated person, as it gives a general ground plan of the arts of form, and of the trend of humanity in past ages, which are essential to a proper and complete comprehension of history.

What is true of the world in general is equally so of a city, and thus by studying the architecture of London, consisting of buildings of every period since the Conquest, along with their history, the proper "atmosphere" of each period is obtained, both architecture and history helping each other, and enabling one to realize the meaning of the different forms in each period, and their relation to the times.

It may be convenient to consider five avenues or means of study which London presents to students. These are (1) the Crystal Palace Courts, (2) the museums, (3) the buildings, (4) the libraries, and (5) lectures.

1. *The Architectural Courts at the Crystal Palace*, dating from the great exhibition of 1851, are among the best means ever attempted to create object-lessons of the different styles of architecture arranged in chronological sequence, and though invaluable to the student of architecture, appear to be little known by the general public. The Egyptian, Greek, Roman, Pompeian and Saracenic Courts were designed by Owen Jones; and the Byzantine, Mediæval, the Renaissance Courts by Sir Digby Wyatt, each of the courts being executed so as to portray as far as possible the leading qualities of each style. In addition there are at the Crystal Palace many excellent models of ancient buildings, such as the Egyptian Temple of Abou-Simbel, the Athenian Acropolis, the Forum of Rome, the Colosseum, and S. Peter's, Rome.

2. *Museums*.—No city in the world possesses museums of such importance as London, so much so that London is the "Mecca" of art students from every country, as they are frequently able to study a subject or period of art better here than in the countries where the illustrative objects are found.

A. *The British Museum* is a treasure-house of all the early forms of art—Egyptian, Assyrian, Greek and Roman. Here we see Egyptian columns, capitals, sphinxes and mummy-cases, as well as Assyrian wall-slabs showing the life-history of the Assyrian Kings, and giving interesting details of the wars and hunting expeditions, and representations of palaces and other buildings. But it is in Greek architecture that the Museum is especially rich. The remains of buildings of the Archaic period, such as the Temple of Ægina, the Temple of Diana at Ephesus, and portions of the later temples, are surpassingly interesting, more especially as little or nothing remains of these buildings *in situ*. Then the Parthenon room, with its excellent model of the Acropolis, showing the position of its world-famous structures, and a splendid model of the Parthenon itself, deserves attentive study. Most important, however, are the Elgin Marbles, consisting chiefly of fragments of the Parthenon brought to London in 1801 by Lord Elgin, and comprising the greater portion of the Panathenaic frieze which was sculptured on the peristyle wall, the carved metopes, and a large part of the sculptured pediments. These represent the finest sculptures of the Periclean Age, and are the masterpieces of the great Phidias.

In the adjoining apartments are columns, capitals, caryatid figures and sculpture from the Erechtheum at Athens, the picturesque temple of Apollo Epicurus from Bassæ, the celebrated Mausoleum from Halicarnassos, two complete Lycian tombs, the Nereid Monument at Xanthos, and many examples of the Greek stele. Numerous specimens of Roman art, such as altars, sar-

cophagi, mosaic pavements and the like, are also preserved here, and it is considered that this collection of Classical antiquities is the most important in the world.

B. *The Guildhall Museum* of the Corporation of London has many examples of Roman art, which have been found from time to time in the city, and amongst these are some excellent Roman pavements, and other remains of the Roman occupation.

C. *The Victoria and Albert Museum* is another institution in which the architecture and ornamental detail of past ages can very profitably be studied. It is especially rich in Gothic and Renaissance art, but contains also many Greek and Roman examples, such as the models of the Parthenon, pediments from the Temple of Zeus at Olympia, and plaster casts of all periods. There is also a full-size model of Trajan's column, casts from well-known Roman capitals; pulpits, altar-pieces, chimney-pieces and Mediæval ironwork from all parts of Europe; and models of Renaissance buildings and their painted vaults. The Elizabethan room from Bromley Palace, complete with its moulded plaster ceiling, panelled walls, carved chimney-piece, tables, chairs and fittings, is an excellent example of that interesting period.

The many examples of furniture of all periods, and the ceramic ware of Della Robbia and others, make this museum a delightful place for the lover of architecture and the allied arts. Indian and Saracenic architecture are well represented in the western galleries.

D. *The Royal Architectural Museum*, in Tufton Street, Westminster, originally founded by lovers of Gothic architecture—Sir Gilbert Scott, Beresford Hope and others—has lately been taken over by the Architectural Association, but the museum is still open, free to all students, and contains excellent casts of every conceivable feature in Gothic architecture.

E. *The Soane Museum*, in Lincoln's Inn Fields, is rich in Greek and Roman art, models of buildings and original architectural designs, among which the sketch-book of John Thorpe, the architect of Elizabeth's time, and other interesting exhibits, may be studied with interest.

3. The buildings of London dating from the time of the Conqueror may briefly be summarized as follows:

In the *Norman Period*, there is the Keep and S. John's Chapel of the Tower of London, the circular portion of the Temple Church, and the very fine remains of the Monastic Church of S. Bartholomew the Great, Smithfield, recently opened out and cleared of the factories and stables which had been built into it.

In the *English Period*, Westminster Abbey forms a petrified history of the English people from the time of the Confessor, although the present structure mainly dates from the reign of Henry III. The many associations and the poetic atmosphere surrounding this world-famous structure render it probably the most interesting and attractive in England, and architectural students can herein trace the evolution of Gothic architecture up to its climax in the sixteenth century. The Eastern portion of the Temple Church, Lambeth Palace Chapel, and S. Mary Overie, Southwark, are other buildings of this period.

In the *Decorated Period*, there is the Chapel in Ely Place, Holborn, the Dutch Church, Austin Friars, portions of Westminster Abbey cloisters, and many of the tombs and chantries of the old Abbey.

In the *Perpendicular Period*, there is the Chapel of Henry VII. (probably the finest example of fan-vaulting in England), portions of the cloisters in Westminster Abbey, S. Margaret, Westminster, the porch of S. Sepulchre's Church, Holborn, the Savoy Chapel off the Strand, Westminster Hall (with its famous hammer-beam roof), and Crosby Hall (a merchant's house of the fifteenth century), now used as a restaurant.

In the *Tudor Period* there is the picturesque Clock Tower, Chapel Royal, and the Old Presence Chamber of S. James's Palace, Lincoln's Inn Gate-house in Chancery Lane, and, at no great distance from London, Wolsey's Palace at Hampton Court.

In the *Renaissance Period* London is particularly rich.

Of the Elizabethan or Jacobean Periods are Gray's Inn Hall, Middle Temple Hall (with its fine hammer-beam roof and screens), Staple Inn, Holborn, the Charterhouse, Holland House, Kensington, the façade of Sir Paul Pindar's house (now in the Victoria and Albert Museum), while Hatfield House and Audley End, Essex, are within easy reach.

In the later period (latter part of seventeenth and eighteenth centuries) there is no city or district which approaches London in the interest and variety of her monuments.

The works of Inigo Jones are shown in the Banqueting House, Whitehall (now the Museum of the Royal United Service Institution), S. Paul's, Covent Garden, Greenwich Hospital (part),

York Water Gate, the Queen's House (now the Royal Naval School), Greenwich, Lincoln's Inn Chapel, Barber-Surgeons' Hall, and Ashburnham House, Westminster.

Sir Christopher Wren is in particular associated with London, the great fire in 1666 having given him the opportunity of erecting over fifty churches in the English Renaissance style, in addition to his masterpiece, S. Paul's Cathedral, which is perhaps the most satisfactory of all Renaissance Churches. The steeples, which usually form part of his church designs, give to London a peculiar picturesqueness quite its own. His secular designs also are of great interest, and the Monument (near London Bridge), Temple Bar (since removed to Hertfordshire), portions of Greenwich Hospital, Hampton Court Palace (part), Chelsea Hospital, Marlborough House, the Orangery in Kensington Gardens, and the quiet domestic work in the Temple and elsewhere, have given to London a traditional and reposeful character which is always pleasing.

There is no space left in this short article for the later architecture, which is equally interesting and in which London is specially rich, except to mention the following as important: Somerset House, the National Gallery, S. Martin's-in-the-Fields, by Gibbs; the mansions of the nobles—as Apsley, Devonshire, Grosvenor, Dorchester, Stafford, and the Bridgewater Houses; the halls of the City Companies, the Houses of Parliament (which rank as one of the world's finest architectural achievements), and the new Westminster Cathedral. Many important and finely designed modern buildings have been erected which indicate that the traditions of English architecture are being renewed, and the many improvements in London thoroughfares, such as the formation of Kingsway, and the new Victoria Memorial and Processional Avenue in the Mall, will tend to beautify the Capital City, and make her more worthy to be the center of a world-wide Empire.

4. *The Libraries* of London are specially rich in architectural works, which enable one to study not only the local architecture, but also that of every country and period. Among the most important may be mentioned the Libraries of the Royal Institute of British Architects (where students under certain regulations are allowed to study), the Architectural Association, the British Museum, the Guildhall Library, the Art Library at the Victoria and Albert Museum, the Public Library, Manresa Road, Chelsea, and the small Lending Library of the Worshipful Company of Carpenters, London Wall. In no other city in the world are there libraries so rich in architectural literature and in rare and valuable works on the architecture of past ages.

5. *Lectures* organized by the University Extension Authorities are frequently given in various districts, and the time, indeed, may have arrived when a central course, dealing with the subject in a more consecutive manner, may be given, fitting in with the three-year course of the Humanities lately approved by the Senate. If such should be the case, London will be able to pride herself in being the first of the Universities to deal rightly with architecture as a necessary part of a liberal education. I am, of course, referring to those persons to whom a liberal education is considered an essential, not as a means of gaining a living, but in order to enable them to enjoy to the utmost their daily existence by giving to them additional interest in their surroundings.

Although it has only been possible to touch but slightly on the all-engrossing subject, lovers of London know full well how it abounds with treasures of art. And what of the setting of these—what of London itself? In the opinion of the writer, who has visited many cities of note, from Chicago to Constantinople, and from Vienna to Cairo, there is no city which can approach London in its picturesqueness and variety.

Paris may be more stately, but London has the greater charm, and this is owing in a great measure to her atmospheric effects, which, as the French sculptor Rodin has pointed out, are finer and more varied than the drier climes of Italy or France, where you may count on your blue sky, it is true, but which are hard and changeless compared to London, where we see each day a sky as variable and often as beautifully colored as one could desire. A day spent by the Chelsea Embankment will enable us to discern a change of sky and atmospheric effects that are in themselves a perfect drama, and even the London fogs produce a harvest of weird, changeable and mysterious impressions!

London gives a clear insight into the English character, with its strong individuality and freedom from control. It also indicates the power and influence of the English nobility, which in the past have provided a unique heritage of beauty and health by the formation of the London Squares—oases of green and quiet in the busy turmoil of city life.

The parks and open spaces, which during the last quarter of a century have multiplied so quickly, show the advancement of democratic principles, and the enlightenment of the governing bodies of London, and their conversion to the doctrine of the paramount importance to the citizen of pure air, beautiful buildings, and the healthy and artistic surroundings which have followed in their train.

ZIEM.

THE Salle Ziem has just been inaugurated at the Petit Palais. The painter has made Paris a present of the collection of oil-paintings and water-colors which he has hitherto jealously kept possession of despite the glittering offers made by the amateurs of two hemispheres. It is a most precious gift. By soliciting it and by providing a worthy setting for it, our ædiles have deserved well of Paris.

The National Government was equally disposed to accept it, as the following authentic anecdote clearly shows. A few mornings ago a representative of the Prefect of the Seine called at the Direction des Beaux-Arts. He came to beg the Under-Secretary of State to draw the Minister of Public Instruction's attention to the octogenarian painter, who is more heavily laden with years than with decorations. Ziem was long ago made an officer of the Legion of Honor, but he has been overlooked in subsequent promotions. The picture he was ordered to paint to commemorate the encounter between the French and Italian fleets at Toulon has never been paid for, nor has he even received one of those beribboned expressions of gratitude which Governments so easily give.

This little enterprise on the part of the Prefect of the Seine was undertaken in order to make tardy reparations for an inexplicable oversight. Hardly had the messenger pronounced Ziem's name when M. Dujardin-Beaumetz, grasping the arm of his directorial chair and suddenly leaning forward, in an outburst of wrath, cried: "You thief, you have stolen what I wanted! It was my earnest desire to obtain from Ziem his collection of pictures. I was planning to put them in the Luxembourg, and you have taken advantage of my speeches in the provinces to carry through this audacious municipal coup of yours. Ah, you have played statesman very prettily, and now you come and ask a *cravate* for him. I am quite prepared to give you one if you'll only go hang yourself with it." It may be added that the visitor to whom the Under-Secretary of State thus addressed himself with his customary rotund, hilarious joviality, was a particularly good friend of his. M. Dujardin-Beaumetz soon found consolation for having been forestalled in his plans and finally promised his support.

The donation to the city was not secured without certain unforeseen details, for you know Ziem isn't by any means an easy person to get at. His house is only entered at the cost of infinite precautions. The master is mortally afraid of the indiscreet and mischievous. He has always barricaded his door in order to work in quiet and to defend himself against the importunities of the curious. *Cave patronum!* In days gone by, when anybody rang his doorbell, Ziem would show his head at one of the two grated windows in the third story of his house. He would peer down into the street a moment and then manœuvre a cord strung over a pulley and let down a little basket in which the visitor would put his card. Slowly the basket ascended, carrying the card, which Ziem carefully scrutinized. Then he generally replied, "I'm out!"

Ziem is eighty-four years old. His memories no longer come crowding in flocks like the pigeons on the piazza of Saint Mark's. They come one at a time on joyful, but not fleet wings.

Ziem's ideal country is Venice.

"The one thing I have always sought after," said Ziem, "is light. I have not only visited Venice; I have visited all the kingdoms and all the capitals of light. Once I went to Colombo, and left immediately because I didn't find the effects I expected. It was just the other way in Constantinople and in Egypt. I stayed a long time. I was in Constantinople when the French troops came through on their way from Sebastopol. What incomparable pictures the Bosphorus and the Golden Horn afford! I have also visited Egypt. I ascended the Nile as far as Khartoum, and the radiant memories of that journey are an undying joy.

"But my preference is all for Venice. They call me a painter of fancy pictures; they say that I have never seen the city of the doges. As a matter of fact, I arrived at Venice in 1841, going there on foot from Rome, by way of the shores of the Adriatic.

From the very first moment Venice made a complete conquest of me. I spent six months there. The next year I came back, and stayed there for three whole years. In all, I have enjoyed more than twenty sojourns among the Venetians.

"I lived on the water. My friend Favart and I rented a large boat of the kind they call a 'topo.' I built a studio on board, about amidships. In front of the studio lived Cherubino, our boatman, who did our cooking. And oh, what cooking! We had some most delightful times aboard the topo. By way of a small boat we kept a gondola tethered alongside, but we rarely went ashore. When we did, we slept in a little hotel near the arsenal, a few steps from the Public Garden.

"One evening a few friends of ours had a grand dinner with us on board the topo—a dinner in which Cherubino displayed his utmost talent; and after dinner we shot off some fireworks. This brilliant illumination attracted the attention of the police, and an officer came out to investigate. At that time I was painting the portrait of a Venetian crank, who brought along the splendid vestments and insignia of a doge to be painted in. These accessories, flung over the backs of chairs, glittered in the light. When the police officer beheld them he was completely dazzled. He drew back, thunderstruck. He doubtless believed that he had stumbled upon some phantom boat where the shades of the doges had come back to celebrate a springtime festival. He made an excessively low bow and retired.

"About the same time I rented a shop near the Rialto where I sold curios and cheap jewelry. My object was to attract the girls and women of the people in order to sketch them. While a young clerk was displaying the merchandise and bargaining with the purchasers I sat at the rear of the shop, crayon in hand, and drew them. Arsène Housaye has told the story of how a dove seller, who had refused to pose for me, fearlessly entered the shop and while cheapening a pair of earrings thus posed in spite of herself.

"Alas, how long ago that all seems! I shall never see Venice again; I'm too old. When the Campanile came crashing down an American offered me a hundred thousand francs if I would consent to go to Venice immediately and paint a picture of the glorious ruins. He agreed to give me half the money in advance, the rest he was to pay me on my return. Nevertheless, I refused."

Ziem has still the nimbleness of youth. On fine summer days he betakes him to the Lac d'Enghien, where he will often sketch a tree, a bit of shore or a boat; oftener still he dreams. And then the lake becomes appalled in the thousand flaming colors of a Venetian lagoon; he sees the pink and white façade of the Ducal Palace rise garnished with lace-like traceries; the lion of St. Mark spreads his quivering wings—and Ziem is serenely and completely happy.—*Joseph Galtier in Le Temps.*

ST. JEAN DU DOIGT.

ONE of the most beautiful of Gothic spire-crowned towers, as we look at it, it is to be found in the Department of Finistère, the extreme northwestern division of Brittany, and of this interesting structure "C. A. N." gives the following sympathetic account in the *Builders' Journal*:

"The church of St. Jean du Doigt compels worship; its stones preach an enduring testimony to the faith—and who shall dare to say that such a building fulfils the purpose of a church less efficiently than the most 'handsome' and 'convenient edifice' where the Chinese puzzle of a massive and 'inconvenient number of seats within sight and sound of altar and pulpit has been most nearly solved, and where necessary makeshifts have been most successfully disguised beneath the lion's skin of mediævalism. The building, too, is fortunate in having been spared the agonies of a French 'restoration,' and though in a rather mouldering and decayed condition, it still contains a good deal of old furniture. The baptistery under the tower is screened with charming mediæval parclozes, consisting of plain, diagonal balusters between moulded rails, all colored and gilt. On one of the nave piers is a trophy of banners, under which stands an old painted and gilt image of St. John in a kind of shrine enclosed with a circular balustrade of seventeenth-century work, the top rail of which is cunningly contrived as a money-box for the sous of the faithful. Perched up in an odd little gallery in the north aisle is a small Renaissance organ-case with a large painting in front of King David and St. Cecilia and a heavenly choir, not perhaps a very fine work of art, but pleasing enough in its faded bravery of color and simple and telling in its drawing and arrangement. The altars have great rococo marble and stucco reredoses with clumsy

Corinthian columns and ponderous imagery, ugly in themselves yet possessing a certain dignity and largeness of treatment which, now that time and dirt have softened the details, would make one sorry to see them altered. At the chancel entrance is a plain Renaissance rood-beam, with painted images and pretty scroll-work at the base of the rood. There is a trough in the north aisle filled with running water from the miraculous spring, and the sacristy contains good store of gold and silver treasures.

"The church roofs are well-preserved specimens of a type common in the district. The nave has a pointed-arched wooden barrel ceiling with moulded ribs close together and a single ridge rib with carved bosses and plainly chamfered tie-beams, the wall ends of which are carved with dragons' heads holding the beams in their teeth. The lean-to aisles have half-arched ceilings corresponding to that of the nave. All the boarding is painted blue and powdered with white stars; the dragons are fiercely green, with vermilion lips and very white teeth; and the tie beams, wall-plates and ribs are painted in a variety of chequer patterns in dark red and white. The wall-plates in the aisles have carved angels and beasts, standing out hammer-beam fashion, and in the south chapel is a delightful carved cornice of vine leaves and grapes, looking as if it had come out of some Cornish or Devon workshop."

MANILA'S GATES.

TO the Detroit *News-Tribune* Mr. Cheri A. Mandelbaum, at present architect for the United States at Manila, contributes the following unpessimistic account of the old gateways in the fortifications of Manila:

In marked contrast to the hurrying, rushing cities of the western world is mediæval Manila—that sombre, monastic, fortified old city, whose bastioned and battlemented walls date back to the year 1590.

Picture to yourself walls from 10 to 20 feet in thickness, fractured here and there by a malicious earthquake. Picture each crack and cranny inhabited by mouse or rat, bat or lizard, or even by a snake. Picture heavily armed sentinels who stand guard at the gates, with the sun at its hottest pouring down its merciless rays upon them. Picture up on top of the masses of earth and great dressed masonry, which form the two and a quarter miles of encircling wall, cannon, some dating back to the latter part of the fifteenth century, some being the modern breech-loaders of to-day.

How impressive is this barren, yet imposing wall, with its dull brick-faced embrasures and parapets! A silence, leaden in its intensity, seems to brood over the land for miles. Dense foliage upon the walls gives evidence that human foot has never disturbed its wild luxuriance. The murmur of the gentle waters in the weed-grown moat, as it creeps on through shadow and sunlight, mingles softly with the rustling, tropical vegetation.

Here and there in the walls, in striking contrast to the mossy green surface, covered with shrubbery, which seems to form an appropriate frame, are six principal gates and one postern at quite irregular intervals. They are chipped and scurfed, moss-covered, and time-discolored, though not all ancient.

Over some of the entrances to the city of Manila are quaint and curious carvings of lions, and other emblems, wrought on massive, wooden forms, on which time, with artistic touch, has softly laid coats of warm colors. There are inscriptions carved on panels of precious woods which seem to defy Time's effort to destroy them.

Of all the gates, it is the postern that possesses the most genuine interest, for it was through this that the Americans made their victorious entrance when they took possession in 1898. In the same year, another gate, the Almacenes, fell victim to the vigor of the American attack, the massive ruins being but lately cleared away.

Santo Domingo gate, which was destroyed in 1880 by an earthquake, has been entirely removed with portions of the adjoining wall, since the occupation of the Philippine islands by the United States.

Through the Santa Lucia gate the visitor to the convent of the Augustine friars must thread his way. This monastery, built in 1600, is Manila's most ancient structure. The Parian gate, built in 1782, is in a fair state of preservation, with a double-gate protection. It still retains its drawbridge. The approach to the Real gate is gained through the entry gate, which forms a protection for it, so to speak. The Americans are responsible for the removal of the drawbridge.

Each of these entrances makes the passer-by stop and think. Time has brought its changes, the drawbridges, which were once raised at 11 at night and lowered at 4 in the morning, have disappeared, but the stranger, in fancy, may hear the sound of the almost invisible pulleys overhead, which once squeaked like vampires. The massive doors are either gone, or gray with age and dust. An indefinable charm pervades the place—a charm due not to an unusual sight, but to the numberless gossamer reminders of the past, that rise and envelop the visitor like a faint perfume recalling some lost love.

The pavement of each gateway is made of hewn stone crumbling, mouldering, worn. Lying about strewn everywhere, are remains of long-discarded old cannon; here and there are fragments of doors that once led from this crypt-like place into dark, gloomy dungeons. Halt, and you can almost hear the cries of horror that rise from below until your soul grows faint at the imagined suffering of men once tortured there. Listen and you can almost transform the dull quaverings that rise in those massive piers and re-echo in the vaulting into low moans and sobs of the sufferers.

Leaving the gate and the garrison of Anlusians, half-breeds and Malays that stand on guard, one passes in the bewildered manner of a sleeper suddenly aroused from the solitude and mediæval spirit of the entrance, to mingle with the heterogeneous mass of people who inhabit the fortified city of Manila.

ILLUSTRATIONS

ROMAN CATHOLIC CHURCH AND RECTORY, BAYSHORE, LONG ISLAND.
N. Y. MESSRS. E. LYNCH & W. H. ORCHARD, ARCHITECTS,
NEW YORK, N. Y.

TWO FRENCH FIREPLACES.

THE GALLERIA UMBERTO I., NAPLES, ITALY.

For description see article elsewhere in this issue.

INTERIOR OF THE GALLERIA UMBERTO I., NAPLES, ITALY.

ENTRANCE DETAIL: ROYAL LAW COURTS, BERLIN, PRUSSIA. HERREN
P. THOEMER & O. SCHMALZ, ARCHITECTS.

STAIRCASE DETAILS IN THE SAME BUILDING.

It seems worth while to copy from *Blätter für Architektur* what seems to us the wildest attempt at "originality" that any architect ever undertook. It would be extraordinary enough as a mere design on paper, but seems simply unbelievable when it is found to be actually carried out in enduring building materials in an enormous group of buildings, all the more incredible since this group is to house such sedate beings as the members of the bar and the judges of the Prussian Royal Land-und Amtsgericht at Berlin. The opening up of Indo-China has had, for some reason, a greater influence on Western architecture than did the opening up of Hither India, though to the latter's inspiration we unquestionably owe M. Poelaert's impressive Palais de Justice at Brussels. Perhaps it was the existence of this very successful adaptation of Oriental design in a neighboring country that induced the Prussian architects to try to "go it one better." After studying this fragment for some time with the intention of attempting to write a serious architectural description of it that should be true to the original, we gave up the idea, convinced of its impossibility and satisfied that the designers developed their idea in the model, using as "elements" bananas, melon rinds and shattered tropical fruits of one kind or another, and of which they built up a wall with such fenestration as the exotic material allowed. If the fragment here shown seems extravagantly original, it should be known that it is as nothing compared with the ingenious designing of the courtyard façades, for there, in one view of a courtyard corner which reveals ninety-one windows, there can be counted twenty-eight different varieties of form and treatment of the window opening.

CITY HALL, COLORADO SPRINGS, COLO. MR. T. MAC LAREN,
ARCHITECT, COLORADO SPRINGS, COLO.

The basement of this building is devoted exclusively to the Police and Health Departments, with separate outside entrances. The other City Departments occupy the two upper floors. The floor between basement and first stories is fireproof, and the remainder of interior of ordinary construction. The building is

faced with Colorado Barre granite. The heating and ventilation is by the Dickinson and Paul systems and Johnson thermostats are also installed. The cost of the building was about \$141,000. The superintendence of the building was done by T. P. Barber, architect.

PLANS AND MAIN ENTRANCE TO THE SAME.

Additional Illustrations in the International Edition.

HIGH STREET PRESBYTERIAN CHURCH, NEWARK, N. J.
THOMAS WALCH, ARCHITECT.

NOTES AND CLIPPINGS.

NEW COURSES AT THE ÉCOLE DES BEAUX-ARTS.—Thanks to M. Dujardin-Beaumetz, the Under-Secretary of State for Art, the École des Beaux-Arts will henceforth be open for students in wood-engraving, etching and lithography.

DEW-POND MAKERS.—The art of making artificial dew-ponds has never quite died out in England. There are still wandering gangs of men whose trade it is to construct for farmers a pond which, in however dry a situation, will contain more water in the summer heat than in the wet winter season. The supply is independent of springs or rainfalls.—*The Nation*.

EQUESTRIAN STATUE OF GENERAL SIGEL.—Robert Cauer, the German-American sculptor, has completed at Berlin the model of the equestrian statue of General Franz Sigel, which is to be erected in Forest Park, St. Louis, next spring. The statue depicts Sigel at the battle of Pea Ridge, when he led his hardy young Germans, four regiments, into the engagement just in time to turn a threatened rout into a victory.—*Boston Transcript*.

MONUMENT TO THE INVENTOR OF CLOCK-SPRINGS.—The city of Nuremberg, in conjunction with the Society of German Clock-makers, has erected a monument by way of commemorating Peter Henlein, who, four hundred years ago, substituted springs for weights in clocks, and thus made watches a possibility. The statue was made by the Berlin sculptor, Meissner. It represents Henlein at work in his shop, in shirt-sleeves and apron.—*N. Y. Evening Post*.

HEIGHT OF BUILDINGS IN ST. PETERSBURG.—In answer to an inquiry of an Iowa architect concerning the local laws governing the height of buildings in St. Petersburg, Russia, United States Consul-General Ethelbert Watts, under date of May 12, 1905, transmits the following information [law of 1900] procured from the municipal board:

1. The height of private buildings erected in this city, regardless of the number of stories, must not exceed the width of the street on which they are erected. Height is limited by the distance from the sidewalk to the point where the roof of the building begins. In public places and open spaces, as well as on streets having a width of over 77 feet, private buildings for living purposes must not be higher than 77 feet.

2. In case a building is erected on the corner of two streets of different widths the height of such building can be the same on both streets, even if such height should exceed the width of one or the other street.

3. The smallest height permitted for any building, regardless of the width of the streets on which they are erected, is limited to 12 5-6 feet on the following basis: (a) In those parts of the city which were not inundated during the flood of 1824, or where the water did not rise to the height of over 2 feet from the sidewalk, permission is given for the erection of one-story buildings to the height of not more than 12 5-6 feet, counting the distance from the sidewalk to the beginning of the roof; counting from the sidewalk to the beginning of the floor, 2 1-3 feet, and from the floor to the roof, 10½ feet; (b) in those parts of the city where the water stood over 2 feet from the sidewalk, the foundation must be carried to the height of 7 inches above the water line of the flood, and the story of the building must have a height of 10½ feet, counting the distance from the floor to the roof.

4. The erection of additional stories on buildings is permitted only upon certified evidence that the foundation and walls are sufficiently safe to allow such erection.

5. In erecting buildings the height of living apartments are not permitted to be lower than 7 5-6 feet.

Permission is given to erect private residences on the quay of the river Neva and along the canal of the general admiralty building without regard to the height limits herein enumerated.

PLACES OF INTEREST BETWEEN BORDEAUX, PERIGUEUX AND ANGOULEME.—Writing in the *Builders' Journal*, H. M. gives this very interesting information in answer to an inquirer:

"The district you propose to visit is very rich in churches, but they are almost all of the Romanesque period. In Bordeaux itself the principal places of interest are the remains of the Roman amphitheatre built about the third century, and known as the Palais Gallien, the churches of St. Seurin and Ste. Croix, the cathedral of St. André and the Port du Palais. Near Bordeaux are the following places: Mégnac, with a great fortified tower known as the Tour de Veyrines; La Sauve, possessing the ruins of an abbey with a fine bell-tower; Rions and Cadillac, with fine gatehouses and churches. St. Macaire contains some of the finest old houses to be found in this part of France, and a very fine church. Good churches and old houses are to be found at Guire, St. André-de-Cubzac and St. Denis-de-Piles. The ruins of a splendid château are to be found at Cubzac and a church of a style transitional between Romanesque and Gothic with an apsidal end is to be found at Pujols. St. Emilion contains a collegiate church the chief feature of which is the bell-tower, while remains of fourteenth-century ramparts mark the limits of the old town. At Périgueux the buildings of particular interest are the churches of St. Front, St. Etienne, the Tour de Vésone, Château Barrière and numerous old houses. A few miles southwest of Périgueux stands St. Astier, with the fine Château de Puycerrac. About ten miles north of Périgueux is Bourdeilles, with its fine château. Two miles farther along the railway from Périgueux to Angoulême is the town of Brantôme, which contains a most interesting monastery, the porch of which is carved out of a natural rock and filled with elaborate sculptures, some very crude but others of more elaborate workmanship. This monastery contains a fine bell-tower of the Romanesque style and a few portions of Renaissance work. Jumilhac-le-Grand possesses a château with a beautiful chapel. St. Jean de Cole and Bussières-Dadil both contain good churches. At Angoulême the domed cathedral is one of the best examples of French Romanesque work. In the vicinity of Angoulême are the churches of Trois Palis and Bassac, and the magnificent Château de la Rochefoucauld. Proceeding from Angoulême in the direction of Bordeaux, the towns of Plassac, Mouthiers and Chalais, which possess fine churches, should be visited. At Charmante is a fine priory and at La Couronne are the ruins of a splendid Gothic abbey. When at Angoulême, if time permits, a trip should be taken to Saintes and Cognac, both of which places are full of splendid examples of architecture of all periods."

ST. PAUL'S EXTRA MUROS, ROME.—After a wait of fourteen years the Italian Senate has at last set aside a fund for the restoration of the magnificent stained glass windows of the Church of St. Paul's, outside the walls, most of which were destroyed by the explosion of a powder magazine in 1891. Several schemes for their restoration have already been submitted by artists, and it is expected that work will soon be commenced. It is the intention to have the new windows represent the same subjects as did those that were destroyed; they must also be in keeping with the magnificence of the church. This is perhaps one of the most beautiful of the Roman churches, although it has been particularly unfortunate ever since it was destroyed by fire in 1844. At that time Pope Gregory XVI. decided to rebuild it on a magnificent scale and appeals were issued to the Catholics of the world for gifts. Pius IX., his successor, continued the undertaking, and it was during his reign that the Sultan of Turkey and the Czar of Russia sent gifts of the precious marbles which now adorn the interior, among them the three malachite altars from mines in the Ural Mountains. The work of rebuilding was interrupted for a few years after 1870 because of the occupation of Rome by the Roman Government. The church has now been nearly completed and represents a cost approaching \$3,000,000. Unfortunately, the sewers constructed a few years ago, which discharge not far from the church, now cause the basilica to be flooded every time there happens to be a rising of the Tiber. This threatens the foundations with damage and engineers are now studying how the waters may be diverted into another direction.—*Osservatore*, in the *Boston Transcript*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, AUGUST 19, 1905.

No. 1548.

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THE fact that Mayor McClellan and the other members of the New York Board of Estimate and Apportionment have given their warm adhesion to the proposal to build a bridge over the Harlem River at Spuyten Duyvil should cause New York subscribers, at least, to regard with more than ordinary interest the illustrations of a few French bridges, published in this issue. As, to a very large degree, the feature that most largely stamps character upon a city, its buildings, is to a great extent not subject to public control, it happens that there are only one major and two minor features affecting a city's aspect that can be controlled absolutely by the civic powers, and these three elements are the street-plan, the parkings of those streets, the parkways and the parks and, finally, the bridges. It is a matter of the weightiest good fortune, in view of the way in which the natural beauties of the lower part of Manhattan Island have been wasted, that the upper part of the island remains largely in unimproved condition and so, probably, will be treated for the benefit and pleasuring of the many in the wise and judicious way that has made the Riverside Park one of the most successful pieces of landscape-architecture that the world affords. The stretches of the North and East Rivers are so great that any bridges built thereover must very largely be merely engineering structures. But the Harlem River is quite another story, and the conditions are such as to invite careful architectural treatment for the many bridges, which, sooner or later, must be thrown over a stream that New Yorkers are prone to laugh at and speak of merely as a sewer, simply because they do not really know it and have not given a thoughtful examination to its picturesque possibilities. The fact that a proper beginning has been made with two noble viaducts, High Bridge and Washington Bridge, lead us to hope that the Art Commission will have the whole weight of the community behind it, reinforcing its decision that no inartistic piece of mere ironmongery shall be erected, when the time comes to accept the design for each successive bridge.

IT is with surprise and much regret that we learn that Mr. Edward Robinson, Director of the Boston Museum of Fine Arts and Curator of its Classical Antiquities, has resigned both positions with what looks like finality. Mr. Robinson is a man of such real force and his services during the last score of years have been of such indisputable value to the institution that we, like many others, took particular satisfaction in the knowledge that he was at the head of the Museum's official staff just at the time it was preparing for a new and better growth, made possible by the impending building of a larger and better arranged museum building. Mr. Robinson, in his letter of resignation announces that he is no longer in sympathy with the trustees on important points, and is forced, out of self-respect, to take a step that so many will regret. We have no special knowledge of the causes that have led to this result, but, recalling that in the last few years the Department of Classical Antiquities has had a greater development than any other and so has benefited by a somewhat disproportionate expenditure of the Museum's income, and that the last Annual Report of the President announced that, for the present, the Museum had reached the limit of desirable expansion in this particular direction, it seems fair to surmise that here may be found one of the points of difference between the late Director and the Trustees.

ALFRED WATERHOUSE, the architect who, more than any of his contemporaries succeeded in making "Victorian Gothic" something more and better than a mere bald, lifeless and ill-understood application of Gothic forms and mouldings to modern structures, has just passed away in the seventy-sixth year of his age. It was with something like consternation that, about thirty years ago London architects learned that a mere Manchester practitioner had succeeded in producing a building of more than usual promise, the Town-hall for Manchester; but when, shortly after, the Assize-courts in the same city followed, in the same well-marked and distinct phase of the style, they were ready to agree that their author ought to come up to London and take his place as one of the leaders of the profession. The Natural History Museum at South Kensington and Eaton Hall, the Duke of Westminster's seat at Chester, followed shortly after and these were in turn followed by an ever-lengthening line of public and commercial buildings in every quarter of the Kingdom, all, as a rule, designed in practically the same style, all unmistakably stamped with the personal *cachet* of their designer. In 1878 Mr. Waterhouse was elected an Associate of the Royal Academy, became a full Academician in 1885 and, besides being for three terms President of the Royal Institute of British Architects and its Royal Gold Medallist in 1878, was a Corresponding Member of the Institut de France and an Associate in the Academies of Vienna, Milan, Brussels and Berlin.

AN observant outsider, wise in his generation, has lifted his voice in protest against the rebuilding of St. Thomas's Church, New York, upon its present site,

and his argument, if not quite canonical, has a certain worldly good sense about it that entitles it to consideration. He argues that very shortly, owing to the advance of commercial interests up Fifth Avenue, and the recession before this advance of the residential centres, St. Thomas's, if rebuilt, will find itself deserted and unfashionable, as have so many other churches farther down town. This disadvantage may, however, remain only a possibility; but what is a certainty, from his point of view, is the fact that the site is too small to provide for a church properly planned to accommodate the audiences called out by those social functions whereat the world and the church shake hands—the fashionable wedding. Taking the times we live in as we find them, we believe the point raised is well taken, and, if the clergy and the vestrymen consent that the church shall be made the scene of these worldly parades, common-sense and decent courtesy require that the church fabric should be arranged for the spectacle, and every one, we believe, will agree that the most important change in plan required would be the comparatively simple one of providing a practicable and commodious carriage-porch, one sizeable enough to accommodate at least two carriages, or three automobiles at a time. It is curious that the modern architect so rarely provides his churches with a carriage-porch, except in the case of picturesque country chapels, planned with no particular regard to ecclesiastical precedent; but there is a real need for these utilitarian adjuncts, not only for weddings and funerals but at all times, and it is evident that the present site of St. Thomas's is too small to provide properly for its congregation and their legitimate comfort.

THE Circuit Court of Ohio has brought perturbation to the spirits of the trustees of all Carnegie libraries that have been erected in that State. The decision comes about through the action of certain citizens of Lebanon, who were unwilling that their town should be bound by the conditions which Mr. Carnegie, *more suo*, exacts in all cases, for the sake of providing for the libraries' up-keep and the perpetuation of his own good name. These objectors pointed out that the so-called "Burns law," enacted not long ago, forbade the making of contracts by towns for any expenditure of money not actually in the town's treasury at the time the contract is made. As Mr. Carnegie's ordinary agreement binds the town to support the desired library in perpetuity, it clearly contravenes the Ohio law, to which appeal has been made, and Lebanon certainly will not have a Carnegie library, unless the terms are changed.

MAYOR DUNNE, of Chicago, has decided that the possibility of serious disaster to abutting buildings through the burrowings of the builders of the freight-tunnels in that city is too real to be disregarded any longer, and consequently has ordered that work upon a large part of the system shall cease, until the contractors can satisfy him that they will adopt a method of excavation and construction that will positively preclude further damage. It speaks well for both the skill and conscientiousness of engineers and contractors alike

that so considerable an undertaking, conducted without any public supervision or the enacting of any special ordinances prescribing safeguarding limitations, should have been carried on during a term of years without causing, under such conditions of soil and load as exist in Chicago, serious injury to abutting property. The audacity of the operators is instanced by the fact that ten miles, at least, of the tunnel are said to have been built without any permit for the work having been issued.

A VERY curious case involving a claim for fire-insurance has just been decided on appeal in a Kansas court, which, as architects have all sorts of conundrums propounded to them, it may be well to record. It seems that the mills and storehouses of the Kansas Woolen Company, at Topeka, were invaded by a flood and submerged for eight days. Owing to the amount of wool that had been soaked, it was not possible to give all of it the prompt attention it needed during the process of drying-out and, as the outside temperature was very high, spontaneous combustion was speedily established and the wool, in spite of all efforts, was finally consumed. As the stock was covered by a fire-insurance policy, it was very natural that a claim should be presented for reimbursement. But the insurance company, while admitting that the stock was consumed by combustion and that fires are also a form of combustion, held that the loss was not due to that particular kind of combustion which it assured against, since the combustion did not generate enough heat to produce the external indication of a fire, did not produce "visible signs of heat" as the court expressed it in upholding the contention of the insurance company, and this view was accepted by the higher court. The principle seems to be a fair one, for, otherwise, it would seem to be possible for one whose property had been consumed by the combustion set up, say, by a mordant gas, to claim indemnification under a fire-insurance policy.

IF the New York *Herald* may be believed, a new peril may sooner or later be added to those which now beset the mariner who approaches or skirts this particular bit of sea-coast. It is reported to be the intention to erect "in one of the parks of Manhattan or in some equally prominent spot" a reinforced-concrete tower one hundred and forty feet in diameter and twelve hundred and fifty feet high, the object being to make an income from the elevators, theatres, cafés and amusement centres that it is hoped to have in this mammoth chimney that will produce a satisfactory dividend on the two million dollars the structure will cost, millions which are alleged to be practically already in hand. What sort of mischief will be created by the electric lights visible through so unusual a radius can only be guessed by the skippers of coasters who, even now, have to be on the alert to avoid disaster because some newly instituted private electric light ashore has, since the last trip up or down, come to play hob with some long-familiar "range." Why can't the promoters of such monstrosities as this be contented with a public acknowledgement that their scheme is practicable and let it go at that?

FERRO-CONCRETE IN BELGIUM.¹

FERRO-CONCRETE is a material which was unknown to the general public a few years ago, but has now entered with phenomenal rapidity into all branches of constructional work. This result is due to its remarkable properties, which may be stated as follows:

(1) The economy rendered possible by its use as compared with other systems.

(2) Its resistance to fire, which is now put beyond doubt by numerous tests, some made for the purpose and others the result of accident. It is, moreover, the only flexible material which possesses this quality of fire-resistance; and after the results of the disastrous fire at Baltimore it is clear that very little confidence can be felt in the use of metallic frameworks covered with thin coatings of refractory materials.

(3) It is unaffected by atmospheric action. Concrete is from this point of view comparable with stone of the best quality, and it improves with age. As to the metal built into the concrete, it has been proved that it is perfectly preserved without loss of weight, and that even if used in a rusty state it will recover after some time the bluish tint which it possessed when leaving the rolling-mill. This almost incredible result is due to a chemical action of the cement and probably to the formation of a protective coating of silicate of iron. Concrete also resists equally well the effects of corrosive fumes and liquids which are feebly acid. It may be used for marine works if the proportion of cement employed be high.

(4) The ease with which the material may be made to take any desired form. While preserving the architectural appearance of stone, a boldness in construction may be attained which is impossible with the latter material. It is merely necessary to measure the materials precisely; an error can be corrected during construction and unforeseen details can be improvised. This adaptability is specially valuable in dealing with existing structures.

(5) Its homogeneity, and the mutual support which neighboring parts give in resisting concentrated loads. Joints are no longer weak places. Girders which cross pass through each other without a break. Monolithic constructions are rendered possible which are far more resisting than others to secondary stresses.

(6) Its rapidity of execution. The constituent parts are merely raw materials requiring no previous preparation, and therefore procurable without delay. The individual importance of the single parts is negligible, thus rendering them easy to obtain, transport and erect. Night-work also does not occasion the noise caused by riveting.

(7) Its impermeability, if it has been "floated" immediately after construction in a careful manner. Under such conditions it may be used in the construction of flat roofs, reservoirs, sewers, etc. The monolithic structure which is also watertight may be produced without crack or re-entering angle, so that it can be freely washed down with the hose. Such a structure is essentially hygienic.

(8) Its great rigidity and the localization of the effects of shocks.

The material is an agglomerate of hard stones bound together with cement. As cement is expensive and contracts considerably, it is of advantage to use the least possible quantity by reducing the volume of the voids between the pieces of stone. This result is obtained by using a mixture of materials of different sizes, such as gravel and sand. Moreover, in order to disperse the cement with great certainty equally through the mass, it should be mixed with sand only. Instead of gravel, granite chips, the refuse of the quarries, may be used with advantage. Although these chips cause more voids they, nevertheless, give a tougher product, owing to their angular form, which increases the adherence. Granite dust may also be used instead of sand. The choice of cement is of the utmost importance, and in order to be quite certain it is desirable to use only Portland cement of a well-known brand; according to the nature of the work, the concrete contains from 350 to 700 pounds per cubic yard.

In systems of construction where the metal framework can carry by itself the whole load, and where the concrete is merely intended to protect the metal, to fix it, and to hold its different parts together, then the quantity of cement may be reduced to the minimum and the gravel may be replaced by slag or by coke-

breeze. Such concrete is far weaker than the other, but it is less expensive, lighter, more refractory and more sound-proof, and nails can be driven into it.

At the present time the metal almost exclusively employed is mild steel with an ultimate tensile strength of 27 tons per square inch. This costs no more than iron, and has the advantage of possessing a greater tensile strength and a higher coefficient of elasticity than the latter metal.

Round bars are generally used, as they facilitate the escape of air and the proper ramming of the concrete; they also possess no sharp angles which would cut the concrete; but, on the other hand, the round section gives the lowest coefficient of adhesion for a given cross-section of metal.

The construction of the centering is the most important part in the erection of structures in ferro-concrete. It takes up the most time and seriously enhances the cost of the work. In the design of the centering the contractor has an opportunity to exercise all his ingenuity; to use wood which can be again employed and to avoid cutting the wood into short lengths and so causing waste of material. If vaulted forms have to be constructed the cost of the centering may be greater than that of the ferro-concrete itself.

Certain systems reduce or even obviate altogether the use of centering by the employment of metal work of sufficient strength or pieces of concrete specially made for the purpose. Mouldings as a rule are roughly formed in the concrete by centering, and then finished in gauged work; but the latter is a difficult process, for the neat cement takes some time to set and is not sufficiently plastic.

It is not possible by a simple examination to ascertain the strength of a finished structure in ferro-cement, for the metallic members are no longer visible and their precise size and position cannot be gauged. The only method is to measure the deflection of the structure under given loads. The results obtained are, however, not precise, and useful information can only be gained by comparing similar structures. The deflections of structures in ferro-concrete are much less than those which would be given by a structure of equal strength built of wrought iron; for when concrete is stressed up to its elastic limit its deflection is less than that of iron under similar conditions.

Professor Rabut has summed up in the following six rules the principles which experience and theory recommend should be followed in the construction of ferro-concrete buildings:

(1) No connections should be made of iron to iron, as the concrete itself holds the parts together in the most economical manner.

(2) At least two distinct systems of reinforcement should be used—the one system to take up the tensile stress and the other to take up the shearing stresses in the concrete; when it is necessary a third system should be used to take up the compressive stresses.

(3) To so arrange the reinforcement that the separate members may be stressed in the direction of the length, so that the stresses produced between the iron and the concrete shall be tangential and not normal to the axis of the members of the reinforcement.

(4) To profit by all means of increasing the homogeneity of the various parts of the structure. This may be done by prolonging the iron parts of one portion of the structure into the thickness of the concrete of the adjoining portions, at a negligible cost, while the construction of rigid joints in a metallic structure is very expensive.

(5) On the other hand, advantage should be taken to the utmost extent of the homogeneity thus obtained to economize materials.

(6) In view of this homogeneity sudden alterations in the cross-section of the parts should be avoided, as the parts tend to assist one another and to distribute the stresses, the constitution of ferro-concrete being, so to speak, democratic.

The component parts of a ferro-concrete structure may be classed under three headings, which the author will examine in turn. They are (1) the parts which resist tensile stresses, (2) those which resist compressive stresses, and (3) those which resist more complex stresses.

These comprise chiefly the beams and the platform beams. In the majority of cases the beam supports a platform which is solid with it, and can therefore be used as a framework in compression; and this is one of the most characteristic properties of ferro-concrete. The beam is therefore really composed of the rib and the part of the platform on each side, and this has a cross-section in the form of a T. The tension member consists of one

¹A paper by M. Edouard Noaillon, read before the Liège meeting of the Institution of Mechanical Engineers, translated for and published in *The Builders' Journal*.

or of several metal bars embedded in the lower part of the rib.

The materials are therefore used in the most rational manner, the concrete resists tension; but this specialization of work is only possible, owing to the adhesion of the concrete to the metal. In reality there are forces tending to produce sliding, and these are proportional to the shearing forces, and therefore attain their maximum value near the supports. These forces tend to shear the concrete of the rib and are concentrated at the contact surface of the concrete and metal. The mutual adhesion of these two materials has a very great importance, and it is well to bear this in mind.

Numerous tests have shown that in a carefully built structure this adhesion is not of lower value than the shearing coefficient of the concrete itself. If, however, the concrete be very poor in cement, or if it has been gauged too dry and insufficiently rammed, then the adhesion may be low and the use of bars of special section has advantages, these bars having projections which prevent all slipping of the metal in its concrete sheath. Such bars are very commonly used in American practice.

It has been stated that the adhesion was illusory, and that in reality the effect was merely due to a high coefficient of friction between the iron and the concrete which compressed it in shrinking. But the fact that beams subject for lengthened periods to incessant vibration, such as those in the floors of flour mills, have remained sound tends to prove that the adhesion is real and lasting. Special tests have always given reassuring results, except when they have been made upon flat contact surfaces; but this is a condition which does not occur in practice, and it is probable that during setting the contraction of the cement produces tangential stresses which destroy adhesion as it is produced. In the case of cylindrical surfaces, on the contrary, this contraction produces compression normal to the axis of the cylinder and therefore favorable.

Adhesion does not only assist in resistance to shearing stresses, but the variations in relative volumes of the two materials in contact must be considered; these variations being caused by change of temperature or by shrinkage of the concrete.

Temperature has no influence, for the coefficients of expansion of iron and concrete are practically the same. When concrete sets in air it contracts, and therefore may produce considerable initial compression upon the embedded metal, while being itself subject to an equivalent tensile stress. When the concrete sets under water the opposite effect is produced; the concrete expands and puts the metal in tension.

It is important that the shearing stress should neither overcome the adhesion of the metal to the concrete nor shear the rib of the beam. To fulfil the first condition it is necessary to form the metal framework of such a number of bars that their surfaces in contact with the concrete shall be large enough, and, in consequence, the chance of surface slips shall be reduced. To avoid shearing of the rib special stirrup-shaped bars are used which join together the two members. It is not correct to state that these stirrups directly resist the shearing stress. In reality, a piece which is under shearing stress throughout its entire length is by that stress subject to bending, but the stirrups have no rigidity and are incapable of resisting any appreciable bending moment; as a matter of fact, they fulfil the same purpose as the tension bars in the web of the lattice-girder; the duty of the compression bars is fulfilled by the concrete of the rib. It is therefore obvious that it is essential for the stirrups to be hooked at one end to the tension bar, and that at the other end they should be solidly embedded in the concrete platform. Fig. 1 shows the

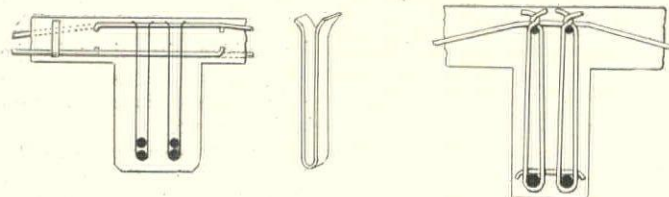


FIG. 1.
SECTION OF HENNEBIQUE BEAM
AND STIRRUP.

FIG. 2.
SECTION THROUGH A
COIGNET BEAM.

transverse section of a beam built on the Hennebique system and beside it the drawing of a single stirrup. This stirrup consists of a flat, bent bar with the two ends bent in the form of claws, allowing it to hook itself solidly into the floor structure. The use of the flat bar in preference to the round bar facilitates the construction. Fig. 2 represents a cross-section of a beam on the

Coignet system. Here there is an upper iron framework. Owing to this it is possible to put the framework of a beam together in advance, and to place it in position entire while holding it by the upper bar. The attachments are made of bars of round iron bent to U-section, and the ends are twisted together so as to form an elongated ring. Owing to the presence of the two frameworks the attachment binds the two members together very effectively. The round section is better suited to the concrete than the rectangular form.

Another means of resisting sliding consists in omitting horizontal bars in tension and substituting bars fixed obliquely in the webs and rising to the floor structure at the ends of the beam. In this manner a beam of variable height is obtained approaching more or less closely to the parabolic form—that is to say, the ironwork will be subject to a constant tension upon its entire length, and the shearing stress will be zero, as it is neutralized by the vertical component of the oblique tension in the bar. In this manner, however, the difficulty is only set back a step, for the bar being in tension right up to the ends, must lose it rapidly in a very limited space, whence arises a considerable tendency to slipping, which is met either by opening out the end into a swallow-tail, or, if this is insufficient, by bending the bar upon itself and placing a cross-pin in the bend. The simple oblique bar is not used for a beam with free supports.

The author has pointed out that one of the characteristics of concrete is to lend itself easily to continuity of structure; but it is clear that this may have the effect of displacing toward the bottom the diagram of the bending moments in such a way that near the supports certain reversed moments may be of higher value than the moment at the centre of the span. From this cause tensile stresses are produced in the top member and compression stresses in the bottom member. In order to overcome the first set it is necessary to provide new reinforcement if it does not exist in the upper member, or to raise the lower reinforcement toward the top of the beam, which has also the advantage of neutralizing the tendency to sliding, as has already been pointed out. To overcome the second series the concrete of the lower part of the web is often insufficient, and then the lower reinforcement is used at this point in compression. Another method which is coming into use consists of banding the concrete of the web, which, as will be pointed out hereafter, considerably increases the resistance to crushing.

When the reversal of the moments is due to the continuity of the beam and the floor platform the use of reinforcement in the upper part is not always necessary; in fact, the platform may then play the part of the member in tension, owing to the "distributing" bars which it contains and to the resistance to tractive efforts of the ferro-concrete itself, which will be discussed later.

When the beams have no continuous platform at their upper part they ought to be provided with comprehensive reinforcement or be banded.

Fig. 3 is a longitudinal section of a portion of a beam on the

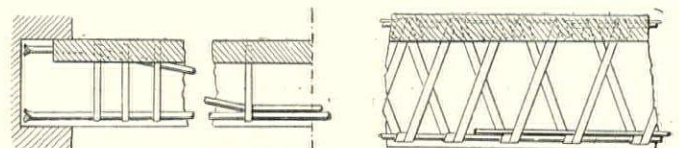


FIG. 3.—LONGITUDINAL SECTION THROUGH A HENNEBIQUE BEAM.

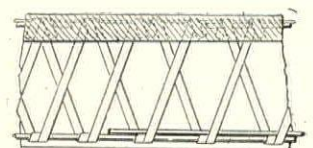


FIG. 4.
PERRAUD AND DUMAS
BEAM.

Hennebique system. It will be observed that half the bars composing the lower reinforcement rise to the top at the supports, resisting at the same time the tendency to slide and also the moment of shearing at the junction. The other half keep their position right to the end, where they serve to resist the compression and to support the stirrups.

Fig. 4 represents a portion of a beam built upon the system of Perraud and Dumas. The attachments are formed of a trellis of flat strips bent obliquely between the lower reinforcement and a bar at the top, so that the body of the beam forms one mass of great rigidity which is of value in the erection. The lower reinforcement is reinforced in its central part by a bar in order to obtain as nearly as possible a section of canal resistance [*sic*]. This method has, however, the disadvantage of giving a minimum perimeter to the section of the ironwork at the supports, which are precisely the points where it should have its greatest value. At the level of the platform there are bars there are shearing at the supports and compression bars in the centre.

The author of this paper desires to advocate a simple system which affords a reinforcement of canal resistance and offers every security for resistance to sliding. Fig. 5 shows its application to a beam without fixed ends. For a span of moderate amount the reinforcement consists of bars of three different lengths.

It will be seen that they leave the lower part of the web at determined distances and rise toward the floor structure, where they end in a hook. In these hooks, as well as in the angles formed

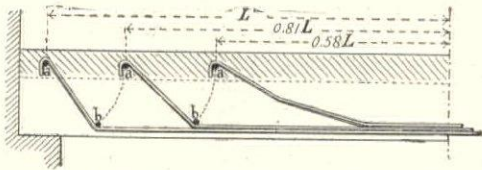


FIG. 5.—BEAM RECOMMENDED BY THE AUTHOR.

by bending, there are placed transversely pins *a* and *b*. These pins are of great importance, for they represent the placing, between the oblique parts, of bars which may be considered as the diagonals of the web of a lattice-girder, and the concrete lying between *a* and *b*, which is analogous to the compression bars.

The reinforcement of a beam with platform is calculated according to the nature of its central transverse section where the maximum bending moment occurs. As the sliding efforts there are zero, the normal sections remain flat after deformation and merely swing upon the neutral axis. This condition of conservation of the plane sections, combined with the equations of equilibrium of movement and of moments, suffices to determine the forces acting upon the reinforcement. But for this it is necessary to know the law which connects the compression of the concrete to its decrease in length. This law, however, varies within wide limits according to the composition of the concrete, and especially with the manner in which it is used in the work, the degree of fluidity and the ramming. Moreover, the law is not linear and is greatly affected by hysteresis, so that the deformation is a function of the duration of the compression and of the former life history of the concrete, so far as stresses are concerned. Yet when the height of the beam is great relatively to that of the floor platform the variation of the law of deformation of the concrete does not sensibly affect the forces acting upon the reinforcement, and the section of the latter may be calculated with sufficient accuracy.

It should be noted that the elements of the floor platform which constitute the reinforcement in compression have an efficiency which diminishes as their distance from the web increases and as the length of the beam decreases.

When in a beam of T-section, the part of the concrete in tension in the web has merely an insignificant influence and may be neglected, it is desirable to inquire if it is not the same with the concrete in tension, in a floor platform which has a section larger than that of the concrete under compression. M. Considère has shown that ferro-concrete can extend without cracking until the reinforcement reaches its limit of elasticity, and that the part of the resistance due to the concrete attains after the first extensions a value which remains constant until rupture occurs. It is evident that if this result is to occur the piece must be free from all cracks before the test, and to obtain this condition special precautions must be taken in its manufacture and setting. Excess of water must be avoided in gauging, ramming must be carefully done, and the piece must be kept moist during the first days of setting.

In practice these conditions are never fully realized, and therefore the rapid shrinkage of the cement produces premature tensile stresses which cause hair cracks. But these cracks never affect any great depth of the floor structure, and many contractors think that one may therefore count upon almost the whole of the concrete in tension to relieve the reinforcement; others, on the contrary, believe that it is always dangerous to count upon this aid.

The tension of the reinforcement of a platform will also vary with the law of deformation which it may be thought desirable to apply to compressed concrete, a law which is all the more uncertain, as concrete is not homogeneous; in fact, the last layer of concrete is not generally rammed so as to facilitate leveling. It is therefore obvious that the theoretical calculation of floor structures can only have a relative value, and that the coefficients which are used in these formulas ought to be obtained from practice. This uncertainty in calculation is, besides, often hidden by the want of precision with which the reinforcement can be fixed in the thickness of the platform.

Like the beams, the platforms are very often fixed or con-

tinuous, and this condition requires reinforcement in the upper layer, or in a simpler manner by the raising of the lower reinforcement near the supports (Fig. 2).

With respect to resistance to sliding, as the perimeter of the section of the reinforcement is almost always less than the width of the platform, it is useless to provide stirrups. Besides the principal reinforcement, there are placed immediately above it, and in a perpendicular direction, some "distributing bars" which are intended to interlace with several of the principal bars and offer a better resistance to a concentrated load. In order to insure regularity of erection the two systems of bars are sometimes bound together at some of the crossing points by means of iron wire.

When it is a question of covering a surface approximately square—a case which occurs frequently in houses—there is a great advantage in making the two systems of bars of equal strength so as to make use of all four sides of the space as supports.

The uncertainty of the condition of stress upon the reinforcement which is so great for the ordinary floor platforms is still more so for the square surfaces referred to above. The reinforcement may be fixed in lines parallel to the sides or parallel to the diagonals; the use of the latter system, which necessitates a large number of different lengths of bars, cannot be justified by any theoretical consideration; a satisfactory system consists in placing the reinforcement parallel to the sides and grouping the bars close together along the middle of the sides.

A simple and elegant arrangement for surfaces of small dimensions consists in the use of expanded metal as the reinforcement; perfect security is then obtained for the necessary adhesion, and a poor concrete may be employed. This method of construction can be recommended for foundation blocks.

Columns are usually made of square section to facilitate centering; as a rule, the reinforcement consists of four longitudinal bars placed near the four angles and joined at intervals by cross-ties. The ties are intended to prevent the buckling of the individual bars, and also serve to retain them in position during the filling of the concrete. The cross-ties consist of plates or round bars which surround the longitudinal bars. Sometimes they are twisted round each bar, or plates with holes may be threaded upon the bars.

The calculation of the reinforcement is empirical, for the determination of the strain is first of all affected by the uncertainty regarding the law of deformation of the concrete, since it is directly proportional to the latter. Besides this the shrinkage of the cement communicates to the metal an initial compression which is very considerable but impossible to value beforehand. Moreover, the bars also assist in resisting the tendency to buckling of the entire column, but the buckling is proportional to the coefficient of elasticity of the column, and this value varies with the load and is very different for the same load according as the preceding load has been greater or less than the load under consideration.

The resistance to buckling and to crushing is much increased by the use of a concrete very rich in cement, gauged with only a small quantity of water and well rammed.

The methods of reinforcing concrete against compression have been revolutionized by the introduction of the banded concrete invented by M. Considère.

The very remarkable work of M. Considère has shown that metal employed under the form of bands has, from the point of view of resistance to compression, an efficiency 2.4 times greater than that used in the form of longitudinal reinforcement. To be effective these bands ought to be circular and should not be placed further apart than one-seventh of the diameter of the banded concrete. By submitting the banded pieces to an initial compression or letting them harden under water the bands become also much more efficient than longitudinal bars in resisting buckling. They have also the considerable advantage of being endowed with an absolutely surprising elasticity, which makes a thoroughly sound structure. Warning is also given of excessive compression by the shelling off of the concrete covering the bands long before the structure has reached its safe limit of compression.

The simplest and most economical form of the bands is the spiral. By putting the turns of the spiral closer together it is possible to strengthen certain parts which are under the greatest stress and give a known increase to the strength. It is also possible to reinforce a structure already completed by winding round it an iron wire which is afterward covered with a layer of plaster. Banded pieces prepared in the workshop with all

possible care, and made with a very rich concrete and subjected to initial compression offer a resistance to compression comparable with that of a structure of riveted steel of the same weight, and are less expensive.

It is safe, therefore, to prophesy that banded concrete will be able in a large number of cases to replace with advantage the compression members made of rolled steel sections in a large metallic structure. The tension members would consist of bundles of round bars lightly banded and dipped in concrete. The connections would be more easily made than those of other frameworks, and could be reinforced by a supplementary banding. Such structures would have an unlimited life with practically no expense for maintenance. In this connection M. Considère has constructed and tested with complete success a bridge of 65.6 feet span entirely built of banded concrete.

An important application of banded concrete has come into ordinary use for piles. Such piles are stronger than those of wood, and have the enormous advantage that they do not rot.

The most important type of these pieces is the vault, in which the reinforcement is specially designed to resist bending stresses caused by non-symmetrical or concentrated loads; while the concrete supports in compression those that are fixed and distributed.

The greatest uncertainty exists as to the most rational method of reinforcing a concrete vault; the calculation of the reinforcement is only rendered possible by the use of empirical coefficients. For vaults of wide span one observes that different builders follow opposite methods; some, like Hennebique, thinking that the essential character of ferro-concrete is the opportunity which it gives for producing monoliths and of profiting in all cases of possible banding, form their vaults of a series of ribs in arcs connected at their upper parts by a horizontal platform; the arc has then near the supports its maximum of height, and this permits a good banding with the abutments. Other builders seem to be haunted with the fear of the effect of expansion and of shrinkage, and give to their vaults as much flexibility as possible by making them with a cylindrical lattice-work. In recent years some have gone farther in this direction and formed arches with three joints.

As has been seen from the preceding remarks, it is most frequently impossible to determine accurately by means of theoretical formulas the actual cross-sections of the reinforcement. The best guide is experience, translated as well as possible into empirical rules. These rules will be all the more reliable according as they are based upon a larger number of structures, and from this point of view it is best to prefer the systems which have been the most employed in practice.

On the subject of principles of calculation for structures in ferro-concrete it is interesting to cite the opinion of Professor Rabut: "I often hear it said that structures in ferro-concrete cannot be accurately calculated as metallic structures; in my opinion the contrary is true; the formulas for metallic bridges are in their principles just as arbitrary and just as far from the expression of the real strains as those of ferro-concrete; but the latter have the advantage of containing twice as many constants, those of iron and those of concrete, which, if these constants are conveniently chosen, will allow of approaching the truth much more nearly."

The author will now briefly describe some types of constructions in ferro-concrete which present interesting features, and will restrict his choice to recent works and those to be found by preference in the neighborhood of Liège.

The dome of the Central Railway Station springs from the level of the roofs of a mass of buildings of the station at a height of 130 feet above ground level and rises another 130 feet to the spire. It is entirely constructed of ferro-concrete by the firm of Vasanne, of Brussels. The work was originally intended to be built in stone, but it was discovered that the foundations would not carry such a weight, and therefore ferro-concrete was preferred, as it could be built hollow. However, it was necessary to follow minutely the form of the original design, which, rationally conceived for a massive material like stone, often presented serious difficulties of execution in ferro-concrete.

The dome comprises four large glass lights placed upon the sides of a square, and upon these rests the actual dome, which in its turn supports a lantern. Each glass light is in the form of a gallery with seven arcades surrounded by an arch of 32.8 feet radius. The arches are framed by an archivolt of 11.5 feet height, which receives at its periphery the haunches of the dome.

The entire structure, which is 1,800 tons in weight, rests entirely upon the columns at the angles of the glass lights, for it was only at these points that a solid support could be obtained.

These columns are Y-shaped in the cross-section, which has an area of 10.7 square feet, and they are subdivided at the height of the centres of the arches into three beams.

The tail of the Y is extended in the diagonal plane in the form of a thrust block, rising obliquely between the two shells of the dome. Each of the limbs of the Y forms the abutment of the beams in the arch, 8.2 feet high, situated in the archivolt. In the horizontal plane passing through the tops of the archivolts is placed a beam in the form of a flat ring 4.92 feet wide, which is supported at eight equidistant points, which are the four tops of the archivolts and the four ends of the thrust blocks.

This beam serves two purposes—it balances the horizontal reactions, due to the obliquity of the thrust blocks, and resists the tensile stress created by the joists of the dome. At the top of each beam of the archivolt are hooked two tie-rods, which go down in the two midribs of the arches and extend into the two central columns of the gallery of arcades and support in its place a horizontal beam hidden in the entablature of the gallery and supporting all lights; it is obvious, therefore, that all the weight of the latter is supported by the columns.

The dome consists of two superposed shells at a distance apart, varying from 3.28 feet to 6.56 feet. The internal shell which forms the ceiling of the entrance hall is completely decorated with sunk-moulded panels; some are round and others square, and they diminish in depth and size progressively from the springing to the summit.

They leave only flat bands on the inside of the shell, and these follow a series of meridians and parallels. A part of these flat bands are formed by a skeleton of joists and trimmers which are supported on the annular beam, and they carry the whole weight of the dome. This skeleton was first erected and served to support the cores which formed the moulds for the panels, and then the latter were filled in with concrete.

The external shell has a uniform thickness of 3.15 inches, and it is relieved by six moulded ribs following meridian lines. It is supported upon the internal shell by small distance pieces normal to the two surfaces; this method of support has been chosen to allow as much freedom as possible for the unequal expansion of the shell, owing to the rays of the sun striking it obliquely.

The most interesting feature of the construction of the dome of the Antwerp station is that all the mouldings and all the sculptures, which are so numerous and of so many different forms, have been executed by direct moulding, and not, as is usually the case, by rough applications which are trued up afterward by gauge boards. It would never have been possible to make in wood the numberless moulds which would have been needed for the latter process, particularly as the work had to be done upon surfaces bent often in two directions like the panels of the dome.

M. Vasanne has invented a very ingenious system of moulding. He begins by executing in plaster the model of the sculptures which are to be reproduced in the concrete. He then spreads upon this negative mould a layer of 1.2 inches to 2 inches thickness of a paste made of sawdust and magnesium oxychloride. This paste hardens rapidly and gives him the desired mould, which is light, strong and can be worked like wood; the same negative mould can be used several times.

The Renommée Hall at Liège was built entirely of ferro-concrete by the firm of Perraud & Dumas, of Brussels. In opposition to what took place in the design for the dome at Antwerp, the general arrangement, the style and proportions of all the parts of the building were specially thought out by the architect, M. Jaspas, so as to be the most suitable for construction in ferro-concrete, and in order to use the properties of that material to the best possible advantage. It was desired to oppose the tendency to make concrete merely play the part of a servile imitator of stone by the employment of a characteristic design which should indicate the nature of the material used.

The principal hall is covered by three cupolas, each 55 feet diameter, placed at a height of about 50 feet above the level of the ground. Each cupola forms part of a sphere which continues in haunches pierced with lights and descending to the corners of the circumscribed square. The intersections of the spheres with the vertical planes passing through the sides of the squares are formed by arched beams which spring from the capitals of short cylindrical columns. The cupolas are 4½ inches thick and are made of concrete composed of cement and clinker finely broken up; they are reinforced by a layer of expanded metal and with a lattice-work of bars. The centering of the first cupola was carried out upon a new design. In order to avoid the great expense entailed by the construction in wood of a spherical cen-

turing, a skeleton was built up of ironwork consisting of 16 bars, each $1\frac{1}{2}$ inches diameter, fixed upon the meridian lines like the ribs of an umbrella, and these were interlaced upon parallel horizontal circles by other weaker bars. The whole skeleton was then covered with sheets of expanded metal, which were designed as the first reinforcement, and afterward the concrete was put on above and below so as to completely surround the expanded metal, which thus acted as its own centering, and it was merely necessary to render the surface up to the required thickness. The bars of the skeleton were then to be removed and used for the other cupolas, and they were finally intended for reinforcing the beams. Unfortunately, this system of centering was found to be wanting in rigidity, and it was necessary to use the wood centering after all.

The roof of the galleries and the spherical triangles between the cupolas form a terrace of 957 square yards area, which serves as a promenade. The concrete of the cupolas and the terraces is not rendered in cement; it is made watertight by a layer of Ruberoid. The principal hall is lighted upon its two long sides by six semi-circular glass lights, each 52.5 feet diameter, framed by arched beams. The spandrels are formed by panels of ferro-concrete, showing on the inside ornament in relief; the moulding was done in the workshop, and then each panel was cut into portions that were erected in position. In spite of the complete absence of mouldings, which were left out to facilitate the centering, the hall is of most elegant appearance.

This company, under the advice of its managing director, M. L. G. Fromont, who is an engineer, has adopted the system of reinforced concrete for the construction of various foundations and for the construction of tunnels, cellars, platforms, hoppers, silos, frameworks for all lead chambers and for various powers, such as are required in the Glover and Gay Lussac processes. Among the interesting applications should be specially mentioned the framework for lead chambers.

It is known that the most modern constructions designed to shelter and support the lead chambers are essentially composite structures, generally made of brick in the lower portion and in iron and wood for the upper portion. The combination and connection of the various heterogeneous parts present many weak points for attack either by the sulphur gas or by sulphuric acid when an accident has happened. Besides this, the enormous quantity of wood used for this kind of structure makes them highly combustible and exposes the manufacturer to serious risks. These disadvantages alone suffice to justify the use of ferro-concrete, and the structure built at Engis, from designs prepared by M. Faure, under the guidance of Prof. Henri Deschamps, constitutes really a monolith from the foundations to the summit without joints or discontinuity.

From the point of view of resistance to gas and acid liquids, the composition and treatment of the concrete has been the subject of special study, and the mixtures employed have given perfect satisfaction.

The structure occupies in plan an area 230 feet long by 92 feet wide; it has a total height of 82 feet, of which 23 feet is for the lower portion and 59 feet for the upper part. The lower portion is formed of piers placed 16.4 feet apart, each consisting of four columns connected at their upper ends by a horizontal girder 92 feet long aided at various points by struts fixed to the base of the columns. The total load carried by the lower structure is about 3,700 tons. At certain points the girders are connected together by joists, and there is a flooring of ferro-concrete which serves as a footway all round.

The superstructure consists of vertical columns 59 feet high, which rise from the ends of each horizontal girder, and besides these there are also columns in the centre of the building. At the upper part all the columns are connected together by horizontal girders with a span of 44.5 feet, and each of these bears a distributed load of 45 tons. The horizontal connections of these girders form the roof terrace. The columns are solidly connected together by vertical partitions of ferro-concrete, which, in conjunction with various struts, give the desired rigidity to the entire structure. The building was erected in 1900, and since that date has been in constant use and has given no trouble whatever. Owing to the careful distribution of the materials it has not been more expensive to construct than the old unsatisfactory composite buildings.

JAMESTOWN RESTORED.

IT is a rather amazing fact that this most notable spot in our whole country is always referred to in terms of the dank marshiness that should have kept the English from landing there. The histories, when they give illustrations on this head,

seem to have only the church tower and a caving river-front in mind. Even Fiske and Winsor give you no more than this. And Winsor, with curious economy, affords only a drawing of the tower made by an English lady in 1857.

From the mainland, the approach to the island is, for a pedestrian, peculiar. The road from Williamsburg, after wiggling its devious way through a beautiful but mostly deserted country, finally brings you in sight of a river, to the left; then it dips behind some trees, and in another moment you are traversing a level space, the road strewn with probably historic bricks; sedges and grasses shoulder-high on each side let you see only some of the towering trees on the island in front. Suddenly you strike a narrow bridge, and find that your level road is barely two feet above the water. But the island, when you get to the end of the bridge, appears anything but swampy, and it is some little distance farther on that you discover you have landed on one of the four "ridges" and still have some low land to cross. From the James River, the side from which the colonists approached, the island is very attractive. The whole south side presents now a nearly level, grassy expanse, delightfully set with lines of fruit trees from among which rises the picturesque ruin of the Ambler-Jacquelin mansion. Tradition has it that here George Washington met his first defeat—the lady would not marry him! Sycamores and mulberry trees stand along the shore, which is an abrupt bank, at least six feet above water, and for most of its length has below it a narrow, sandy beach, running off nearly a mile to the southeast, where the point of Goose Hill juts out. West of the pier, which stretches far into the river, the land rises a little in the neighborhood of the old church, and the trees are thicker.

Besides the discrepancy between the look of the island itself and what has been written about it, the most interesting facts, which are new, have apparently not got into print at all, except lately in one historical magazine that probably hasn't five thousand readers in the whole country. Don't fear, however, that I am going to "recall that on a morning of early May in the year 1607," etc. I can, but will not, name to you some well-known journalists who have come here only to suffer shipwreck on that day in early May. Besides, Jamestown has now a bit of modern history, or rather of archaeology, that is little known, and especially deserves printing because it has led to correcting our accepted history, including even the work of so high an authority as the beloved John Fiske.

William Leal, Scotch stonecutter, constable, custodian and postmaster of the place—the Schliemann of Jamestown—it is who plastered and patched up the remnant of the church tower, who dug up and put together the ruined tombs and uncovered the foundations of the church and other buildings of the early days. He has had a curious connection with important work since he came to America in 1871. First he worked in Maine, cutting stone for the then-building post-office in New York City. Then he worked for a time on the Capitol at Albany; next on cotton mills in Rhode Island; and finally he settled in Richmond. Here he soon became known and was employed on the private monumental work of the best people of the city. He also put up many monuments to mark Confederate sites; the big column in Alexandria is a piece of his work. From this it will appear why the Association of the Preservation of Virginia Antiquities has given him nearly free rein in Jamestown. He was appointed custodian by unanimous vote at a meeting of the directors in the old tower, Fitzhugh Lee presiding, and he has deserved well of them and of all who would take pride in Jamestown. If ever you go to Jamestown, cultivate him; he is one of the finest old bits on the island.

Mr. Leal had appeared to me, in the first place, apparently from nowhere, but the mystery was solved when he led the way to his house. The roadway comes down from the north immediately in front of the church tower. On the opposite side, across the road, are high, grass-covered banks well set with trees, and in a gap in the bank is a narrow entrance, latticed and heavily covered with honeysuckle. This opens into the area of the Confederate fort that forty-odd years ago was one of the defenses of Richmond. Inside this enclosure, heavily shaded by trees, is William Leal's house, a story-and-a-half affair; and swarming about are hens, chickens, ducks, young and old turkeys.

The story of the uncovering of the Jamestown relics is a very recent one, but it has been much mangled and distorted by some who have tried to tell it. Among other mistakes, undue credit has been given to the efforts of E. E. Barney, who bought the island some years ago. After the State of Virginia had granted the immediate church and grave plot to the Association, Mr. Barney generously conveyed to the Association $22\frac{1}{2}$ acres of

ground surrounding the church, and including the old Confederate fort. He had tried before this to preserve the tombs, but by a method so unwise as to reflect seriously on his judgment. Many of the stones he had had removed from the churchyard to a safe place, and it is said in his behalf that he had a plat of the yard made at the same time, and numbered stakes set to show the position of each stone. When, however, the Association tried to straighten things out, the supposed plat and stakes were nowhere to be found, and the last degree of certainty as to most of the yard was gone. The need of some such proceeding, however, or the placing of a keeper, is shown by one incident of the havoc done by relic-seekers. A year ago the captain of a barge lying in the river off Jamestown brought his wife over to see the ruins, and he then told Mr. Leal how, fourteen years before that, when his barge was anchored in nearly the same place, her crew had come to the island by night and carried away the big top slab of a tomb, which they broke into small pieces and sold at a huge profit.

In the Jamestown churchyard, the remains of the tombs were in most cases two or three feet below the surface. When Mr. Leal was sent to the island, in 1901, the task of restoring these must have seemed all but impossible. The sites were much in doubt, nearly every top-slab was in pieces, and many of the pieces were missing. There was one exception, still notable—the tombs of Commissioner Blair and his wife, who was a daughter of the original Benjamin Harrison. Between these tombs a sycamore sprang up, and now, a great tree two feet in diameter at the level of one's head, its enormously expanded base holds the tombs in a resistless grip. The top slab of Mrs. Blair's tomb is now fairly within the body of the tree, two feet above the surface of the ground; on the other side, the tree has already enclosed one of the marble stones of Commissioner Blair's tomb, and has spread halfway over two others, so that only one of the four slabs is now really free.

Excavation of the church foundations was begun in 1901, and three feet below the surface they were found, enclosing an oblong 55 feet long and 26 feet wide, one end joining the tower. They did not disclose walls "three feet thick," as one writer who should have known, has declared; these walls would be more than 15 or 18 inches, unless one measures through the buttresses, of which there were three on each side. A little within this wall were found fragments of a much thinner one, presumably the foundation of one of the early frame churches. These walls have now been built up to a level. They are now protected from the weather by a light frame structure which is to be replaced, when money is forthcoming, by a brick building in the style of the old church. The floor, aisles and chancel of the old church were found surprisingly well preserved. How utterly forgotten they had been is shown by the fact that the graveyard wall, built 110 years ago, was carried right across the body of the building.

The chancel proved to be one of the most interesting finds, the first excavation uncovering there a floor of tiles nine inches square; later digging disclosed two other floors under this one. There were evidences of fire here, and on the lowest floor, in a corner, were found the sexton's tools, charred bits of wood showing where the handles had been. It would seem that after the church was burned, during Bacon's rebellion in 1676, the floors must have been repaved above a foot or so of rubbish from the fire. Within the chancel were found a number of graves, laid east and west, with the axis of the building, and one notable find was a skeleton measuring six feet six inches in height. Of two tombstones unearthed within the body of the church near the chancel, one has the distinction of being the only one found in America that has signs of once having borne such inlaid brasses as are seen on old monuments in England. The brasses were gone from this one, but their shape is plainly shown by the channels in the stone, showing the figure of a knight, with pointed helmet and a scroll issuing from the mouth. Partly under the tomb was found a skeleton with spurs at the heels, and scraps of gold lace at the shoulders. The stone bore no inscription, but research seems to show that the knight was Sir George Yeardley, one of the earliest Virginia governors, who died in 1627.

"James Citty," as it used to be, has been restored in large part by the very scholarly research of Samuel H. Yonge, engineer in charge of the concrete breakwater which was partly completed in 1901, and is now being extended over the whole west end of the island. Here it may be noted that the shape of the island is a thing the casual reader is likely not to find in the books, though it might seem worth setting down, if the historians really knew it. Roughly, its outline is a good deal like that of a big oyster shell. It is about two and one-fourth miles long, the

main axis lying northwest and southeast, with the narrower end of the island toward the northwest. At this smaller end was the low, tide-washed isthmus that once connected it with the mainland. The present wooden bridge is some hundreds of yards east of where the isthmus used to be. From the spreading southeast margin of the island, behind the high James River front, fingers of marsh stretch nearly across the island. On the north-west, the river has been cutting away the land for some fifty years past, until it has taken off a strip about 500 feet wide. The western margin is still indicated by a big sycamore, now far out in the water; near it, at low tide, are the stumps of two other trees, showing that there must once have been a considerable grove there. John Smith's powder-house was near these, but it has now disappeared.

The present extension of the sea-wall just saved a very important set of foundations—it practically touches them—whose excavation two years ago spurred Mr. Yonge to the best of his research work. These foundations showed the existence of several small, connected buildings. They include cellars and steps leading into them, and the foundations extend 240 feet from the present river edge inland. Mr. Yonge has shown pretty clearly that the most eastern of these was the State House in existence in 1676, in which Bacon contended with Sir William Berkeley. The building next the river was apparently the so-called Country House, and the next that of Justice Philip Ludwell. A human touch is given to these two by Mr. Leal's story of how he found, in digging out the basement of the first, a lady's stirrup, a thimble and a pair of scissors. The other gave up, besides melted lead and an obviously ancient bottle, a number of old cannon balls, the four and five-inch pellets that used to serve for the land pieces of that day.

Mr. Yonge has upset the universal opinion of historians that the old settlement lay mostly west of the church. John Fiske says in "Old Virginia and Her Neighbors" (1896) that more than half of the site of the old town has been destroyed. Careful study and plotting of the old records of land patents has shown on the contrary that the town extended as far east of the church as west, and that it had a total length along the river of three-quarters of a mile. The records also show that the eastern or "New Towne" was of permanent character, and for many years after its establishment, in 1623, was the most important part of the corporation. Mr. Yonge has succeeded in laying out an approximate map of the old town, with its single "Back Street" some 300 to 500 feet from the river. His work is convincing, and should have wider currency than it gets in the *Virginia Magazine of History and Biography*. Its details cannot be even summarized here, but the story reconstructs the past time as no chronicle of famines and Indian fights has ever done. His work could have been done in part before, but it was actually due to the new excavations.—*B. S. Baker, in Boston Transcript.*

ILLUSTRATIONS

THE VIADUCT, MORLAIX, FINISTÈRE, FRANCE.

ENTRANCE TO THE PONT DE LA CAILLE, ANNECY, HAUTE SAVOIE, FRANCE.

THE SUSPENSION BRIDGE, AVIGNON, VAUCLUSE, FRANCE.

VIADUC D'AUTEUIL OVER THE SEINE, PARIS, FRANCE.

VIADUCT OVER THE RANCE, DINAN, CÔTES-DU-NORD, FRANCE.

HOUSE OF CHARLES G. W. BOND, ESQ., SWAMPSCOTT, MASS. MR. JAMES T. KELLEY, ARCHITECT, BOSTON, MASS.

STABLE OF CHARLES G. W. BOND, ESQ., SWAMPSCOTT, MASS.

ENTRANCES: ESTATE OF CHARLES G. W. BOND, ESQ., SWAMPSCOTT, MASS.

HAUS TRARBACH, 47 BEHRENSTRASSE, BERLIN, PRUSSIA. HERR RICHARD WALTER, ARCHITECT.

As one notes the graceful—perhaps graceless—nudities that adorn this façade, one cannot but feel how lucky it is for those New Yorkers who, a few years ago, protested against the nudity of St. Gaudens's "Diana" on Madison Square Garden tower, and certain figures in the tympanum of the Stock Exchange pediment, that they are not dwellers in the Prussian capital.

Additional Illustrations in the International Edition.

ENTRANCE PORCH, "PLUMSTED": HOUSE OF JOSEPH S. WHISTLER, ESQ., LENOX, MASS.

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, SEPTEMBER 2, 1905.

No. 1549.

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IT would seem as though the enthusiasm with which architects everywhere set about solving the conditions stated in the programme for the Carnegie Peace Palace might be seriously cooled by the thought that history has just proved that an important treaty of peace may be negotiated without calling on the good offices of Mr. Carnegie or consulting the stipulations of The Hague convention. Still, the palace is to be built, quite as if it, and not some unimportant town favored with an agreeable climate, were to be the scene of all future treaties between nations. But whatever may be the character of the competitive designs submitted, there can be no question as to the character and competency of the professional members of the jury of award. It would be difficult to name a jury whose standing would be more readily acknowledged than that composed of Dr. Cuypers, representing Holland; M. Nénot, France; Herr Ihne, Germany; Mr. Colcutt, England; Professor König, Austria, and Prof. Ware, the United States. Further particulars concerning the programme may be found in another column of this issue.

THE possibilities of "grafting" in connection with public works of construction are so numerous that it is not surprising that the Philadelphia *North American* should have thought it worth while to discover what matters of the kind had been engineered by the ring, or "gang," as they are called in Philadelphia, who have recently been overthrown by Mayor Weaver. Few, however, could have anticipated the interesting revelations that have resulted. It appears that, although, in Mr. W. B. Powell, the city had an efficient city-architect, matters were so arranged that he was given only unimportant work to do, which kept him and his staff but imperfectly busy while all the "good things," the large and interesting work, were placed in the hands of Mr. Philip H. Johnson, who had the good fortune to marry a sister of Mr. Israel Durham's, the now discredited and deposed

"boss," in 1901, although up to that auspicious date Mr. Johnson appears to have had no knowledge of or practice in architecture, having until that time followed the calling of surveyor and not having risen above a minor place in the city's Bureau of Surveys. His fortunate marriage seems, for a while, to have served him in better stead than the most prolonged and elaborate of architectural educations; for, if the *North American's* figures may be relied upon, it secured to him work as architect of divers and sundry municipal buildings, which brought him commissions of between three and four thousand dollars per year during the last four years—a return which does not exhibit a particularly flagrant case of nepotism.

BUT when Mayor Weaver had effected his *coup d'état* and was free to uncover things, he found that Mr. Johnson was at work upon the drawings and specifications for eight million dollars' worth of public buildings for the city, and was at the time about to award the contracts for the Municipal Hospital and Home for the Indigent, groups of buildings which will cost about four million dollars, and naturally he called a halt and made inquiries how it came about that Mr. Johnson and not Mr. Powell, the city-architect, was in charge of the work. This brought to light the fact that, one week before he himself came into office, his predecessor, Mayor Ashbridge, had made a seemingly binding contract with Mr. Johnson, by which the latter was to be the architect for four great groups of hospital buildings, upon which the city was to spend eight million dollars. The case recalls the similar one in New York, when Mayor Low found it impossible to take all of the municipal work out of the hands of Messrs Horgan & Slattery, because Mayor Van Wyck had, a few days before his retirement, made a similarly binding contract with the latter. As would be expected, in the Philadelphia case there are all sorts of sinister charges, involving the employment of ward "heelers" as building inspectors—paid, too, by the contractors, whose work they were supposed to watch—which are at present under investigation and which may result in such proof of wrong-doing as will make it impossible to abrogate the Ashbridge-Johnson contract.

IT is disturbing to have reported from Albany accounts of the effects of the subsidence of one portion or another of the foundations of the Capitol building, results which call to mind the serious misgivings that nearly thirty years ago were entertained lest, owing to the dipping of the clay stratum upon which parts of the foundation of the building rested, the entire hillside should at some time, when drenched with an unusual amount of moisture, slip off into the Hudson River. Some three weeks ago it was decided that the piers supporting the Assembly staircase—upon which some eighty thousand dollars had to be spent nearly a score of years ago, owing to the effects of subsidence—were in need of immediate reinforcement with steel clamps and bands to offset the result of the crushing which was going on under unequal strain. This report was followed by the account, a week later, of the falling of the plastering and a small amount

of masonry from the groined ceiling of the board-room of the Agricultural Department in the same wing of the building. Older practitioners will recall the long debate which followed the announcement that Mr. Eidlitz intended to employ—practically for the first time in this country in such important work—real masonry vaulting for the Assembly Chamber and other rooms in the building, and it is within the memory of most of us that the Assembly Chamber vaults had to be replaced by a flat wooden ceiling, causing the destruction during the process of William M. Hunt's famous mural paintings, already partly perished through having been painted directly upon stonework not properly prepared for the work or protected on the outside from percolating moisture. Presumably the vaulting recently affected by settling of the foundations will now also have to be replaced with a wooden ceiling.

THE competition for the Cook County Court-House, Chicago, to which we have referred once or twice, seems to have been conducted conformably to the conditions of a very singular programme, since, otherwise, it is not easy to see how, according to reports, the designs submitted could have represented buildings ranging in height between eight and twenty-six stories. Fortunately, the Commissioners, having early had experience with the ambiguities of the programme they had formulated, decided to call an expert to their aid in deciding on the merits of the designs actually submitted, yet, after all, have not followed their adviser's recommendations. The expert placed first in order of merit the design of Messrs. Barnett, Haynes & Barnett, of St. Louis, one of the specially invited firms. The Commission, however, swayed perhaps by the popular jealousy that exists between Chicago and St. Louis, have selected for execution the design of Messrs. Holabird & Roche that was ranked second by the expert-adviser.

ALTHOUGH, thanks to the introduction of all kinds of wood-working machinery, the carpenter to-day is not the good "all 'round" mechanic his grandfather was, it has always seemed to us very unfair that, simply because carpentry is essentially one of the easy trades and so readily becomes overcrowded, those who follow the calling should have to accept a relatively low wage-rate. It is therefore with real pleasure that we learn that Judge George L. Wentworth, selected as umpire to decide the difference of opinion between the Boston Master Carpenters' Association and the Carpenters' District Council, has made his decision unqualifiedly in favor of the demands of the latter. The new conditions, which go into effect October 1, are these: The working-day is to remain eight hours, as now, but that for shop and mill hands is reduced from nine to eight hours; double-time in place of time-and-a-half is to be paid for work overtime and on holidays; Decoration Day is added to the stated holidays and a Saturday half-holiday is to be the rule from the middle of June to the middle of September; and, finally, the wage-rate is advanced from three dollars to three dollars and twenty-eight cents per day.

URBAN roof-tops are used so much more than they used to be as places of rest and recreation that every care should be taken to make them places of

really safe repair; parapet-walls should be inspected and strengthened and particular care should be paid to installing proper and strong wire screens over all skylights that may, under any supposable condition, be called upon to sustain the weight of a human body. Even ventilator shafts of certain forms of outlet need protecting screens, as is shown by two similar mishaps of recent occurrence. In one case a deck-hand on an ocean-liner sprang into the mouth of one of the ventilators to escape a wave coming over the quarter, lost his grip and fell to the fire-room a hundred feet or so below. In the other case a boy, playing with others of his age on top of a public school in this city, hid in the mouth of a ventilator shaft, and, he too losing his hold, fell through the height of four stories, to be caught and jammed at a bend in the pipe. Broken limbs only, fortunately, attended each of these accidents.

THE magnitude of the school building operations in New York, to which we referred the other day, is further instanced by the fact that this city is now procuring by condemnation proceedings—which call for a total outlay of \$598,000, or at the rate of \$19.77 per square foot—a site for School-house No. 65. The site in question is in the crowded "East Side," between Hester and Canal streets. Here some thirty-four hundred children—equivalent in number to three full regiments and their bands—are to be housed and taught, although only a few blocks away, at Hester and Norfolk streets, there is already a still larger school-house wherein forty-two hundred and fifty children are seated; and large as the latter building is, it is exceeded in accommodation by School-house No. 188, on Houston street, about half a mile away, which provides seats and instruction for nine hundred and fifty more pupils than are to be taught in the new building for which the site is now being procured. The figures are impressive, not more because of their actual size than because they exhibit the American valuation of a literate population.

ANOTHER curious insurance case will shortly come before the Fairfield County, Conn., Superior Court. A hotel in Danbury, Conn., owned by a Mrs. Cary was burned, and, as it was insured, she in due time received proper indemnification for the loss from the several insurance companies interested, amongst others from the Phoenix Company. Having in this way been compensated for her loss—whether in full does not appear—Mrs. Cary next brought a suit for damages against the N. Y., N. H. & H. Railroad Company, because it had caused the destruction of her property through allowing sparks to escape from the smoke-stack of its locomotive, and on this claim was awarded, after a jury trial, nearly six thousand dollars. This the railway corporation was about to pay, when the Phoenix Company intervened with an injunction, claiming that Mrs. Cary had already been reimbursed for the loss of her property, and that it was not lawful for her to collect another payment for the same loss; but that, if she elected to retain the larger sum awarded in the damage suit, she must first return to the insurance company the smaller amount paid as fire-loss. As this argument seems to belong to the *opéra-bouffe* order, we fancy that Mrs. Cary will be able to make good her right to bank the proceeds of both awards.

THE PASSING OF A CITY BUILT INSIDE A PALACE.

THE one city of all the world where everybody lives in a palace is doomed, and bit by bit—not before the vanguard of progress, but because of archaeologists' cravings—the curious town of Spalato, on the Dalmatian coast of the Adriatic, is changing to a sleepy, south-European settlement.

At Spalato anyone could realize the dream of the old ballad of imagining "one slept in palace walls," for even the hotel is part and parcel of the edifice—no less a one than the home of the great Roman emperor Diocletian.

The approach to the city built in a palace cannot be forgotten. For three hours the steamers from Sebenico ply southward, through the Dalmatian archipelago, the most beautiful island-chain in the world. Centuries ago these isles were stripped of their forests and they rise as cones of purest white from the purple sea, fading to blue and lavender as distance drops them over the horizon. Here and there the peasants have brought soil to the slopes, and patches of vineyard appear. Later the islands increase in size, and come to be clothed with forests, amid which vessels steer to their destinations.

From the harbor no trace of the city appears: only a single irregular pile, slightly rectangular in shape, built on a terrace rising from the shore and resembling, through its mighty walls, some great Roman camp. Five tiers of windows, quaintly point-

of the courtiers stretch to right and left. Just ahead is the home of the Cæsar. Between, three or four story tenements—their lower floors used as little shops—occupy the space; and little passageways lead off to join the old byways of the palace. Beneath the Roman arches spanning these, donkey-boys cry their faggots, or picturesque peasant girls lean from gabled windows to flirt with the pedestrian. Very few of the people of Spalato itself wear the national costume, and the peasant groups, gossiping in Croatian or spoiled Italian, at the door-steps where the Cæsar lingered to exchange sweet nothings with court favorites, as well as dames of the better class—who chat, in German, of things that women chatted of in this place ages ago—are in twentieth century attire. Only occasionally some farm-wife from the interior is seen in the native costume of Dalmatia.

Two main streets cross the palace at right angles from wall to wall, and at their intersection is the Plaza of to-day—an open space, roughly 120 feet by 44, surrounded by Romanesque arches which formed, in the olden time, the Great Court of the Palace. On the south stood the vestibule of the Empress, a gable-crowned structure of magnificent porticos, crowned with three tall towers. Between it and the sea lay the atrium of the Cæsar—a covered square, just a trifle smaller than the chief court itself, and enclosed by splendid pillars. In the march of the centuries this space has been encroached upon, and to-day



THE PORTA AUREA, SPALATO.



A BYWAY INSIDE THE PALACE, SPALATO.

ed or rounded, mark as many floors in the building. Modern panes and lace curtains, above awnings on the lower floor, give these a turn that fascinates at once. One great portal pierces the walls, and as the boat draws nearer glimpses are caught of sidewalk cafés on busy streets within. Such is the palace as it first appears.

Only on land, however, is it possible to appreciate the size of this compressed "flat"—roughly, five hundred feet on all fronts, and from forty-four to fifty-six feet in height. On all sides, save the one toward the land, sixteen small towers were originally interspersed with the square corner turrets, but of these only three now remain. An octagonal tower—in addition—flanked the main portal to the city on each side, while triangular turrets occupied the center of the walls. These towers and the four gateways closed, the old palace was, in its day, well-nigh impregnable, and one can picture folk in the windows of the superstructure along the sea—built to make that wall of uniform height with the rest—laughing defiance at the landing foe.

One enters Spalato through the Porta Aurea, the main gateway. Remains of barracks of the Emperor's guard and of homes

the old entrance gives access to modern shops of butchers and bakers and candle-stick makers, for the candle still lights most of the homes of the city.

Passing through this medley of shops and crossing the porticos of the palace crypt, the busy feet of the palace dwellers traverse the roof of mammoth subterranean chambers—534 feet long by 24 in width—upheld by a series of fifty-two arches, resting upon "half pillars" that extend in long rows down the center. This cellar, which is now closed to visitors, terminates on the south in rich loggias, which form a pleasing prospect on arrival by sea, as well as affording to present-day tenants a charming view of the gorgeous sunsets.

On the west side of the open square there stood once Cæsar's and other richly-decorated buildings—bath and sleeping apartments—but squalid tenements and narrow lanes now occupy their sites. Through the open arches of an arcade which, but for a chance rift of sky, seems a replica of the Boston subway, one finds his way amid the tenements of the poor to the Cathedral square itself, where the mother-church looms above wide clean streets, but with the beauty of its stately tower marred by scaffoldings

set to protect it. Here, too, are the better homes—their exterior coated with a colored concrete common in the south of Europe.

It is a curious irony of fate that this church and baptistery—the best preserved structures of the Roman period in the town—survive because of their use by the Christians, the people whom, above all others, the Emperor delighted to persecute. A portico before the Cathedral door and the old column-groves inside, neat, side-altars and a modern pulpit, oaken pews and ancient windows mingle the centuries in this church.

House-numbers grace the palace walls; glass shop-windows are in the staunch old frames, and modern posters cover hoary corners on the lanes that lead to this baptistery. Here the grating, the doors and the altars are modern—for the place is still used—but the huge stone font, the inscribed panels about, and the heavy gray sarcophagus in a corner of the edifice, date to the year 305, when this formed the private chapel of the Emperor.

As one saunters on to the Imperial Mausoleum, the custodian of the Palace, a genial old cleric, tells the story of the foundation of Spalato's palace in the following words:

"In the fifth year of the fourth century of our era, the Roman Emperor Diocletian, then aged fifty-nine, tired of ruling, and, having divided his empire among four Cæsars, each with separate capital and domains, abdicated at his birth-place at Salonæ (close by), and took up the erection of this palace, where he was to end his days in peace. Such, monsieur, was the birth of our city;"—and this way of putting it is of just the right



PALACE WALL, FROM THE SEA, SPALATO.

length to cover the short walk from the peristyle up a public stairway, that reminds one of Genoa, to an open platform on which the mausoleum is built.

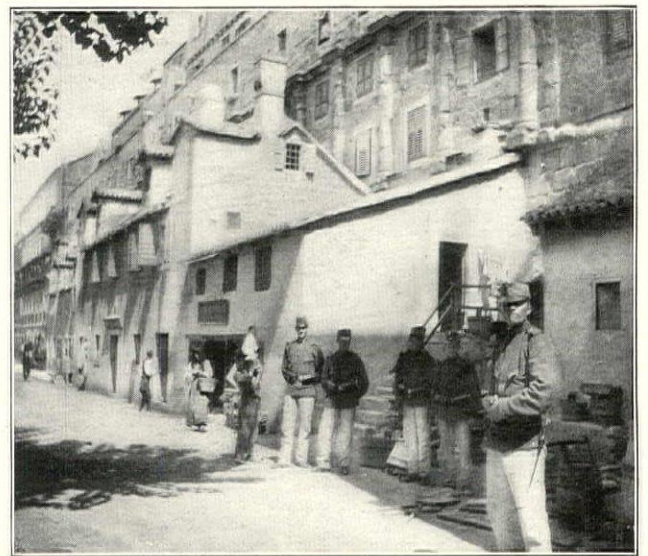
This tomb was originally an octagonal building, seventy feet high by forty-four across, but back in the thirteenth century the fore-hall was removed to make way for a Romanesque clock-tower from which, even to-day, the hours are chimed—at the appointed moment and then again five minutes after. Of the twenty-four pillars once forming the corridor of the mausoleum nineteen remain, and against these street urchins lounge, awaiting the stray visitor to whom to sell post-cards. The interior of the tomb is made up of square and semi-circular niches, four of each—encompassed by parallel pillars of granite and porphyry, hung with splendid tablets. The building, which was a masterpiece, architecturally, in its day, is lit by a single semi-circular window, by whose dim light inscriptions and mosaics without number are visible. In the crypt beneath the marble floor, eight rounded niches for the dead are preserved, and Diocletian, it is evident, builded far better than he hoped.

Both among these structures and over the neighborhood generally, relics of various sorts have been found, and these are assembled in three small civic museums. Pale blue urns of translucent glass—for holding the ashes of the dead—enclosed in tall stone jars, metal statuettes and vases of alabaster mingled with clumsy lockings of iron, cameos, and tortoise "bracelets" (still enclosing, in concrete, the bones of the martyr), are to be seen in these museums; and after spending an hour in the first of the buildings, it gives one a decided shock to emerge on the little shops of to-day and other evidences of a

belated twentieth century, lining the way to the other museum. There, too, there are tablets innumerable—among them a curious one of two zebras—with students engaged in making casts from the inscriptions, which date to the period of the decadence. In fact the greater portion of the remains of Spalato reveal the haste with which the rapidly-failing and hypochondriac Emperor sought to build for himself a retreat from an unwelcome world.

Ever since mediæval times numerous small buildings have clustered against the outer walls of the palace—notably along the southern exposure, where, in the century just passed, a nation of shop-keepers built—as well as around the structures on the inside.

Following the example of the French Government, which forbids alteration of the exterior of such of the old Government buildings of Paris as are now rented or leased, as early as 1850 a movement was inaugurated to purchase and remove these barnacles, and estimates made showed that forty-eight thousand dollars would complete the work. The matter, however, developed a political controversy, and died a speedy death. After a few years it was proposed that in addition to paying for confiscation the city should build homes for the evicted beyond the walls. This, too, aroused tremendous party-feeling, and could not be brought to an issue. Finally, however, laws were passed to the effect that while nothing existant at time of such passage would be disturbed, thereafter,—under penalty of from two hundred to two thousand dollars,—no one might build either in or about the palace "to its harm," and a committee of citizens



PALACE WALL AND MODERN SHOPS, SPALATO.

was appointed to interpret the clause. Ever since, Spalato has been steadily acquiring all buildings attached or built inside the palace and effecting their removal at once. The State reserves the right, at any change of ownership of property, to appropriate what the Ministries of Culture and Education, Justice and Finance deem wise, and it is quite probable that before many years the long-coveted end will be achieved.

A tabulation of all properties proposed for removal serves to show that, in the year 1904, there were just 2,786 persons living inside the walls,—occupying 469 rooms of the palace itself and 271 buildings of post-Roman origin. The property inside the palace was that year assessed at \$920,434.

Modern Spalato,—beyond the palace,—lies on a peninsula washed by two great "canales," and encircled by lofty hills, rising to as high as six hundred feet. Its population is given at a trifle over 16,000.

The homes of this Spalato are three-story affairs,—the exterior coated with yellow concrete. Inside the palace walls gardens are unknown, even "back yards" are at a minimum; but in this suburb pretty flower-beds and clumps of shrubbery reveal the love of the Dalmatians for green things.

Horse-cars minus tracks ply the streets to the doors of the palace, but inside it, only the burro and donkey appear. Turks or Bosnians, from the market inside, peddle chickens, geese and white turkeys, or figs and egg-plants and pecks to the householders beyond the walls. Now and then, a peasant woman—in loose brown robe, with white sleeves emerging from the gown and bandanna of red, about head and neck—goes by, but she, too, seems curiously out of place and modern.

In the palace-city time is marked by the old clock, ten-minutes behind the rest of Dalmatia; but on the outside folk correct the error and standard time prevails. Here the streets are lit by gas; there are modern office-buildings, theater, hospital and parks, and a handsome up-to-date quay.

These things, however, are of the other Spalato; not the one which the rare tourist delights in. Archaeologists, the world over, revel in the thought of the denuded palace approaching ever nearer complete vacation. But the world, which loves the quaint and queer, views with sincere regret the passing of the city built in the palace.

FELIX J. KOCH.

TERNE PLATES FOR TIN ROOFING.¹

IN considering this subject it must be borne in mind that progress in the various trades and a demand for a cheaper material than terne plates on low-priced work are probably the dominant causes of the falling-off in the use of terne plates. While the unsatisfactory lasting qualities of the plates of the present day may have had much to do with bringing about the present conditions in the trade, still the current practice of putting on the cheapest possible roof-covering that will last for a number of years with the least possible care, accompanied as nearly all are with a ten-year guaranty, is in all probability the dominant reason for the use of these materials in preference to terne plates for roofing purposes, for it cannot be denied that a tin roof, to last, must have care and attention.

The supplanting of terne plates by slag, plastic slate and other like materials on good work, and by tar, gravel and the various pulp, paper and other products, combined with asphalt, etc., such as Rubberoid, Paroid, Flint-coke and other kindred coverings, on cheap and temporary work is undoubtedly due to their cheapness rather than their lasting qualities, for there is no record of any of these materials having been on a roof fifty years and over, while there are many roofs of tin and terne plates in this country and Canada that have been on for longer than that time, and they are good to-day.

The deterioration in the lasting qualities of terne plates and the consequent want of confidence in the material is undoubtedly due largely to one cause, and that is the substitution of steel as a base for the old-time charcoal iron.

The use of steel plates as a base commenced in Wales about 1878, and when the industry came to this country about 1890 steel became and is still the base of practically all the terne plates made in America and in a large majority of those made in other countries. Bessemer and Siemens-Martin, or open-hearth, steels being of a soft pliable nature, admitting of a fine smooth surface, it was thought that they were the ideal materials for roofing plates, especially as they could be manufactured at a much lower cost than iron and at a minimum percentage of waste. Their use for roofing became universal, and the fact is not to be denied that as a roofing plate, taking a heavy, smooth coating, they far excelled in their working qualities the old-fashioned iron. After a few years' use roofs of steel base terne plate commenced to give out, the principal cause being pin-hole rings, or the appearance of thousands of small holes as minute as the point of a pin, in a single sheet. As time progressed the complaints from this source multiplied. Various causes were assigned for this trouble and remedies sought, but up to the present time there has not been discovered a satisfactory remedy, for steel plates do still pin-hole, some in a short time, some in a few years, and some not at all, for there are records of terne plates made of steel being on roofs fifteen years and still good.

This clearly shows the existence of some deleterious substance in the steel, and what that is and a remedy therefor is yet to be discovered. As to the cause of this pin-holing, there are about as many theories as there are steel manufacturers; perhaps the whole thing may be summed up in an answer made by a Government engineer. In his tour of inspection of steel manufacturing he visited one of the largest tin-plate plants in the East and, after spending a number of hours in thoroughly inspecting the coating processes of tin and terne plates, was asked this question: "Now, Major, what in your opinion causes pin-holing?" His answer was: "The steel plate you use as a base contains within itself elements of its own destruction, and what those elements are I have never been able to find out and have never met any one who has." All have theories, but none a satisfactory explanation. This is true of the plate to-day. The pin-holing and the consequent want of confidence in terne plates

is the sole cause of its being passed by as a roof covering. There are other causes which may be and undoubtedly are important factors in bringing about the abandonment of terne plates for roofing.

These may be summed under two heads: First, poor workmanship, particularly the modern way of nailing a tin roof; second, allowing a roof to stand after it is completed for days or sometimes weeks before it is painted. The roofer claims the paint holds better after it is rusted. Was there ever a greater fallacy? You coat the iron and steel to prevent rust and preserve it, and why allow that very thing to occur before putting on the protecting coat of paint? This theory, born of ignorance, is too ridiculous to dwell on. A tin roof should be carefully cleaned of all rosin, etc., and painted just as soon as finished. This is the care that the metal demands and must have if you want it to last.

The modern way of nailing a flat-seam roof is one of the worst enemies of a tin roof, for every nail you put through the plate itself invites a leak, and it is a matter of surprise that the largest manufactory of terne plate in the world should advocate this very system in its book, "*A Fifty-Year Roof.*" By this system you nail the sheet direct to the roof board, using $\frac{7}{8}$ or 1-inch wire nails, five or seven to a sheet, three or four on the long seams, two or three on the short seams. Then the seam is hammered down over the nails covering them up, or is supposed to do so; but as the seam is barely over $\frac{3}{8}$ inch, even if carefully put in, the edge of the nail is only 1-16 inch from the edge of the seam. In soldering-off, the solder runs around the nail head, not over it, for it cannot; and in five or seven places in the seam you have a seam only 1-16 inch. In nine cases out of ten you will find the leaks near these nail heads. This is a cheap way, but one of the worst for a tin roof.

There is only one way to put on a tin roof—that is, cleating for both flat and standing seams. If put on in sheets, three 1½ or 2-inch cleats to the cross seams and five on the long seams on every 14x20 sheet; if put on in rolls, a cleat every 4 or 5 inches. By this method, when your seams are flattened down and your roof soldered off and the seams well soaked, you have practically a solid sheet of tin for a roof. Every seam is as good as the sheet, if not better, and not a nail hole on its entire surface, as the nails are put through the cleat, not through the plate. All expansion and contraction is taken care of with no buckling of the sheet.

The above are undoubtedly the main causes of the decadence of terne plates as a roof covering, and until a satisfactory, permanent remedy is found and the good old-time methods of putting on the plates are adopted, the material will continue to be passed by and neglected as a roof covering.

Charcoal iron as a base plate, it is claimed, is now rapidly coming back into use, the same as it was thirty years ago. This is not a step backward, but simply a return to something that has been tried and not been found wanting. By charcoal iron I mean iron derived from smelting the ore in charcoal furnaces and working up the charcoal pig iron in charcoal knobbing fires, and not the "charcoal iron" that is made in America to-day for terne plates, which is manufactured from scrap steel by a so-called process of making iron from steel, a reversal of known and tried processes. This last is claimed to be charcoal iron chemically pure, but in a chemical analysis the point of demarcation between iron and steel is so fine that without a thorough knowledge of the physical tests the analyst is unable to determine accurately which is iron and which is steel. All the old brands now on the market were made of charcoal iron prior to about twenty-five years ago, and it was this material that gave them their reputation for service. There are instances where terne plates have been known to last on a roof 100 years, but they were iron, not steel. There is a church in Vermont whose steeple was covered with iron plates coated with pure tin in 1816, and it had never been painted up to 1903—87 years on a roof.

The trade is at present flooded with all kinds of articles boasting the steel-base plate and giving steel attributes and qualities that are known to belong solely to charcoal iron. One of these is entitled "The Charcoal Iron Delusion." In the first chapter of the article the following statement occurs: "The result is pin-holes in the coating, a common fault of charcoal-iron tin plate." This is simply a perversion of facts and is entirely misleading, and every one at all conversant with the two materials knows that charcoal iron does not pin-hole, while steel does. When the base of a plate goes all the coating you can heap on will not prevent a leak from declaring itself very shortly.

¹A paper, by Mr. Wm. Martin, of New York, read before the National Association of Master Sheet Metal Workers, Milwaukee, August 9-11.

Again, the claim is made that the soft absorbent surface of steel causes the metal to absorb the coating. This is not a fact. You can take a steel sheet, and after scraping off all the coating, you will have a fine, close-grain steel surface with no trace of coating. Take a sheet of charcoal iron and subject it to the same process and you will find particles of the coating all through the grain of the iron, showing that iron does absorb the coating. Still there is no denying the fact that the smooth surface of steel takes the coating much quicker and easier than the rougher surface of iron. It is for this reason that steel is preferable for coating to iron. Steel is very sensitive to the action of the atmosphere, and rusts very easily, gradually destroying itself. Iron, on the contrary, is very slow to rust, and if properly protected from the atmosphere will not rust at all. It is this characteristic that makes iron so superior to any steel for these sheets.

A cheaper process of making charcoal iron in this country will undoubtedly be discovered, and when it is there will be a return to iron for terne plate and a consequent restoration to the old-time prestige of tin plate as a roofing material. Every one knows that there is nothing better than a good tin roof for an ordinary dwelling.

I might also add there are many other factors that could be considered in this paper on tin roofing which have an important bearing on its success. Prominent among them is the use of Al solder to make the seams of the roofing plates, particularly flat tin roofing, adhere properly to one another. In my opinion good solder is as necessary to a tin roof as good bolts and rivets are to the steel frame of a modern building. For instance, supposing the rivets of a modern steel frame building were composed of rotten material; what do you consider would be the value of that steel frame? Any practical man in this business could readily perceive what the result would be. Then, again, I might add that if you had the best of material, both tin plate and solder, and had poor mechanics to put those tin plates on the roof, there would be then a very grievous doubt as to their making a good tin roof.

Another complaint is in the manufacture of tin plates; when the black sheets are cut in the mill to the requisite size, for some reason or another they don't appear to be square; or, in other words, they are cut askew. The consequence is, when attempt is made to put the sheets together properly, it is almost impossible to get a straight edge on the sheets or a strip of tin. Then when attempt is made to lay sheets, particularly upon a flat roof, it generally results in what I would term, in trade parlance, "busted seams," and requires considerable time, solder and often nails on the outside of the seam to make a finish. Any one in the trade knows that when nails are driven into the sheet of tin outside of the seam, particularly on a "busted seam," even if a large amount of solder is put upon each nail head, the contraction and expansion of the sheet on the roof will force that flat head up through the solder, and the consequence is a leak. Another difficulty in making good tin roofing, particularly flat seam, is that it is almost impossible to keep sheets of tin notched and edged all ready for use, simply because when notched the tin, unless used immediately, becomes oxidized or rusty from moisture or the fumes of muriatic acid or many causes that are found in the tin-roofing shop. A rusty butt is a common nuisance and requires extra time and solder to overcome it on the tin roof. These last defects in tin roofing I have overcome and have had patents granted to me within this last three years covering the method, which I hope soon to put upon the market. There are many other minor details that I might refer to, but I consider I have taken up about as much time as I am entitled to. I will close for the present and expect honest criticism from all quarters of the globe upon the above subject.

DISCUSSION.

JACOB RINGLE, Jersey City: I think this paper should be discussed. It will go forth among the trade as the views of Mr. Martin, of New York, and in many cases I do not think his views are correct. For instance, the conditions in New York and in the surrounding States are different from what they are in the country. He says, for instance, that a steeple in Vermont has been covered for so many years. You could not possibly have done that in New York City. We have to contend with smoke and the salt air there. And there are other things which make it far different in the large cities than in the country. You might be able to leave a roof in some localities without paint for months, but you could not do that in New York, no matter what kind of a roof it was. If you left a tin roof unpainted for two weeks in New York it would be as red as a fox.

I have been in the business fifty years, and I have used the various brands that are manufactured in this country, and have used imported tin to a large extent, and I have had a very wide experience. In New York and surroundings there are plates used that weigh 100 pounds to the box, a kind of tin that should never be used at all. In some cases I have heard of plates that weigh 90 pounds to the box, a little better than tissue paper. Now can you be surprised that a roof does not last when you cover it with such stuff? But if you get an old-method plate, which is well covered, and you put that on a roof and cover it with a good paint, I know it will last a long time.

MR. EARLEY: In discussing the question of tin roofing I am possibly not a very good authority, although my experience dates back forty years as a tin roofer, but I will admit that I have only recently come to the conclusion that we are making a grave mistake in recommending to our friends and customers the use of gravel, slate, etc., instead of tin roofing. I admit that I have done this myself, but I have come to the conclusion that I thereby committed a mistake, a blunder and an injustice to my fellow-man. The whole thing, as I understand it, is due to the substitution of steel for iron, which was a great and serious mistake, and was done by the American manufacturers in order to drive the English product out of the market. I believe it would have been better had the American manufacturers aimed to produce something better than their English cousins, and with American push, enterprise and energy we would have found a market for it anyhow.

Our American makers have erred in substituting steel for iron. However, all kinds of tin plate have rendered good service, as you all can testify. The best qualities have disappointed us and the worst qualities have agreeably surprised us. I know of a 6,000-foot roof of the cheapest American tin that has stood twelve years and is still good. It was painted as soon as finished, and again in two weeks, and has had the best of care since. I know of an old-style double-dipped roof that was put on three years ago and was replaced in six months. In Philadelphia, rows of houses are put up in the cheapest possible manner and they are covered with cheap American tin plate that has lasted for years. Let us not condemn tin roofing. Let us rather do good work, see that it is painted immediately with good paint. If we all do it, tin roofing will come back into popular favor.

W. U. FOLLANSBEE, Pittsburg, Pa.: I have been deeply interested in Mr. Martin's excellent paper and your interesting comments on it. I have been selling tin plates for twenty-six years and know some of his points are well taken. He is to be greatly commended for the care he has taken in preparing his paper. Nails through the sheets and the paint used cause much of the complaint about tin plate. I feel the importance of this point question and hope your association will take it up separately and learn the effect of the different paints. I know positively as the result of investigation that paint is a great cause of trouble. Plates carefully made by men who are trained will be furnished with a guaranty of their durability. Nevertheless, 40 pounds of coating have been applied by the palm-oil process and yet the plates have pin-holed. Some of our own that had my confidence pin-holed and cost us money to replace. We have tried to solve the problem and think we have, and are willing to give a fifteen-year guaranty with our tin plate, if properly painted with the right paint.

Steel is the base of practically all the plates made in this country. In 1889 I made a visit to Wales, when there were but two small Welsh mills making charcoal plates, and all the other makers had been making steel plates for twelve or fifteen years. Those steel plates are on roofs all over this country and have been for twenty-five years, and those Welsh plates are lasting. The Welshmen studied the best method of making steel plates for durability, and this knowledge is the secret of their success. The change from iron to steel was on account of cost, but they made good steel, which has advantages over the best charcoal iron. In making steel there are forty different operations, or forty opportunities to make a mistake. Some manufacturers are trying to avoid them. The charcoal-iron cry is a fad. Charcoal-iron roofs are making as poor a showing in Pittsburg as steel roofs. The interest and effort of the maker to overcome pin-holing will eventually meet with success. The fact that 90 per cent. of the tin plate made is used for cans, which only need last a short time, does not encourage the effort to make plates that will last long, and this influence is hard to overcome.

In making plates they are subjected to a strong acid bath that is hot; they are then swilled in pure water to remove the acid; but if any part of the hot plate dries in changing from the acid

bath to the water acid crystals form that cannot be dissolved and they are the secret of much pin-holing. A heavy outer coating will not prevent the action of this internal destructive agent. Then, again, there is not sufficient care in providing the best annealing furnaces, and too little time is given to annealing, which process should be given forty-eight hours. These are the secrets of the lasting qualities of Welsh plates.

Good tin plate was made in this country in 1873. In 1895 I got from Mr. Wood charcoal-iron tin bars, had sheets rolled, then coated and tested them. We have shown faith in our investigation by erecting at a great expense a steel plate plant when we could for less money have built charcoal forges. But charcoal iron would make a further draft on our forests, which are already disappearing too fast. I think, in the light of my experience and investigations, that charcoal iron would be a step backward. In conclusion, we are prepared to guarantee our steel plates. I heartily thank you for your kindness in according me an opportunity to say a few words from the standpoint of a manufacturer.

THE ARCHITECT'S DUTY IN SPECIFYING FOR CONCRETE CONSTRUCTION.*

THE use of reinforced concrete has progressed so rapidly that, except among technical men who have devoted special study to the subject, there is a lack of knowledge decidedly to the advantage of the material. Even among architects the men who have to specify its use and who must determine the relative values of the various systems, there is so little real knowledge of the subject that they are inclined to waive all responsibility and try to make the construction stand up by placing the contractor under a bond. It is needless to say that the less real knowledge a fireproofing company may have of the subject the more willing will it be to sign a guaranty, imbuing its system with supernatural powers, and blinding the eyes of the owner with a money security to the possibility of a collapse which may send him and his associates into eternity. What good will a bond do them? It may replace the building. It surely will not replace the loss of life due to incompetent design. Why should an owner consent to place himself and his associates under the shadow of a reckless design? It is for two reasons—the love of the almighty dollar and the lack of appreciation of the risk being taken. Two fireproofers may be asked in a general way: "What does your system of fireproofing cost per square foot?" The answers, because of the variation, are a surprise to the owner. One man quotes a standard price. He uses the same construction, regardless of span or capacity, and offers to give a bond that his floor will have the required strength. The other takes more time to consider, figures out accurately the quantities of materials required to do the work in a scientific manner, and quotes a price consistent with the design. The work is awarded to the first, he being the lower bidder, and the owner moves his business into quarters which are a continual menace to public safety. He is simply letting apples be shot off his head, and feeling that he will not be hit because the marksman has had pretty fair success picking off apples heretofore, and he has put up a bond to shoot straight this time. In talking to an architect a few days ago, the writer dropped a few remarks about the probabilities of a collapse in concrete-steel construction and the desperate chances some people are taking. "Well," said the architect, "you are the last person on earth I expected to hear talking that way," and he spoke the truth. He has had concrete-steel men pumping concrete impossibilities his way until he expects them all to be prevaricators of the rankest nature. Concrete is subject to all of the faults of building materials and a few more. Every ingredient must be perfect. Mixing and placing must be perfect. It must have the proper time to acquire its strength. Any one of these points failing, it is no better than so much mud. The question arises, if a material hazardous in itself must be used, should not the reinforcement be placed in such a way as to reduce to a minimum the possibility of a collapse? There can be but one answer: Do the reasonable thing; supply in steel what is lacking in the concrete, and do it consistently throughout the design from the centre of the slab to the base-plate. Concrete-steel is like all other good things; it is common sense from the beginning to the end. If reason calls for a certain thickness of slab, then it should be used, for to cut down in so essential a feature is taking a responsibility for the lives of

others. If common sense says place reinforcement here or there, then it should be so placed in spite of the cost in excess of that design neglecting it. A prominent engineer once said to the writer: "If your design does not look to you symmetrical, common sense, logical, consistent, then keep on until you get it." Every word was true, and it has been the greatest aid in the design of structures to feel, when the conditions were attained, a kind of self-satisfied confidence that the design would fulfil the conditions of those words. In consideration of the conditions outlined, what is the owner to do in regard to the fireproofing of his building? In the first place, he is to realize that the fireproofing is the most important part of the construction, without exception, upon which it is his lot to pass. In the second place he, in conjunction with the architect, should settle beyond a doubt the exact form of construction which he proposes to pay for. Far too often is a general contract signed in which no provision is made in regard to the fireproofing to be used, other than that it should fulfil certain tests, when with proper attention the best might be had without additional cost. The result is, that the contractor not being bound to any particular system, is free to take such bids as he sees fit. The well-designed system, upon which he may have originally based his bid, is unable to meet the price of reckless competition, and it is crowded out to give its place to one deficient in thickness of slab, or quantity and correct design of reinforcement. The reputation of the architect and his own personal interests demand in every way that only such a system be used as is fully consistent with the requirements imposed upon it, and, above all things, when an owner buys fireproofing he ought to get what he wants, for it is his head it is going to hang over. Summing up, the following points may be noted as worthy of thought: A chain is no stronger than its weakest link. No matter how strong the longitudinal reinforcement is, the shear member may prove the weak link, causing the wreck of the whole. Be consistent, from the load to the support. A bond will not contribute to the strength of the design, nor will the fact that one panel has stood a strenuous test be any criterion that the next will do the same, if the design is not logical and consistent throughout. The man who wants the best must select it for himself when he pays the price, or he will get a substitute, carrying with it a continual menace to business and human life. The importance of the reinforced-concrete work as a part of the entire structure has not been considered. The architect and owner may fully realize the necessity of good designing in reinforced concrete, as well as in other materials; but the question arises in their minds: "If this work is to be done by companies designing under patented systems and is to be entirely a work of specialty, how are we to get the desired results?" The first thing of importance for the architect to consider is the specification. It lies within his power to lay down certain rules, which designers, in submitting their schemes, must adhere to. In order to make consistent specifications, however, something of a knowledge of the subject is absolutely necessary. Requirements should be made in such a general way as not to exclude good systems of construction in favor of any particular one, but they should not be so general as to allow the indiscriminate figuring of those companies known to submit habitually designs inconsistent with engineering principles. One of the first matters for consideration should be that the concrete-steel designer will have the liberty of designing the reinforced concrete portions of the work in such a way as is most consistent with his system. He shall submit details sufficient to illustrate his method of construction and furnish a specification clearly setting forth the thickness of the slabs and the depth of the beams and stating the proposed arrangement of the steel reinforcement therein. His specification should state the ingredients which he proposes to use in his concrete, together with their proportions; but in no case should the designer use a concrete less rich in cement than in the proportion of one part Portland cement to three parts of sand and four parts of gravel or crushed stone. In no case should the use of cinders in any structural portions of the reinforced concrete be considered. The reason for stating the proportions as above is evident: it is a simple way of stating that the architect and owner will not be satisfied to consider a leaner mixture than that specified, but if the fireproofing wishes to use a richer concrete he is at perfect liberty to do so. The architect who specifies a definite proportion for concrete takes a certain responsibility for its strength, but if he says, "not less than," he is relieving himself of this responsibility. The same question arises in regard to placing of the reinforcement. If an architect chooses to design the reinforced concrete for the structure, then he should be absolutely responsible for its stability, for he is asking general contractors to bid upon

*Extracts from a paper on "Concrete Construction and Consistency in Reinforcement" read before the Northwest Railway Club, by Louis F. Brayton, of the Brayton Engineering Co., of St. Paul.

the work who have made no particular study of reinforced concrete, and do not claim to know whether the steel reinforcement, as called for in the architect's plans, is of sufficient strength or not. It would be unreasonable under the circumstances to ask the contractor to guarantee that the floors would stand a load of any definite amount under test, except in so far as the architect is willing to take the responsibility for the correctness of his design. The writer had occasion to figure some fireproofing a short time ago, in which the architect specified the requirements which would be used, at the same time he required the general contractors to guarantee that the floor would stand up under a test load of 1,000 pounds per square foot without sign of failure. There were two very inconsistent propositions in this specification. In the first place, the reinforcement, as the architect designed it, had nothing like the capacity which he asked the contractor to guarantee. In the second place, the idea that a reinforced-concrete construction should stand up to its utmost capacity without signs of failure is inconsistent, for what is it expected that the concrete will be doing while the steel is stretched up to and far beyond its elastic limit? Under the specifications any cracks occurring in the concrete would be considered a sign of failure, and yet we know that the very nature of the materials used will necessitate a stretching of the steel under a load, and that the concrete must necessarily show more or less cracks on the tension chord as a result.

COMMUNICATIONS.

HIGH STREET PRESBYTERIAN CHURCH, NEWARK, AND ITS ARCHITECT.

NEWARK, N. J., Aug. 28, 1905.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir:—After persistent inquiry I have just ascertained that Thomas Welch was the architect of "The High Street Presbyterian Church," corner High and Court streets, Newark.

I remember him very well as practising here for some years between about 1855 and 1865. He was an Englishman, of good professional training and ability, as is evident from this and other churches designed by him and erected here in Newark, all of which will stand the test of educated criticism. Unfortunately, the church in question was enlarged some ten years ago by extensions out of harmony with the original design of Mr. Welch, who, I understand, returned to England and died there.

Very truly yours, JEREMIAH O'ROURKE.

ILLUSTRATIONS

CENTRAL PORTICO: FEDERAL PALACE, MEXICO. M. E. BENARD, ARCHITECT, PARIS, FRANCE.

DETAIL OF THE SAME.

VIEW IN THE SALLE DES PAS-PERDUS: FEDERAL PALACE, MEXICO.

A CORNER OF THE STAIRCASE-HALL: FEDERAL PALACE, MEXICO.

PREMIATED DESIGN FOR THE LEGISLATIVE PALACE, MONTEVIDEO, URUGUAY.

We feel that it will be of interest, while publishing the drawings that show what sort of a parliament building M. Bénard is erecting for one of the largest of the Spanish-American Republics, to show also the premiated design for the similar building that is likely to be erected in one of the smallest of her sisters. We copy the plate from the *British Architect*, which seems to have reproduced its plate from some French publication.

CHURCH OF OUR LADY OF LOURDES, WEST 142D STREET, NEW YORK, N. Y.

This curious architectural freak is due to the ingenuity and energy of one of the good Fathers who conduct one of the several Mission Churches in New York, who at the time the National Academy of Design, in Twenty-third street, was pulled down, procured a portion of the material used for its outer walls and then, shortly after, persuaded the Archbishop of New York to give him the material forming that part of the east end of St. Patrick's Cathedral which had to be torn down to make way for the new Lady Chapel. With this fund of ready-made material

there was economically constructed a little chapel which will always draw the attention of the passer in the street.

INTERIOR VIEWS IN THE SAME.

The curious rococo screen-work, which is absolutely purposeless and, so far as discernible, functionless, suggests nothing so much as that it must have been the gift of certain grateful plaster-working parishioners who wrought out their own ideas, using whatever moulds they happened to find about their shops.

Additional Illustrations in the International Edition.

MAIN ENTRANCE: TOWN-HALL, COLCHESTER, ENGLAND, MR. JOHN BELCHER, ARCHITECT.

NOTES AND CLIPPINGS.

THE BEGINNING OF THE "STEEL AGE."—About 1890, some railroads commenced to build small spans and plate girders of steel, and for eye-bars steel was almost exclusively used. At that time most of the rolling-mills, which had formerly manufactured wrought iron, were equipped with steel furnaces, but continued for some time to make both kinds of material, until they found it more profitable to confine themselves to the manufacture of structural steel only, and discontinued the manufacture of wrought iron. In 1894, it was practically impossible to obtain wrought-iron shapes, and from that time forward steel entirely superseded wrought iron as the modern structural material. The year 1894, therefore, may be considered as the commencement of the present epoch—the steel age.—*Scientific American*.

PUBLIC AND PERSONAL HYGIENE.—The sphere of hygiene may be divided, as it often is, into the two hemispheres, public hygiene and personal hygiene, or it may be cut into one portion dealing chiefly with the human mechanism and its operation (personal hygiene), and another portion dealing chiefly with the environment of that mechanism (sanitation). The time has gone by when any one person can safely undertake to deal with the whole sphere of hygiene. The physiologist and the physician must in the future leave to the architect and the sanitary engineer such subjects as housing, heating and ventilation, water-supply and sewerage, precisely as the sanitary engineer has never presumed to deal with foods and feeding, vaccines and antitoxins, exercise, sleep and rest. The former subjects deal chiefly with the control of the environment, the latter subjects chiefly with the control of the individual, and sanitation and hygiene must henceforward be regarded as separate hemispheres of the science of health.—*Scientific American*.

PONTINE MARSHES TO BE DRAINED.—Prince Borghese, the Marquis Ferrarinati, the Duke of Sermoneta and the other great Roman nobles owning the Pontine Marshes have, after many years of negotiation, at length concluded a contract with a German syndicate, headed by Baron von Donath, for the draining of the marshes in question and their conversion into arable land. What this means to Italy and to Rome will be understood when it is explained that these marshes, which extended over a distance of thirty miles from near the sea to the Alban hills, are a source of intense unhealthiness to Central Italy and constitute the breeding ground of that ague and malarial fever which is one of the curses of that portion of the kingdom. The law accepting and sanctioning the baron's project for the draining of the marshes was enacted a number of years ago. But until now the great territorial magnates mentioned above have stood in the way of the execution of the project, owing to the fact that they preferred to use the marshes as game preserves. Now, however, they have all been brought into line, and there is no further obstacle to the enterprise. The marshes are to be drained, without a single cent of expense to the State or to the land-owners. All that the syndicate asks for is a certain percentage of the land reclaimed.

It is interesting to recall that this scheme has been, in a fashion, under consideration ever since the days of Julius Cæsar, who had several plans for dealing with the problem under discussion when laid low by the dagger of Brutus. Roman Emperors, all the Popes and Kings of Italy have each, in turn, had before them the question of draining the marshes, now about to become an accomplished fact.—*Marquise de Fontenoy, in N. Y. Tribune*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, SEPTEMBER 9, 1905.

No. 1550.

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IT must be, that many of the generation of American architects that is now passing away, having in their own youth experienced the hardship of acquiring a decent architectural education in this country, determined at that time that, fortune favoring, they would do something that should make the efforts of later generations more easily productive. The establishing and operation of the many architectural schools in this country have disguised the fact that not many individual architects have remembered to give effect to their own admirable youthful resolutions. Mr. Charles A. Cummings, however, whose death we had to chronicle a few weeks ago, was more mindful of what one generation owes to another, and his thoughtfulness, coming not long after Arthur Rotch's will, since both are permanent in their operating effects, go far toward making Boston permanently one of the important architectural centers in the country. Mr. Cummings bequeathes to the Boston Museum of Fine Arts the sum of fifty thousand dollars, the income from which shall be used "in the purchase of representations—whether models, casts, paintings, drawings or photographs—of the best architecture of all ages," the said purchases to be effected after consultation with the executive committee of the Boston Society of Architects. A second bequest, of ten thousand dollars, is made to the Trustees of the Boston Athenæum, who are to use the income of the fund in the purchase of architectural books and photographs.

WE hope we may not give offense to any one's sensibilities by pointing out that the bequest to the Museum of Fine Arts becomes known at a very fortunate time, the plans for a new building being now in course of incubation. Architectural models and casts are bulky things and can be provided for properly only in specially arranged galleries, and if the Museum is to elect to enlarge its present loan-collection of architectural casts by

using the Cummings income for the purpose, now is the time to arrive at such decision. Mr. Cummings was deeply and actively interested in the welfare of both the institutions mentioned, but he was hardly less so in the architectural collection of the Boston Public Library, many of whose later acquisitions had been purchased at his suggestion or by his advice. It is a cause for gratulation, however, that a perception that the public purse would care effectively for the growth of the great public collection of architectural books prevented him from dividing his bequests between three institutions rather than two. Divided as now the money can accomplish better results than if divided by three in any proportions.

THE investigations into the collapse of the Myers department-store at Albany, a few weeks ago, conducted by the coroner and by a commission of experts appointed by the city's mayor having resulted in practically identical reports, the contractor for the repairs, John Dyer, Jr., and his superintendent, Clark L. Daggett, have been arrested for manslaughter at the instance of the coroner and held to the grand jury under bail of five thousand dollars each. As the reports seem to be sensible, the men will probably be indicted and have to stand trial. The evidence is that excavation was carried too near the three piers that first collapsed and that about one of these piers no attempt at shoring had been made, while about the others the means and efforts used were palpably insufficient to provide the needed support for the loaded floors above. A blunder, in its results proved to be a crime, has been committed and punishment may properly be visited upon those responsible for it; but the real criminality in the matter is not reached and cannot be, since the public itself is the guilty party, because it has not by legal enactment forbidden the occupancy of buildings while undergoing repairs that may imperil their structural stability. Every permit granted for repairs, issued by public authorities, should expressly accord or deny the privilege of occupying and using the building affected during the operations for which the permit is issued. The account we gave some weeks ago of the manner in which a theatre in Buenos Ayres was rebuilt, without losing a performance, shows that there are building departments which are willing to exercise properly their guardianship over the lives of persons who desire to occupy buildings while undergoing repair. It was a blunder to cause the collapse of the Albany building, but it was a crime, for which Mayor and coroner, in their degree, were alike responsible, that there should have been three hundred, more or less, employes and customers in the building with their lives at the risk of an always possible blunder.

IN connection with the final plans for the new court-house in Chicago, the State's attorney, Mr. Healy, makes a suggestion that is worth incorporating in the programme for any court-house that may, hereafter, have to be built for any county of the first rank. As the present custom of taking jurors out to a neighboring hotel, under the charge of marshals or deputy-sheriffs, for sleeping or eating is not only undignified but affords many opportunities for "getting at" members of the jury with

bribe or threat, Mr. Healy urges that in the new building there shall be provided not only means for feeding jurors but also bedrooms enough to accommodate those juries which, because of the importance of the cases before them, ought to be placed out of the reach of interested outsiders beyond a peradventure. A properly equipped restaurant would find in a building as populous as the Chicago courthouse a patronage sufficient to make it self-supporting, quite independent of the sum the sheriff could afford to pay for feeding the jurymen under his charge.

RATHER late in the day, as it were, a French court has established a rather nice and important difference between the responsibility to the owner of architect and contractor under the severe terms of the Code civil. It seems that in the city of Carcassonne, while a gendarmerie and prison were being built, after the plans of the Departmental architect, M. Desmarest, certain walls gave way and buried several of the workmen, in addition to the material damage. The city at once brought suits against the architect and contractor as provided for by the Code, one suit on account of the damage to the gendarmerie and the other on account of the prison. After a prolonged hearing and the examination of expert witnesses, the Conseil de Préfecture d'Aude decided that the accident was due not to any "*vices du plan et du sol*," for which the architect could be held to account, but was caused solely by the lack of skill and care on the part of the contractor, and the latter was condemned to pay to the Department forty-two thousand odd francs for damage to the gendarmerie and some seventy-five hundred francs for damage to the prison. The architect, while absolved from responsibility for the accident, was, nevertheless, held to have been negligent in the matter of supervision and, so, was condemned to lose his commission and was obliged to guarantee the Department in the sum of eight thousand francs for the gendarmerie and twelve hundred for the prison, in the case that the contractor should prove insolvent. The contractor appealed, but the Conseil d'Etat affirmed the decision of the lower court.

THE decision is interesting in several ways. It brings out clearly the fact that it is the architect who is responsible for the condition of the soil upon which he undertakes to build as well as for defects of his design and specification, while the contractor is responsible for all defects of material and handling; that, further, the architect can be held responsible for negligence in supervision only on direct proof and to a degree determinable by the conditions of each particular case, and that even this monetary responsibility is collectable only in case the contractor is unable to pay the assessed damage in full. We believe that it has been usual in such cases to hold both contractor and architect jointly and severally responsible for the full amount; that is, if the contractor could not pay in full the architect must. This new decision seems to limit the responsibility of the architect in a less savage fashion: his obligations are made distinctly subordinate to those imposed upon the contractor—the man, that is, who actually does the work and gets, usually, the largest share of the profits. *L'Architecture*, which reports the case, does well to regret that so few cases in which architects are concerned ever get carried before the Conseil d'Etat, and it should be explained that this

case of M. Desmarest's would not have had that happy fate had it not been taken up and pressed by the Caisse de Défense mutuelle des Architectes; the final decision being recorded in June of this year, while the decision of the lower court was entered in June, 1901.

NEW YORK has just put into operation Senator Saxe's law forbidding the offering, accepting or demanding of illicit commissions, which seems to be nearly identical with one adopted a year ago by the Massachusetts legislature, an unquestionably good law, if ways and means can be found to enforce it. Its requirements cover not only the giving and accepting of tips by hotel servants and the rake-off demanded from tradesmen who deal with the butlers, stewards and coachmen of the well-to-do, but also evidently and clearly contemplate the suppression of the illegal practice adopted by some material-men in their endeavor to secure orders through the influence of architects. The weak point is that the penalty, supposing it ever could be imposed, while sufficiently deterrent to prevent a head-groom from demanding a rake-off on a set of harness, is altogether inadequate in the case of the *honorarium*—save the mark!—that passes between the material-man or contractor and the shyster architect—if any such there be. A fine of "not less than ten dollars nor more than five hundred dollars" is not to be weighed against the profits to be made out of a several hundred thousand dollar job, even when "imprisonment for not more than one year" is also authorized as a possible punishment; for everyone realizes that the ordinary commercially-minded jurymen is little likely to impose imprisonment for an offense that he himself may, any day, imitate in the regular course of trade.

THE far too prevalent belief that an individual who chances to hold an executive position may do pretty much what and as he pleases, if only he be sufficiently positive and strenuous in the doing, receives an unneeded exemplification in an incident that occurred recently at the Metropolitan Museum of Art in New York. Since the death of General Cesnola, the former Director, and during the absence of Sir C. P. Clarke, the present one, Mr. G. H. Story has been serving as Acting Director, and a week or so ago it was his pleasure to cause the ejection from the Museum of a fellow-official, Mr. F. E. Elwell, curator of the Department of Sculpture, an act for which he is not unlikely to be held responsible in damages. It appears that amongst Mr. Elwell's duties, as stated in the by-laws, is that of unpacking and installing all exhibits intended for his department, and it was very natural he should expostulate when he found Mr. Story, who is properly curator of the Department of Painting, at work unpacking and about to install the bronze statue of C. V. T. Gallus recently presented to the Museum by Mr. J. P. Morgan, but it was not natural that his expostulation, however warmly it may have been stated, should have resulted in an order for his forcible ejection from the premises where he lawfully was, issued by one temporarily holding an executive position. It seems patent that it will be for the new Director to take charge at once, all the more that it has been decided to build a new wing for the Museum on Fifth avenue, of about the same size as the present one and extending northwards.

OUR SINFUL EXTRAVAGANCE.¹

THIS North America of ours is vast indeed, our natural resources are great and we have grown to look upon them as inexhaustible. With ruthless abandon we have devastated our forests; we have worked our lands beyond endurance, our mines, our fields are handled without regard for the morrow. Within but a few years our economists have called our attention to this useless waste, and already we find ourselves confronted by a scarcity of certain commodities hitherto thought unlimited. People are just beginning to awaken to the true condition of things.

But of all the useless wastes that we, as a people, have indulged in, in the United States and in Canada, that of fire, our annual bonfire, is the most insane, in fact criminal, for by it is property not only devastated, but lives by thousands are sacrificed yearly. Think of it, in 1904 7,000 people were burned, an average of 19 fatalities through fire every day in the year, a record that nearly equals that of all the railroad accidents of the two countries, generally considered by far the most fruitful source of fatal accidents. And the record of 1904 was not an extraordinary one. The increase in deaths by fire has been growing steadily. Our present ratio is about nine lives lost by fire every year for every one one hundred thousand of population. In 1900 the ratio was eight, and in 1890 it was five. Unless something drastic be done, what will be the ratio in 1950?

If the loss of life is appalling, the loss of property is disgusting. One hates to think that he is part and parcel of such a race of stupid. Not even China and Japan, with their paper and bamboo houses, submit to such a tax as we do. Our fire-losses are equal to a tax of \$25 per year per family, and that tax shows but the loss of property actually consumed. We have burned up one thousand millions of dollars' worth in six years! Most losses, so called, are really but exchanges, one product turned into some other form, a loss, perhaps to many, but a gain to someone. Not so with fire. That loss is final, absolute, and the visual one is actual. The only gain to anyone is an indirect one to the insurance companies, who profit just so much more by the added anxiety after a fire that new people have to be insured. But the insurance business is not run upon strictly philanthropic lines. The result of the transformation caused by fire is—smoke. \$230,000,000 worth of smoke last year! And like last year's death record, the property-loss does not show as a spasmodic increase or something very extraordinary and unlikely to happen again. Even including the Baltimore fire it was but little over the regular increase, a record that has been climbing ever upward, a record that hovered about the sixty-million figure in the 70's, the hundred millions in the 80's, and that has not been under the one hundred and sixty million limit since 1900.

And mark you, that is the destruction of property. Along with that we throw away \$150,000,000 or so more in the maintenance and perfecting of water plants and fire-departments, salves to assuage the pain of the sore, not a cure for the malady. Then on top of that we go to work and gamble with the fire-insurance companies and pay out countless millions more so that they may reimburse us individually should we suffer a loss through fire! For every dollar that the individual loser receives as indemnity, the community has paid out three dollars as insurance-premiums! That is the average. I have in mind one city that has paid out in a given time \$692,000,000 in premiums, and has received back \$107,000,000 for its losses by fire during the same period. An unintelligent speculation, to be sure, but then, what gambling is intelligent.

But leaving aside the accessories, so to speak, and restricting ourselves to the actual destruction of property, the \$230,000,000 of last year means a daily average loss of \$630,000. Now, large as that is, we were satisfied some time ago that it did not tell all the story. We draw those facts from fire-department records, insurance-reports, et cetera, more or less fallible sources of information that are far from being all-comprehending. We were sure that there were hundreds of fires unreported, in interior districts, destroying uninsured property, and where there were no fire-departments. So, early in February of this year the Society of Building Commissioners and Inspectors prepared a most elaborate system, albeit expensive, to get all the facts concerning fire for at least a short period. The system was in working order by February 19, and was, I am sure, perfect on the 23d. During the ten days of the test, from the 19th to the

28th, there were 1,315 fires, totalling a loss of \$14,809,800, or one and a half millions a day. True, it so happened that there were some pretty severe fires during that period, but who tells us that there will not be as severe, or more severe ones, later on during the year, just as there were previous to that time?

Granted that the record of a million and a half a day will not obtain the year around, and assuming, indeed, that we will not actually average more than half that amount, still that figure is exceedingly near the mark reached by the new buildings we are daily erecting, and that give such a semblance of progress. At a most liberal estimate we build but a million's worth a day, hence are we destroying perilously near as much as we are creating. Talk of race suicide!

New York averages 8,700 fires a year, Chicago 4,100. We burn up three theatres, three public halls, twelve churches, ten schools, two hospitals, two asylums, two colleges, six apartment-houses, three department-stores, two jails, twenty-six hotels, one hundred and forty flat-houses, and nearly sixteen hundred homes every week of the year. We may say that every person who lives or has business in buildings is more or less exposed to danger by fire, owing to our recklessness, our criminal carelessness and ignorance; but setting aside such broad terms, we have estimates that there are 36,000 lives daily in danger; that is, there are that number of persons directly exposed to fire, persons who escape from burning buildings, lives that are in imminent peril. No war, however bloody, shows any such average of lives daily exposed to destruction.

And what is being done to prevent this terrible loss? Little, almost hopelessly little, in the way of prevention, though much in the way of palliative. We throw water upon our fires (and are constantly endeavoring to throw it more scientifically) and expect the next fire to burn less fiercely because thereof. In San Francisco, for instance, there is little being done, comparatively, to improve the standard of construction. It is notoriously a wooden city, yet insurance-rates are fairly low because, forsooth, the *fire-department is excellent*. That is like extolling the advantages of a certain locality as a health resort; it may be miasmatic, yellow fever may stalk amuck, its houses and streets may be foul, but, Glory Be! its doctors are so skilful! As far as cure goes, note how little we have done. In all this broad land there are but three thousand buildings that truthfully can be called "fireproof," and that very largely only in their structural parts, that is, fireproof buildings like those in Baltimore whose steel frames and terra-cotta floors withstood the attack where all else abort them, the stone, the marble, the wood went the way of all things combustible or destructible.

What is the cure? But two things will tend toward the accomplishment of the desired end, and neither water-supply nor fire-department is one of them. The first thing to do is so to surround our old and dangerous buildings with safe-guards, to correct their worst faults where practicable, and to compel their demolition as soon as possible. The second is to absolutely bar the erection of combustible structures in the future. Some would say that that would be a hardship upon the individual, for we have grown so accustomed to using wood that it seems to be the fixed mode of construction, sanctioned by time and custom, a sacred inheritance any tampering with which must needs savor of sacrilege. Therein lies the folly.

There was a time when wood construction was truly economical, indeed the only thing available. To-day, wood is almost a luxury. Lumber has gone up in price—over 150 per cent. in the last few years—while fireproof materials, brick, steel, fireproofing tile, cement, et cetera, have been cheapened in cost of manufacture. There is absolutely no economy in building even the simplest cottage of wood. Granted that the first cost in fireproof material is ten per cent. more than wood. But consider the wear and tear, the maintenance, the insurance, and all such incidentals, and your frame cottage will have cost you in twenty years' time thirty per cent. more than a well-built, non-inflammable structure would have cost.

The deterioration in the value of a well-built, fireproof building, fire-resisting in its finish and decoration, is but one ninth of one per cent. a year, while that of the ordinary wood joists and stud-partition is nearly four per cent. a year. Besides, such improved construction has a host of other advantages; it is sound-proof, vermin-proof, warmer in winter and cooler in summer, and in every respect vastly superior to the old way of building.

Some weak-hearted ones would have us believe that to bring about those two conditions would involve superhuman effort, well-nigh an impossibility. But our cities have accomplished

¹A paper, by Alcide Chausse, Architect, Building Inspector of Montreal and Vice-President International Society of Building Inspectors, read before the convention of the American Society of Municipal Improvements, at Montreal, September, 1905.

other reforms quite as revolutionary, and so thought at the time, as this would seem to be. The people sometimes chafe at what they term the restraint of individual liberty, involved in the enforcement of drastic curative laws. But not for long. North-American intelligence is such as to readily recognize the value of individual sacrifice involved in a great public benefit. We may not hope, however, to bring the desired conditions about by mild persuasion, by preaching. It will take vigorous action, and the only action that will accomplish anything is the adoption of most stringent building-regulations, and their strict enforcement by competent, executive officers.

Building, in general terms, requires the clearest definition and restriction, while every class of building calls for thoughtful and comprehensive special legislation. If we think that theatre-builders ought to enjoy certain latitude, we have but to scan the record of the Iroquois Theatre; if it be suggested that dock-sheds are hardly worthy of special legislation, think of what happened at New Orleans; if wholesale warehouses be deemed unimportant, note what happened in Toronto. And so it is with every class of building. Nothing can be deemed unimportant, for that very building, or class of buildings, may prove the ruin of half your city. Strict building-regulations, I say, are all-important and supremely necessary. Two hundred and sixty-four of our American and Canadian cities have realized this, for there either have been, or are being, adopted perfected building-regulations by as many cities. One hundred and sixteen cities or considerable towns heretofore unprovided with a special building officer or department have the creation of such office under consideration. There are happy indices of betterment wherever we may look, thank heaven! but it is just such societies as this, made up of thinking, public-spirited men, zealous in the upbuilding of their several municipalities that can do a world of good in facilitating this work and bringing about its consummation even in our own times.

Of all the cities that have given most thought and earnest work to this matter, Cleveland easily takes the lead. Her building ordinance may be said to be the combined work of nearly all the building experts in the country. A vast sum was spent upon its preparation. Every item was discussed by experts and its effects upon the legal side of the question as well as the technical were carefully weighed by specialists, and the society of which I am an officer, the International Society of Building Commissioners and Inspectors, has virtually advocated that ordinance *in toto* as its model and standard, and is urging every city in both countries to adopt it also with as little change as possible. Some may think it verbose. It has to be, since it is complete, and leaves nothing to the misinterpretation or misjudgment of a perhaps too-lax officer. Every point is covered.

I submit, and you will readily appreciate, that it would be a tremendous advantage to have a uniform code throughout both countries. As it is now, one city will permit of a certain thickness of brick walls to carry a certain height of story; a city fifteen miles distant therefrom insists upon an entirely different standard. So it is with allowable strains in framing, et cetera. The building business of all the cities is so closely related that this everlasting difference is not only confusing but leads to endless discussion and trouble. A hundred other considerations should compel us to advocate not only good building-regulations, but uniform ones, and I sincerely trust that each one of you gentlemen will not only advocate in his own city the necessity of wise and strict requirements, but that he will go a step farther and strongly urge the council, or whatever power is in charge of that branch of municipal service, to adopt the code that is most worthy of being made standard, and that has already been engrossed upon the statute-book of so many of the cities of the United States and Canada.

HEATING AND VENTILATION.—XIII.

WHILE the tables of pipe-sizes previously given are in convenient form for laying out the mains and risers in a building, they are not always well adapted for use in the design of pipe mains for central heating or power plants, where steam is used for various purposes, or condensed in different forms of heaters. In cases of this kind it is usual to compute the quantity of steam required in pounds per minute, and determine the necessary pipe-size from this, instead of doing it directly from the radiating-surface as previously described. There are several ways of doing this, but one which has given

excellent results in practice, is by the use of D'Arcy's formula, with suitable corrections made for actual work. This in its different forms is given below:

$$Q = c \sqrt{\frac{(p - p_1) d^5}{w L}}$$

$$W = c \sqrt{\frac{w (p - p_1) d^5}{L}}$$

$$d = \sqrt[5]{\frac{W^2 L}{c^2 w (p - p_1)}}$$

$$p - p_1 = \frac{Q^2 w L}{c^2 d^5}$$

in which

- Q = cubic feet of steam discharged per minute.
- W = weight of steam in pounds discharged per minute.
- w = weight of a cubic foot of steam at pressure p.
- p = initial or boiler pressure of steam.
- p₁ = terminal pressure at the extreme end of the main.
- p - p₁ = drop in pressure (all pressures in pounds per square inch).
- d = diameter of pipe in inches.
- c = a constant, depending upon the diameter and interior surface of the pipe.
- L = length of pipe in feet.

TABLE I.

VALUES OF C FOR DIFFERENT DIAMETERS OF WROUGHT-IRON PIPE.

Diam. of Pipe.	Value of C.
2	52.7
2½	54.3
3	56.1
3½	57.1
4	57.8
5	58.4
6	59.5
7	60.1
8	60.7
9	61.2
10	61.8

TABLE II.

FIFTH POWER OF DIFFERENT DIAMETERS OF PIPE.

Diam. of Pipe.	Fifth Power.
2	32
2½	97.6
3	243
3½	522.9
4	1024
5	3125
6	7776
7	16807
8	32768
9	59049
10	100000

As the computations are somewhat complicated, tables are given, with full directions for their use, covering all conditions commonly found in practice.

Table III gives the flow of steam in pounds per minute for pipes of different diameters, and with varying drops in pressure between the supply and discharge ends of the pipe. These quantities are for pipes 100 feet in length; for other lengths the results must be corrected by the factors given in Table V.

TABLE III.

Diam. of Pipe.	Drop in Pressure. (Lbs.)									
	¼.	½.	¾.	1.	1½.	2.	3.	4.	5.	6.
1	.44	.63	.78	.91	1.13	1.31	1.66	1.97	2.26	
1 ¼	.81	1.16	1.43	1.66	2.05	2.39	3.02	3.59	4.12	
1 ½	1.06	1.89	2.34	2.71	3.36	3.92	4.94	5.88	6.75	
2	2.93	4.17	5.16	5.99	7.43	8.65	10.9	13.0	14.9	
2 ½	5.29	7.52	9.32	10.8	13.4	15.6	19.7	23.4	26.9	
3	8.61	12.3	15.2	17.6	21.8	25.4	32.0	31.8	43.7	
3 ½	12.9	18.3	22.6	26.3	32.5	37.9	47.8	56.9	65.3	
4	18.1	25.7	31.8	36.9	45.8	53.3	67.2	80.1	91.9	
5	32.2	45.7	56.6	65.7	81.3	94.7	120	142	163	
6	51.7	73.3	90.9	106	131	152	192	229	262	
7	76.7	109	135	157	194	226	285	339	390	
8	108	154	190	222	274	319	402	478	549	
9	147	209	258	299	371	432	545	649	745	
10	192	273	339	393	487	567	715	852	977	
12	305	434	537	623	771	899	1130	1350	1550	
15	535	761	942	1090	1350	1580	1990	2370	2720	

As the length of pipe increases, the friction becomes greater, and the quantity of steam discharged in a given time is diminished.

Table III is computed on the assumption that the drop in pressure between the two ends of the pipe equals the initial pressure. If the drop in pressure is less than the initial pressure the actual discharge will be slightly greater than the quantities given in the table, but this difference will be small in pressures up to 5 pounds and can be neglected, as it is on the side of safety.

For higher initial pressures Table IV has been prepared. This is to be used in connection with Table III, as follows:

First find from Table III the quantity of steam which will be discharged through the given diameter of pipe with the assumed drop in pressure; then look in Table IV for the factor corresponding with the assumed drop, and the higher initial pressure to be used. The quantity given in Table III multiplied by this factor will give the actual capacity of the pipe, under the given conditions.

TABLE IV.

Drop in Pressure in Pounds.	Initial Pressure.					
	10	20	30	40	60	80
1/4	1.27	1.49	1.68	1.84	2.13	2.38
1/2	1.26	1.48	1.66	1.83	2.11	2.36
1	1.24	1.46	1.64	1.80	2.08	2.32
2	1.21	1.41	1.59	1.75	2.02	2.26
3	1.17	1.37	1.55	1.70	1.97	2.20
4	1.14	1.34	1.51	1.66	1.92	2.14
5	1.12	1.31	1.47	1.62	1.87	2.09

Example.—What weight of steam will be discharged through a 3-inch pipe, 100 feet long, with an initial pressure of 60 pounds and a drop of 2 pounds? Looking in Table III we find that a 3-inch pipe will discharge 25.4 pounds of steam per minute with a 2-pound drop. Then looking in Table IV we find the factor corresponding to 60 pounds initial pressure and a drop of 2 pounds to be 2.02. Then, according to the rule given, $25.4 \times 2.02 = 51.3$ pounds, which is the capacity of a 3-inch pipe under the assumed conditions.

Sometimes the problem will be presented in the following way: What size of pipe will be required to deliver 80 pounds of steam a distance of 100 feet with an initial pressure of 40 pounds and a drop of 3 pounds? We have seen that the higher the initial pressure with a given drop, the greater will be the quantity of steam discharged; therefore, a smaller pipe will be required to deliver 80 pounds of steam at 40 pounds than at 3 pounds initial pressure. From Table IV we find that a given pipe will discharge 1.7 times as much steam per minute with a pressure of 40 pounds, and a drop of 3 pounds, as it would with a pressure of 3 pounds, dropping to zero. From this it is evident that if we divide 80 by 1.7 and look in Table III under "3 pound drop" for the result thus obtained, the size of pipe corresponding will be that required. Then in the example under consideration we should have $80 \div 1.7 = 47$.

The nearest number in Table III marked "3 pound drop" is 47.8 which corresponds to a 3 1/2-inch pipe and is the size required.

These conditions are seldom met with in low-pressure heating, but apply more particularly to combination power and heating plants.

For lengths of pipe other than 100 feet, multiply the quantities given in Table III by the factors found in Table V.

TABLE V.

Feet.	Factor.	Feet.	Factor.	Feet.	Factor.	Feet.	Factor.
10	3.16	120	.91	275	.60	600	.49
20	2.24	130	.87	300	.57	650	.39
30	1.82	140	.84	325	.55	700	.37
40	1.58	150	.81	350	.53	750	.36
50	1.41	160	.79	375	.51	800	.35
60	1.29	170	.76	400	.50	850	.34
70	1.20	180	.74	425	.48	900	.33
80	1.12	190	.72	450	.47	950	.32
90	1.05	200	.70	475	.46	1,000	.31
100	1.00	225	.66	500	.45		
110	.95	250	.63	550	.42		

What weight of steam will be discharged per minute through a 3 1/2-inch pipe, 450 feet long, with a pressure of 5 pounds and a drop of 1/2 pound?

Table III, which may be used for all pressures below 10 pounds, gives for a 3 1/2-inch pipe, 100 feet long, a capacity of 18.3 pounds for the above conditions. Looking in Table V we find the correction factor for 450 feet to be .47. Then $18.3 \times .47 = 8.6$ pounds, the quantity of steam which will be discharged if the pipe is 450 feet long.

Examples involving the use of Tables III, IV and V in combination are quite common in practice. The following shows the method of calculation:

What size of pipe will be required to deliver 90 pounds of steam per minute a distance of 800 feet, with an initial pressure of 80 pounds and a drop of 5 pounds?

Table IV gives the factor for 800 feet as .35, and Table IV that for 80 pounds pressure and 5 pounds drop as 2.09.

Then $\frac{90}{.35 \times 2.09} = 123$, which is the equivalent quantity, we

must look for in Table III. We find from this table that a 4-inch pipe will discharge 91.9 pounds, and a 5-inch pipe 163 pounds. As 4 1/2-inch pipe is not commonly carried

in stock we should probably use a 5-inch pipe in this case, unless it was decided to use a 4-inch and allow a slightly greater drop in pressure. In ordinary heating work with pressures varying from 2 to 5 pounds, a drop of 1/4 pound in each 100 feet length of run has been found to give very satisfactory results.

Although power-work does not come within the scope of this article, it often happens that the heating engineer is required to run mains for supplying engines, in connection with the heating plant.

Authorities on the steam engine generally agree that the supply pipes should be so proportioned that the velocity of the steam does not exceed 6,000 feet per minute.

The velocity is calculated on the assumption that the cylinder is entirely filled with steam at each stroke. If A = area of cylinder section in square inches, and S = the piston speed in feet per

minute, then $\frac{A \times S}{6000} =$ the required area of steam pipe in square

inches. If we assume a mean effective pressure of 40 pounds,

then the horse-power of the engine will be $\frac{40 \times A \times S}{33,000}$.

If we divide the total area of steam pipe by the horse-power of the engine it will give us the required area in square inches per horse-power.

Making this division we have—

$$\frac{A \times S}{6,000} \times \frac{33,000}{40 \times A \times S} = .1375;$$

so that knowing the horse-power of the engine, we may multiply by .1375 and at once obtain the required area of steam pipe in square inches.

This formula is in part empirical, because in the first place, we assume that the entire cylinder is filled at each stroke, while in actual practice from one-fourth to three-fourths of a cylinder of steam is used.

However, steam pipes computed on this basis correspond very closely with the best modern practice.

Another formula giving results very similar to the above is:

$$\text{Horse-power} = 6d^2, \text{ or } d = \sqrt{\frac{\text{Horse-power}}{6}} = .408\sqrt{\text{Horse-power}},$$

in which d is the diameter of the pipe in inches. When the supply-pipe is 100 feet in length or over, it is well to increase the size somewhat, depending upon the length of run, and to place a large steam receiver in the pipe near the engine. The factors found in Table V may be used for increasing the sectional area of the pipe when the length is over 100 feet.

Example.—What size of steam pipe will be required for a 100 horse-power engine, situated 200 feet from the boiler?

$100 \times .1375 = 13.75$ square inches area. Looking in Table V we find the factor for a pipe 200 feet long to be .7, which means that a given pipe 200 feet long will carry only .7 as much steam under the same conditions as it would if only 100 feet long; so that in the above case we must increase the pipe area in the ratio of 1 to .7 or $13.75 \div .7 = 20$ square inches nearly, which corresponds to the internal area of a 5-inch pipe.

The formula may be adapted to the calculations of exhaust-pipes by substituting 4,000 for 6,000, which gives an area of

$$\frac{A \times S}{4,000} \times \frac{33,000}{40 \times A \times S} = .2 \text{ square inch per horse-power.}$$

CHARLES L. HUBBARD.

(To be continued.)

BRUGES.

HERE is one of the three most perfectly mediæval cities that remain to us to-day: Oxford, masculine and scholastic, and serenely-tempered, Sienna, the gorgeous remains of a grand and proud lady, and Bruges, still a little, black-cloaked, religious nun, faithful and quiet and self-recollecting. The sluggish canals move almost imperceptibly between rows of crow-step gabled, faded brick houses—great dwellings black with age, ornamented with strange carven devices, wearing all the infinitely tragic charm of old age and impending desuetude still held at bay; the innumerable, delicate towers that top each view; the almost unceasing bells and chimes, striking not only every quarter, but every half-quarter, of the hour, giving the town its well-deserved title of the "gray city of bells and towers"

—all these lead one back a step in time till one seems to be walking through an untouched quarter of the fifteenth century.

A highly decorative little town, but dead and unrelated to modern life as is a Dutch engraving. The wavering skyline, gray upon gray, is broken at all points by minarets and towers and quaintly devised scroll roofs and the recurrent point of narrow stair gables. It is an actual fact that every street corner has its carven image of the blessed Lady or some saint bending over and peering down into the narrow cobble-stone streets as if it were the chief business of the heavenly hosts to inquire into the ways of men.

These little houses vary in age and value, some tawdry and slight, gilded all over, and others mutilated and charred by time. One little Blessed Lady sits crouched on the steeply sloping Dutch roof of an arch, and on her drawn-up knees she bears a little King of the World, grave and still of countenance, and with uplifted, warning hand. There is constant recollection of the closeness of heaven and earth, a sense like Blake's of an unbroken stream of communication, and yet a touch of the naïve and sweet and humble in the humanity of the interpretation. In the believing faces of the Bruges folk there is, mixed with the stolidity and simplicity of a past tradition, the humanity of true devotion, and one feels that there remains in these invigilating relics a constraining force to urge them forward into nobler action, and to hold them back from unworthy deeds. In the type of countenance one sees no sign as yet of the rush and worry of modern life; none of the look of greed begotten of the feeling that life is so short and eternity so uncertain that it is well for a man to grasp all that he can of having and doing ere death shall come tacitly to take him. The entire town bears its tale on its quaint and charming face, as the faces of the people bear the imprint of belonging to the town. House after house shows its pictured legend on the outside. The Pelican-in-its-piety, again a favorite device in Oxford, is a recurrent decoration, either in low relief paneling set in the wall, or topping the highest point of the gable, a full-rounded figure of the wounded mother-bird with the seven clustering young. Justice with scales, the judgment of Solomon, the story of Susannah, clasped hands denoting good faith, the four quarters of the globe represented by a negro, an American Indian, a Dutch merchant, and a fourth non-descript gentleman, family arms, Adam and Eve, all these devices, exquisitely carved in stone or wood, are the ancient forms of advertising in an age when men founded life upon a stable hope instead of lending themselves as allies to time, and helping the moments to speed by making what is unworthy to live long, that all may veritably move and nothing abide.—*Louise Collier Willcox, in N. Y. Evening Post.*

THE INVENTION OF ONE FORM OF FIREPROOFING.

“THE ocean traffic is as it was two hundred years ago. Terminal facilities, with few exceptions, are no better; they simply use more men, more stupidity, more muscle and larger boats. With a dozen exceptions, probably two hundred years ago they could unload a boat equally well at any of the best coast harbors in this country or Europe. New York harbor is a disgrace, Boston harbor is a disgrace, all the harbors on the coast of this country are a disgrace, when we all know the energy, the good business ability and the quick judgment of business men to take hold of projects that will produce good returns in carrying them to completion; but simply the habit of the eastern coast has kept them where they are, they have almost gotten the Far East lethargy and believe their methods good enough; the conditions have always been there, and there they must remain.”

In running over the account of the proceedings at the late annual convention of the American Society of Civil Engineers our attention was caught by the emphatic statement quoted above—a statement with which we are in hearty accord. Then, finding the remark was made by Mr. Alexander Brown, head of the Brown Hoisting Machinery Company, which is largely engaged in the work of unloading water-borne freight—chiefly iron ore—and producing the machinery used in such operations, we read on and were rewarded by discovering the following interesting story which once more illustrates how necessities generate inventions:

“The works that we have now are the outgrowth of necessity, and in 1900 we had to reorganize in order to see what to do to double the capacity of our works. After fairly getting started we had a disastrous fire that wiped out our entire place in the midst of the busiest year we ever had, and that necessitated car-

rying on the business, building and doing all the work at the same time, with as little injury to our business as possible, and that, like other times in our business, forced us to do things which, if we had had all the time in the world, we would probably not have done half as well. It forced us to find, in the same area, capacity to double or treble our former business, of which we suspected we had reached the limit. I am glad to say we have trebled the capacity on the same area we had before, but, as I said, this very necessity forced us to do things—as generally the best work is done that way—that we would not have done if we had had all the time and opportunity at our disposal first to consult and afterward to go abroad. The result of the fire was that we were greatly afraid of being burned out again, not but what we could get insurance, perhaps, but the loss and interruption to business was more than a person could stand twice in a lifetime. Our determination was that our shops should be made absolutely fireproof, and the difficulty of doing that within reasonable cost and at the same time covering the area, together with the necessity of doing it along with other business, took a great deal of what you will be interested in—that is, the engineering end of the problem.

“The fireproof feature is this: The whole building, to start with, is of steel—that is, the framework—the foundation is all of concrete, and the sides and roof of concrete and steel. I was confronted, however, with one thing, that there was no roof-covering made at the time, that was entirely fireproof, but what weighed from 35 to 40 pounds per square foot, also including a system of purlins and sub-rafters, which were a necessity to hold the blocks of tile, etc. This necessitated a larger amount of structural material than we were willing to put in for this purpose, as we only need a cover to keep out rain, wind and snow. I made up my mind that it was not good sense to load the building down with from 35 to 40 pounds per square foot, besides providing for 30 pounds for snow and wind, and told our engineers to design for 15 pounds per square foot, and we would not exceed that for the roof covering. I found it impossible to get anything fireproof anywhere near this weight per square foot, and that forced me into finding, or designing, or doing something for this purpose while the building was going on, and, until the building structure was nearly up, no one knew what we were going to put on either the sides or roof. The theoretical thing in my mind was to make some thin metal that would hold a thin body of cement, not to exceed 15 pounds per square foot, that would be waterproof and fireproof, and capable of spanning about 5 feet from purlin to purlin. It occurred to me to make dove-tailed corrugations of sheet metal. The commercial end of making that was the difficult proposition, but I happened to strike on a method of accomplishing it which I will show you this afternoon. This material can be made so cheap, commercially, that it is now included as one of the branches of our business. To give you an idea of how little cement and steel it takes to make this roof-covering, I will say that it is composed of No. 24 dove-tailed sheet-metal (or ferro-inclave, as we call it) with corrugations only one-half inch deep, covered on the top and above the corrugations with a thickness of three-eighths-inch of mortar, one part of Portland cement and two parts of sand, and the under side plastered with adamant or cement plaster of the same thickness as the top coating, making the thickness over all about 1¼ inches, and the whole weighing only from 14 to 15 pounds per square foot. This covering will stand about 5 feet with a working load of 60 pounds per square foot, with a factor of safety of 5; in other words, when tested with 300 pounds per square foot the plaster on the under side will just crack; the same material, ferro-inclave, is not only used for the roof-covering, but also for the sides, gutters and ornamental work, fittings, cornices, etc. This construction, where only 15 pounds per square foot for the roof covering had to be provided for, saved us more than \$50,000. That is, this additional sum would have been required for the structural work of the building, in excess of what was actually used, if any of the other forms of fireproof roofs had been adopted.”

SIR JOHN VANBRUGH'S PIE HOUSES.

SIR JOHN VANBRUGH, the eminent and eccentric architect and dramatist, was the subject of a paper read by Mr. F. W. Nunn, Lee, at a recent meeting of the Woolwich Antiquarian Society. Additional interest was lent to the paper by the fact that the meeting was held at Vanbrugh Castle, on Maze Hill, Greenwich, or as it was formerly called “Bastille House,” or “the Bastille,” it being said that it was built by Vanbrugh in resemblance of a portion of the Bastille, which was demolished in July, 1789, and in which Vanbrugh himself, when a

young man, is said to have been once confined for about ten months. Mr. Nunn mentioned the fact that it was the custom in Vanbrugh's time for the architect to employ such workmen as he thought fitted for the job, to pay them himself, and call on his employers from time to time for money as it was required. As Vanbrugh was building this for himself he would naturally give it his best attention, and the other buildings close by, erected at the same time (A. D. 1717), doubtless grew up under Vanbrugh's immediate and continuous superintendence. Mr. Gilbert H. Lovegrove, in a prize essay to the Architectural Association, stated that Vanbrugh Castle was built of stock bricks, ornamented solely by keystones, impost, corbel-tables and string-courses in projecting brickwork, the whole somewhat resembling a fortification, a conception carried still farther by the crenelated or embattled wall which surrounds the garden and the turreted gateway. This picturesque old gateway, with its square turret on either side, was removed about a year ago for the purpose of widening the road, the frontage line being now set back. The staircase, as was frequent in Vanbrugh's designs, formed a prominent member of the main front, although it became as a consequence dark and inconvenient. By another staircase one reached the roof, from whence was obtained a beautiful view over London. Vanbrugh House, which stood on the opposite side of the road, a little to the left, and nearer Westcombe Park, was demolished about two years ago. It was an immense rectangular building, also of stock brick, with a circular tower at each end. Internally there was a long dark central passage opening into rooms on each side. The hearths were of marble, and the chimney-pieces were well carved in wood to simple designs.

The "Mince Pie House," now known as "Sherwood," still remains. It was one of the smallest of Vanbrugh's houses. The entire building is on the ground floor, and, besides containing several rooms of larger size and better proportions than the other houses, is much more comfortably planned.

Vanbrugh's style of architecture was only suitable to the largest of buildings, and was even then the occasion of much sarcasm and ridicule from the wits of his day; one of his buildings was likened to a dog-kennel, another to a pie, and a third to a coal-scuttle, a flat candlestick, a piece of floorcloth, a snail, a chaise, a tilt in a boat, a house of cards, a mouse-trap, and so on. This was doubtless the cause of the name Mince Pie House, just as the house which he erected from the ruins of the palace at Whitehall, in which he died in 1726, came to be known as "the Goose-Pie House" through Dean Swift, who seems to have observed it during the course of its erection, as he wrote in derision:

"At length they in the ruins spy
A thing resembling a goose pie."

That building thus obtained and retained the name of "The Goose-Pie House;" but in its declining days it was known as "the Pill-Box." Voltaire, who stayed three years in England, had knowledge of some of Vanbrugh's buildings, for he wrote that "They would be more comfortable if Vanbrugh had made the rooms as wide as the walls were thick." Sir Joshua Reynolds, the great portrait-painter, was one of the few who appreciated Vanbrugh's originality of invention. He writes that "In the buildings of Vanbrugh there is a greater display of imagination than we find in any other, and this is the ground of the effect which we feel in many of his works." Had Vanbrugh received a more sound architectural education, the probability is that his name would have occupied a more prominent position in the temple of fame.

The first notice of Vanbrugh as an architect was in 1701, when he furnished the design for Castle Howard for the Earl of Carlisle, who appears to have been his first employer of note. Castle Howard, with its south façade 323 ft. long, is said to be one of the finest examples of the Corinthian renaissance in England. The main building was not completed till 1714, but in 1704 the Earl of Carlisle, the then acting Earl Marshal of England, in appreciation of Vanbrugh's work, obtained for him the lucrative appointment of Clarenceux King-at-Arms. In 1703 Vanbrugh bought land in the Haymarket and built a theatre there called the Queen, in honor of Queen Anne. In 1702 Vanbrugh was appointed Comptroller of the Board of Works, which had as its surveyor-general the great Sir Christopher Wren. In 1705 Vanbrugh was appointed architect and surveyor, by the Duke of Marlborough, of the palace it was proposed to erect at Woodstock in commemoration of the victory of Blenheim, which is probably the largest domestic building in England, with a frontage 348 ft., a library 183 ft. long and a hall 67 ft. high. In 1716 he was appointed architect to Greenwich Hospital at a salary of £200 per annum, and he is said to have designed the centre of the more

southern range of the west front (King William's block) in red brick with stone dressings, and some of the external decorations of the Painted Hall are attributed to him. Vanbrugh Castle, Vanbrugh House and the Mince Pie House, as we have seen, were built in 1717. Sir John's chief architectural works numbered some forty-two, all curious and many of them great massive buildings.—*Builders' Journal*.

THE HOUSING QUESTION IN GERMANY.

THE housing question in Germany presents much the same problem for solution as in Great Britain. The migration of the people to the towns consequent upon the growth of trade has increased enormously the population of the towns, especially of those with more than 100,000 inhabitants, and housing accommodation has not been equal to the demand. Thus in April of the present year there was, says Mr. Consul-General Oppenheimer in his report on the trade and commerce of Germany just issued (No. 3,445, Annual Series), in Frankfort, 133 single-room lodgings available for 554 applications, so that not even one-fourth of the demand could be satisfied. The disproportion between demand and supply of apartments of two rooms was even greater. Only one-sixth of the demand could be met, and in the case of three-room apartments half the number of applicants only found what they sought.

The annual increase in the population of Germany numbers 800,000. These, as well as those already in existence, must be housed properly, and most of them must be housed cheaply. The rapid increase of the population has caused a rise in rents generally, so that, as with the similar classes in the United Kingdom, the poorer classes are spending a constantly increasing percentage of their income in the payment of rent. Delay in the solution of the housing question is dangerous in so far as it complicates the possibility of any remedies, for space is limited, and as far as it is required for cheap housing difficult to replace, once opportunities have been missed. What were suitable and available sites only a few years ago have been bought up by the speculative builder, who has produced luxurious houses along luxurious streets. Then the prices of building materials have risen, wages are higher, and the value of sites has increased. The Imperial Treasury has spent 15,000,000 marks since 1901 for the purpose of providing housing accommodation, but this expenditure was practically limited to cheap apartments supplied for Imperial officials at low salaries. The Home Office has in some instances encouraged the building of small apartments by letting sites on prolonged leases (*Erbbaurecht*) at reduced rental under the condition that artisans' dwellings be erected, but often, as in the case of Schömhölder Haide, in the north of Berlin, it has disposed of Treasury lands to builders and others at the best possible price, though suitable for cheap lodgings, and has thus missed rare opportunities. Many of the large factories have spent great sums in supplying their workmen with lodgings, often model dwellings. In some instances the area covered by such dwellings practically equals that of large villages, as in the case of the chemical works at Höchst; but the objection to the system lies in the fact that the tenancy ends with the contract of labor, and the workmen are thus easily robbed of the possibility of an independent attitude in questions arising between employer and employé.

In some parts of Germany building societies of a charitable nature were started with the purpose of building cheap dwellings for the workmen. Thus in Rhenish Prussia there exists 117 such building societies. The number of houses supplied by the societies amounted, up to April, 1904, to 4,242, containing 9,020 lodgings; 62.5 per cent. were built for sale, the others for letting. Both kinds were chiefly built on the plan of admitting two families. The rents are on an average 20 per cent. cheaper than the ordinary local rents. In the houses for sale the workmen live more cheaply too after the deduction of the payments made to capital account. Yet the financial position of the societies is in most cases satisfactory—71 of them paid an average dividend of 3.2 per cent. If the 9,000 families thus housed are on the average calculated to consist of five persons, 45,000 to 46,000 persons in Rhenish Prussia owe to these building societies healthy and clean houses, from which there is small danger of ejection, and where there is no fear of increased rents. But it was only when a bill was put on the table of the present Diet that an attempt was made to provide a remedy uniform for the whole kingdom.

The bill in one of its parts devises means to remove the causes which have so far deterred the builder from erecting small lodgings. The speculation in sites which is the chief reason for the

present high rents is rendered impossible by provisions concerning the planning of the streets, the building plans, the frontage line, etc. Whereas the present building plans generally favor deep sites, very wide streets, and consequently buildings, with a great number of apartments and courtyards, the new building plans are to be devised on a footing corresponding to the requirements of the district, so that quarters that are suitable for small lodgings shall be mapped out in shallow sites and streets of lesser width. As an inducement to the building of small lodgings the contributions towards the road-making are to be considerably reduced in all cases in which healthy and appropriate lodgings are built for the housing of families of small means. Another part of the bill regulates the police intervention in the case of bad and crowded apartments. In communities of 10,000 inhabitants and more, it is proposed to compel the police to frame lodging by-laws, and to give them power to frame such by-laws for communities with less than 10,000 inhabitants. These by-laws must regulate air-space, the separation of the sexes, the sleeping accommodation of employes and servants, etc. Provisions are also made for the inspection of lodgings by special officials, the communities with more than 10,000 inhabitants being forced to appoint a Lodging Board, consisting of competent persons, to carry out such inspection. Thus the bill tackles the housing question from three different points: (1) By means of building plans and building regulations; (2) by means of reduced taxation; (3) by the introduction and supervision of minimum demands concerning hygiene and morality. It is thought, however, that it does not go far enough. The provisions for cheapening of lodgings are considered by many to be insufficient; the reduction in the contribution toward road-making is considered an inadequate inducement to the builder; it is held that the lodging by-laws should be made compulsory in all communities instead of permissive where they do not number 10,000 inhabitants, and the question of windows has been entirely ignored. Yet the importance of this question of light may be gathered from the fact that in 1900 Berlin counted 24,000 so-called "cellar lodgings," so that 5 per cent. of its inhabitants were then lodged in cellars. There is nothing to show that the percentage is much lower in 1905.—*Journal of the Society of Arts.*

ILLUSTRATIONS

ST. THOMAS'S CHURCH, AFTER THE FIRE, FIFTH AVE., NEW YORK, N. Y. RICHARD UPJOHN, ARCHITECT.

SOUTH TRANSEPT AND VIEW FROM THE SOUTHWEST: ST. THOMAS'S CHURCH, FIFTH AVE. AND 53D ST., NEW YORK, N. Y. RICHARD UPJOHN, ARCHITECT.

PUBLIC SCHOOL, HASBROUCK HEIGHTS, N. J. MESSRS. WALKER & MORRIS, ARCHITECTS, NEW YORK, N. Y. PLANS AND SECTION OF THE SAME.

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SEVENTEENTH-CENTURY HALF-TIMBERED HOUSES, HERSFELD, PRUSSIA.

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ST. THOMAS'S CHURCH, FIFTH AVE. AND 53D ST., NEW YORK, N. Y., BEFORE THE FIRE. RICHARD UPJOHN, ARCHITECT.

NOTES AND CLIPPINGS.

THE "WHYPRESS" TOWER, RYE, ENG.—Rye is a curious old place and offers attractions to golfers and antiquarians—two very different tribes. Once it was a seaport and a strong fortress. Its Yprès Tower, which used to dominate both town and sea, is still standing to remind one of William of Yprès, who built it centuries ago. But the citizens have mostly forgotten him, and call their mediæval fortification the "Whypress" Tower without in the least knowing why. Now the tower no longer frowns

on the sea, but looks over a mile and a half of marshes between it and the channel, and incidentally over the golf-links. The streets of Rye are all uphill, winding, and so narrow that from the windows you can almost shake hands across them.—*New York Globe.*

THE ROYAL ACADEMY DEFENDS ITS CONTROL OF THE CHANTREY BEQUEST.—The members of the Royal Academy, after an inexplicably long period of delay, have issued a memorandum dated in February last on the report of the House of Lords' Committee with regard to the administration of the Chantry Bequest. They do not, as might be expected, accept all the conclusions arrived at by the committee with regard to the merits of the Chantry collection and other matters referred to in the report, but express themselves as anxious to meet suggestions it contains. They take exception to the proposed appointment of a committee of three to select and buy works on account of the Chantry Fund. Such an appointment would be in contravention of the will, and is open to other objections. The Academy think it is unlikely that such a committee would be broader in their views than the whole Council of Ten, or more impartial in the exercise of them, and besides this there is the practical difficulty that, since works of sculpture as well as those of painting are purchased under the will, both arts should be represented on such a purchasing committee, which would in that case consist either of two painters and one sculptor, or the reverse, and might consequently fail to command the confidence of the general body. The Academy propose, therefore, to appoint two or more sub-committees of not more than three members of the Royal Academy, each committee consisting of painters or sculptors alone, who would report on and recommend such works as are, in their opinion, proper to be purchased; the power of purchase remaining as at present with the Council. The Academy state that they have long been of opinion that it would be advantageous if the recommendation of the committee in their report, relative to the commissioning of works of sculpture from an original model already approved, could be adopted, but they consider that they should retain the right to refuse the finished work, if it should not in their opinion be equal to the model. The disadvantages arising from the clause forbidding the purchase of works otherwise eligible according to the terms of the bequest, but not entirely executed within the shores of Great Britain, are not, in the opinion of the Academy, of sufficient importance, nor of such frequent occurrence, as to demand any alteration in the will.—*The Building News.*

A MARINE USE FOR PORTLAND CEMENT.—The *Cement Age* tells of a novel use of cement, it being no less than repairing a hole in the hull of a British steamer. Recently at Newport News the steamer *Albarea* went into dry-dock for repairs, and it was discovered that a large hole through her bow, received through contact with a sharp pointed rock in the Straits of Magellan, had been temporarily filled with a mass of timber, canvas, ballast rock, and Portland cement, and that this temporary filling enabled the vessel, without further damage, to make her port. The cement was so strong that the chief of the hull construction at the dry-dock found that it would take some six weeks to chip it out with the ordinary appliances, and finally he was compelled to put in small charges of dynamite, and after three days of blasting the cement was at last removed without injury to the vessel.

FAILURE DUE TO EXPANSION OF CONCRETE AND STEEL.—Subsequently to the collapse of the concrete-steel reservoir at the Madrid waterworks in April last, it was observed that the main girders, connecting the columns of two other service reservoirs, were expanding under the influence of heat to such an extent that some of them had assumed a more or less serpentine form. Consequently many of the columns became seriously distorted, and after a few days some two hundred of these members were thrown down. This result occurred in June, but as access to the works had been strictly prohibited by the authorities, no personal casualties took place. The expansion was temporarily arrested by a reduction of the temperature and, so far, no further destruction has occurred. It is highly probable, however, that the remaining columns are doomed. The girders in question extend continuously over a length of nearly 600 feet, and, as the range of temperature in Madrid is fully 65 deg. Fahr., it is easy to see that the expansion of concrete in these reservoirs constitutes a most important factor, which appears to have been overlooked by the designers of the concrete-steel construction.—*The Builder.*

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, SEPTEMBER 16, 1905.

No. 1551.

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ONCE more the full bench of the Massachusetts Supreme Court gives welcome proof that in that State the recorded law is a thing to be observed and not broken or varied from at the pleasure of individual or corporation. If there ever could be found a reasonable excuse for shutting one's eyes to the evasion of stated stipulations, it would be in the case where the material welfare of so important and deserving an undertaking as the Massachusetts Institute of Technology is concerned, an educational institution in whose progress and well-being not only Boston but the entire State is deeply interested. Our readers already know that the Institute, owing to its growth, finds itself seriously hampered through not knowing how and where it may expand its buildings, so as to provide the house-room and shelter the students require; for, owing to the terms upon which it occupies the site whereon its two oldest buildings are erected, it cannot extend its buildings over more than one-third of the assigned area. The true solution of the problem seemed to be a removal to a more commodious site or a modification of the terms of the grant, which would enable the Institute to occupy more of the site than the State originally intended, and so a legislative enactment was finally secured which was believed to accomplish these ends. That this was a mistaken belief the Supreme Court has now definitely and without qualification decided, and has made it plain that when Massachusetts enacts that a given site "shall be reserved from date forever" it actually means "for all time." The Institute holds its site actually in mortmain, and the only alternative to staying upon it is to forfeit it to the original grantor. For, "although the Commonwealth is a Sovereign State, it can no more change the grant thus made than can an individual."

THE owners of abutting real-estate through whose procurement this very emphatic decision is formulated, their plea being that they had bought and improved their own property in the belief that the area upon which it faced could be occupied only in accordance with the known and plain terms of the original grant, have not acted with unadvised selfishness. They have done a public-spirited act and, for one thing, have established the fact that the "rights" of trade and business and the desires of real-estate men are not paramount. Even if the Institute should elect to replace its two buildings with a new one occupying an exact third of its property, but carried up to the full legal height—one hundred feet—for that neighborhood, the value of the abutting properties would not be materially affected nor any great amount of light and air lost to them. But the actual gain in floor-space to the Institute thus secured would be so small in comparison with the cost of building that this solution is hardly likely to be undertaken, and the problem before the corporation is as far from settlement as ever.

THE courts, both in Massachusetts and elsewhere, have recognized the principle that restrictions upon real estate established by private grant can be suffered to lapse and be extinguished, when the end and aim of such restrictions has been nullified beyond dispute by changes in the surrounding conditions effected by the passage of time. Quite recently, through the medium of a friendly lawsuit, the owners of certain properties on the upper part of Beacon street, Boston, were in this way allowed to advance their street-fronts to the normal city building-line, in spite of the perpetual restrictions upon the sites contained in the recorded title-deeds. This new decision seems to make plain that, although the higher power residing in the Commonwealth or in the law itself may cancel or denounce, as it were, such private stipulations, it cannot, once it has divested itself permanently of a certain power reassume that power under any possible conditions. This is a particularly happy decision, when the value and permanency of "breathing-places" in cities is considered, for there is nothing which should be so jealously guarded for the benefit of the entire community as the inviolability of an established breathing-place, just as there is nothing which the selfish thoughtlessness of the real-estate improver is so ready to attack. In all future enactments establishing parks, squares and open spaces in a city, the drawers of the bills that seek to establish them will do well to include a clause that declares that the space is to be "reserved from sale forever."

NEW YORK has of late secured for itself rather a bad eminence because of the ease and frequency with which its buildings tumble down, the latest to collapse being an old three-story brick house on Grand street, occupied, which had been, it is said, weakened by blasts fired in an adjacent excavation. A wrecking-gang from the

Building Department had just begun to fix shores against the walls when the collapse, which caused the death of three persons, occurred. But New York is not the only place where evil chance waits on careless building operations. Half a dozen men were carried down, and some of them fatally hurt, by the fall of the wall of a new brewery building on North Pennsylvania avenue, Pittsburgh, last week. And even Boston, where such accidents are of the rarest, was treated to a very spectacular sight when a quick-witted motorman of the elevated road stopped his train just in time to prevent its being buried in the ruins of a four-story brick carriage-factory, which fell partly across the tracks, at the corner of Washington and William streets, Roxbury. In this case the building was undergoing alterations, so that, fortunately, none but the builders' workmen were about the place, and, as it was Saturday afternoon, very few of these. Alterations and the shoring of endangered buildings are almost always risky undertakings, and they demand the handling of only thoroughly trained and competent mechanics, whereas, since it is not worth while to spend much money on "the old shells," they are too often entrusted to incompetent jobbers and botchers, simply because these undertake to do the work without the outlay of much money.

ON the heels of these accidents—still another building slid into an adjacent excavation on East 31st street, New York, this week—comes the news that Eugene Allison, the responsible promoter of the Darlington Hotel, that collapsed in March, 1904, has been found living, and apparently prospering, in Guadalajara. As Mexico does not grant extradition for manslaughter, for which crime he was indicted, the community cannot have the benefit of whatever deterrent effect his punishment might have upon other speculating real-estate improvers.

THE recent return by the Russian Government of the books looted from the library of Prince Radziwill, at Warsaw, by the troops of Catherine II, more than a century ago, would, but for one thing, be worthy of note merely as a very belated piece of decency, which should actually have dated back nearly to the final partition of Poland. The significant fact that the books were returned in the boxes in which they left Warsaw and which have remained unopened for more than a century calls attention once more to the iniquity of looting the higher products of the mind, in spite of the proof that history gives that the process is one of potent force in advancing the intellectual and artistic growth of the looters. In this particular case, it is hardly surprising that the semi-barbaric people over whom Catherine ruled did not at once undertake to improve themselves by a sedulous reading of the Radziwill books. But there is a certain analogy between these undisturbed boxes which have rested for a century or so at St. Petersburg and the thousands of unopened cases that are known to cumber the cellars and attics of the Louvre and other public buildings in Paris and elsewhere, cases which, to a large extent, contain mainly the artistic spoils of those chartered and semi-legalized looting raids commonly known as archæological exploration expeditions, but some of which are very likely to hold some of the artistic

plunder gathered by Napoleon, and known to be still missing from their legitimate homes. The Radziwill case is an excellent example of the real uselessness of such spoiling of the Philistine in the name of promoting intellectual or artistic growth in the homes of the spoilers.

SPEAKING of collections and the difficulty of finding housing for them, we are reminded of the curious legal entanglements in which the Union Centrale des Arts Décoratifs found itself involved not long after it succeeded in securing space in the Pavillon de Marsan. A few years ago, M. Peyre bequeathed to the Union his large and very valuable collection and it, like the other collections of the Union, is now, we suppose, national property. Still, the fiscal authorities levied a succession-tax upon it, in the amount of two hundred and sixty thousand francs, which, naturally, the heirs declined to pay, since why should they both lose the collection and pay for losing it? And why should the Union pay, since the collection was to become national property? The fiscal department stood firm—or nearly so—and declared some sort of a tax must be paid by somebody and, to make it easier to do so, first reduced its claim to one hundred and eighty thousand and then to eighty thousand francs, but still with no chance of getting paid. Seemingly the only way red-tape can be satisfied is to have the Peyre collection, already national property, seized by the government and sold, a process which might satisfy the legal, while it must confound the lay, mind.

ANOTHER of the worthy class of men who have done much for their time and fellow-men in this country, the architects who began life at the carpenter's bench, has just died in his seventieth year. Mr. Marcus F. Cummings has long been known as the oldest established and one of the busiest of the architects of Troy, N. Y., in which city and its neighborhood he built during his long career many buildings which won for him a satisfying reputation in that immediate community, amongst others the city-hall, the court-house and the high school.

THE editor, newspaper or other, has more than once undertaken to make it more difficult for the average house-building architect to make a living, by publishing designs for cheap houses—so-called; but it has been left to the conductor of the Hornellsville, N. Y., *Times* to invent a new way of enabling the public to save that dreaded "per cent." on which the practising architect is supposed to batten. The *Times* has been at the trouble to procure "eighteen sets of working drawings," one-half of which have been placed "at Sutherby's drug-store" and the other half "at Mrs. Sweeney's," where they will remain for one week and then Mrs. Sweeney and Mr. Sutherby will exchange drawings. Hornellsville is expected to build "more houses during the next twelve months than during any three years of its existence," and the *Times* man thinks it "is the duty of every citizen to help on the movement," and, accordingly, has established this reciprocating architectural exhibition, with the aid of Mrs. Sweeney and Mr. Sutherby. It is an ingenious way of beating the over-grasping architect and may, possibly, result in a real beautification of Hornellsville, if the working-drawings are perused with sufficient diligence.

SWEDEN TO-DAY.

PROBABLY no architect entered the Swedish section in the Fine Arts Building of the Chicago Exposition without asking himself what manner of work the architects do in a country which produces artists capable of what he saw there. Nor was the St. Louis exhibit one whit behind. The Swedish painters and sculptors have for over a decade stood in the front ranks.

But Sweden is a small country, as population goes, and the education of an architect is a matter of millions. A painter may spoil many a canvas by his efforts and no one be a loser but himself. Architectural experiments are costly and an architect's education is not finished with his school thesis. All the more is the observing traveler impressed by the splendid buildings to be seen in all parts of this supposedly poor country, and even more by the really good qualities of design, which in very many cases are highly personal.

There is to-day in Sweden a group of well-educated, far-traveled, brilliant young architects, some now in the prime of life and others still too young to have done much. No country gives its people a better education. As on the one hand the percentage of illiteracy is the lowest among the nations, so is the higher education equal to the best. When a young man training for architecture has finished his college course, he spends four years in the Technical High

competition for the Royal Medal, which entitles the holder to three years' foreign travel. It seems that, medalists or not, most of the young men manage to spend a year or two in southern Europe, and several have supplemented their home training with some years in American offices. The average number of students in the Academy is only fourteen or fifteen, because the many competitions and examinations have weeded out the weaklings. The four or five yearly graduates form a select group.

Young men who cannot afford to spend so much time, but still wish to become draughtsmen, enter the ordinary technical schools where the standard of admission is lower. These men seldom develop as independent architects. Architects and draughtsmen thus receive separate training.

There are readily noticed three tendencies among the modern architects. First, there is, as with us, the "eclectic" school, and foremost among the eclectics are Clason, Aronson, Johanson and Josephson. These men go where they think the suggestions for the problem in hand are the best. One day it is Italy, then Isle de France or England, and next time it is Spain or, perchance, our own

Richardson may furnish the inspiration.

The "national" school contends that the only way is to continue the tradition of their own country reverently and intelligently. Hagstrom, Liljekvist, Wahlman and Lindegren have done splendid work based on suggestions from the past. It is



ACADEMY OF FINE ARTS, STOCKHOLM.
Axel Anderborg, Architect.



APARTMENT HOUSE, STOCKHOLM.
E. Josephson, Architect.



NORTHERN MUSEUM, STOCKHOLM.
Prof. I. G. Clason, Architect.

School under the careful and thorough instruction of Prof. Clason, himself a master of design, an art critic and historian. Only about one-half of the applicants are admitted, the examination being competitive. After finishing this course, the best students spend three years in the Academy of Fine Arts, devoting themselves entirely to design. In the last year there is a

certainly a worthy effort to link our day with yesterday. Among the motives that have appealed to these men are the strong and bold roof-lines, often gracefully curved and freely broken up with towers and turrets, dormers and chimneys. A characteristic treatment of the roof is seen in the break at about half height, with a foot or two vertical, and often pierced with

windows. This motive is exemplified in several of the illustrations. It is an echo of the clerestory. Another suggestion is found in brick walls where a pattern-work of sunk panels has the

not guilty of slavish imitation, as is at times true of the last group. This may be called the "individualistic," and probably includes the most resourceful of the designers, even if some of



M. E. CHURCH AND APARTMENT HOUSE, STOCKHOLM.
E. Lallerstedt, Architect.

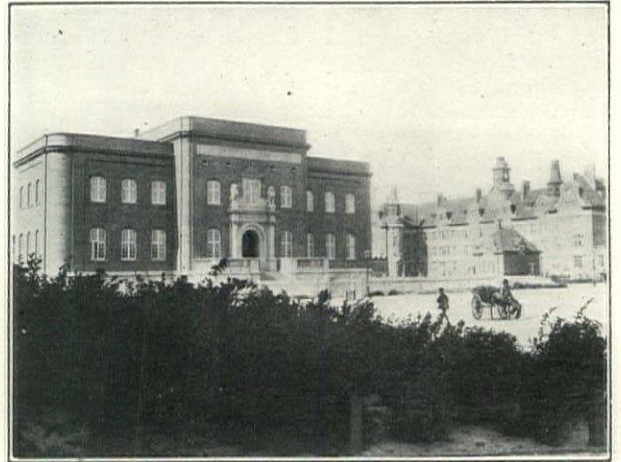
background plastered to bring out the design. They call this "Baltic." For the interior there are endless suggestions in the



RAILROAD OFFICES AND APARTMENT HOUSE, STOCKHOLM.
E. Lallerstedt, Architect.

ceilings, both paneled and plastered, the wainscoting and doorways of the early Renaissance.

It must be said, too, in all fairness, that the nationalists are



COURT HOUSE, MALMO.
Axel Anderborg, Architect.

their work is so new that the shock when first seen is difficult to get over. If they always did as good work as Boberg, Wick-



EHRENBORG RESIDENCE, NORRKOPING.
Lofgren, Paulson & Otterstrom, Architects.

man and Lallerstedt, one would have little fault to find. It is the work of these men that runs parallel with l'Art Nouveau.



ROYAL OPERA HOUSE, STOCKHOLM.
Axel Anderborg, Architect.

But hasten to read on, for such as the new art has been interpreted in Germany, it is all but unknown in Sweden. These men are to be classed apart, much as, with us, Sullivan, Eyre, Grey,

Cope and others who have perhaps only this in common—that each one is capable of imparting something of himself to his creation.

There was a time when the use of real brick and stone for the face of a building was unknown in Sweden. It was the era of the pseudo-classic, when nothing would "go" except the "orders" and an accompanying cut-and-dried system of details, invariably executed in stucco. One is sometimes tempted to ascribe the dullness of the architecture to the use of this method of building. A few years ago, Professor Clason, then quite young, made a bold effort to break away and introduced real stone in some apartment-houses. It is worth noting that he found, when looking for suitable material, just one quarry in a country with limitless supplies of the finest kind of granite, sandstone and limestone. To-day, all that has changed and new buildings of any note, at least public structures, are always of native stone or brick.

Curiously enough, stucco has really lost nothing. In place of being used for senseless imitations of Italian forms, this material has now come to its own, when handled by masters of design. They use it in broad masses, sometimes colored, as a background to set off the grouped windows. Recognizing its plastic qualities, they concentrate their ornament and use flowing forms that are in harmony with the natural manner of working in this material. Sgraffito is also used, notably in friezes, where good effects are obtained by scratching patterns through a light top-coat to a dark coat beneath.

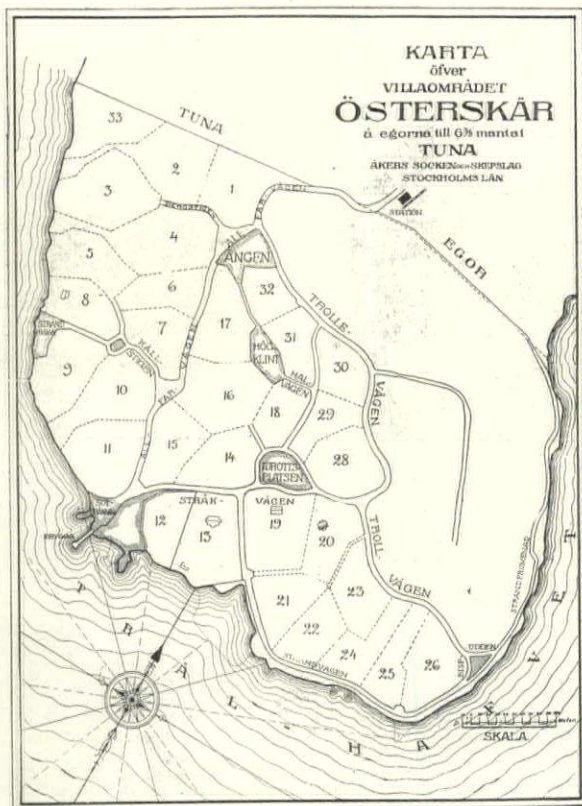
Although there is no licensing of architects, building is very thorough. A general law obtains throughout the whole country. Local conditions are provided for by supplementary regulations

use of brick walls, as they are considered the best of fire-retardants.

It is well known that labor in Europe is paid hardly more than half as much as here, and yet building is nearly as expensive. Materials are higher, progress is slower and the average workmanship better, or at least more thorough. It is therefore

all the more creditable that so much money is put into building, notably public structures. Take the new public school at Sala, completed last year. This is only an apartment-house, but about one-half of the entire building is given over to what some call the fads of school-teachers. Besides the eight class-rooms, there is on the ground floor a large kitchen with adjacent dining-room for the cooking-school. In this kitchen are four double ranges. On the same floor is a fairly large double assembly-room, two rooms for teaching Sloyd to boys and one for girls. Then there is a steam-bath room, built according to old accepted rules, a shower and a plunge. Above is a large, very complete gymnasium running through two stories, with a gallery at one end. All this in a small city of eight thousand or nine thousand people. In a neighboring city about twice the size, a new school was being erected with fireproof floors and partitions. Nearly all schools in Stockholm are equipped with complete baths and every child takes a bath once a week. These baths are compulsory, but only as a matter of form, for a Swedish steam-bath, followed by a shower and a

plunge, is one of the delights of existence. It is intended to derive some income from the school baths in Sala, by opening them to the public when not required by the children. School-houses cost from \$75 to \$100 per child.



A SUBURB NEAR STOCKHOLM.



A PUBLIC SCHOOL, STOCKHOLM.
G. A. Nölsson, Architect.

enacted by each city. As an instance of the strictness of the laws, it may be noted that no wooden stairways are permitted inside of city limits. Stairs are usually of stone or cement and are carried by brick walls. And there is no skimping in the

As labor is cheap, machine-made stuff is more rare than with us. The result is that architects can afford, even in quite ordinary work, to indulge in "special design." The extra cost is not of any moment. In fact, standard designs of pews, pulpits,

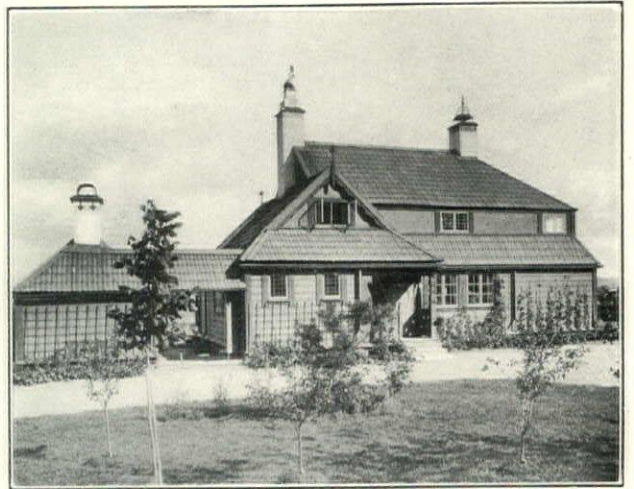
mantels, etc., are nearly unknown. This is certainly no small advantage.

From the architect's point of view there are some advantages in a paternal system of government. It is this makes schools,

where the natural conditions of valleys, hills, rivers, railroads, existing buildings, old roadways and other circumstances influence the final appearance. Several new cities have been planned *de novo* by the architect Hallman, and at least two cities, Gothen-



SUMMER COTTAGE OF ERNST STENHAMMAR, ARCHITECT.



SUMMER COTTAGE OF L. WOHLMAN, ARCHITECT.

as at Sala, possible in a country with comparatively few natural resources. Then, too, in such a country the government controls many of the public utilities and can bring the administration of these under one roof. This is often a great gain. There is a very small place called Floda which has a railway-station far better than those we provide in places many times larger. But under the same roof is to be found passenger and freight offices, express-office, post-office, telephone and telegraph offices. This tendency to combine is quite noticeable even where not as natural as in this case. Nearly all school-houses, stations, banks, etc., have rooms used by the people in charge. In fact, many new banks, for purposes of revenue and to make a showing, run up several stories in height and rent the upper floors as apartments. And even the cities, at least the smaller ones, combine apartments with the city-hall or court-house, for purposes of revenue. There is, however, considerable danger of giving public structures a domestic air by this proceeding.

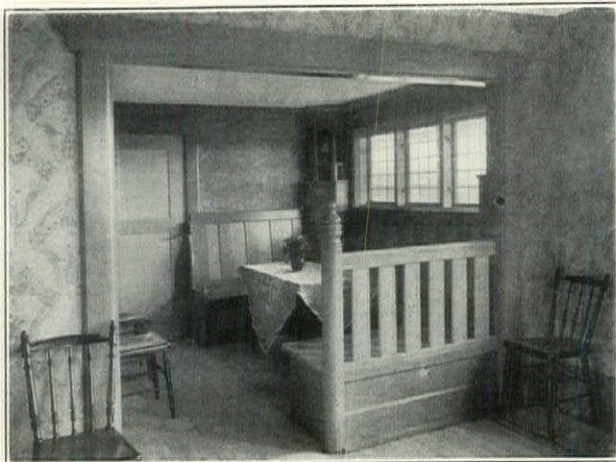
burg and Helsingborg, have instituted competitions for the best scheme for future extension of their limits.

The newer villa-architecture is quite notable. Somehow, the Swedes have learned—even the carpenter builders know how—to place suburban, seaside, or mountain residences so as to nestle down snugly among the surroundings, much as though grown right up from the ground. The original clump of pines, firs or birches is preserved as much as possible, and just enough of the house, with its flag-pole, is seen as to excite the curiosity of outsiders, and yet give the dwellers a view to the outer world. It is interesting to see in the accompanying plat how even the speculative land-agent tries to follow the contours of the land. And then, too, how cleverly he manages to give a little bit of water-front even to a plat of ground rather far inland, for bathing and sailing are passions with these people.

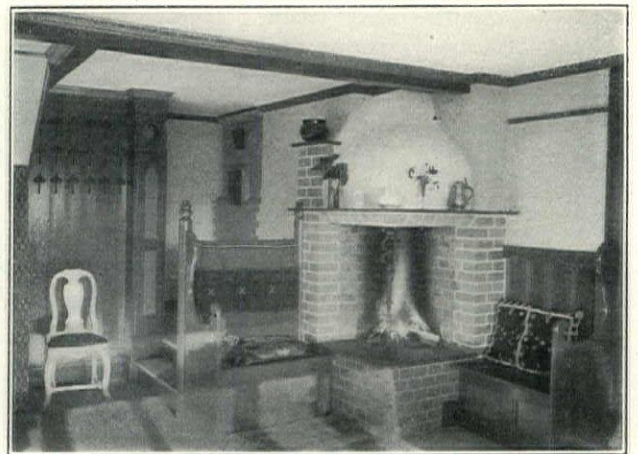


RESIDENCE OF COUNT VON HOLWEYLL, STOCKHOLM.
Prof. I. G. Clason, Architect.

It is quite impossible to ignore the name of F. W. Scholander. He was really the founder of the present movement for better



THE DINING CORNER: COTTAGE OF L. WOHLMAN, ARCHITECT.



COZY CORNER: COTTAGE OF L. WOHLMAN, ARCHITECT.

Not only the architects, but what is more to the point, the city fathers have begun to realize that there are two ways of planning a city, one using the engineers' checker-board, and one

things in architecture. By nature a poet, and by nature and training an architect and painter and a man of strong personality, it was inevitable that his influence as professor of archi-

ecture for a generation should be great. Nearly all of the older architects were guided in their early years by him.

A worthy successor was found in Professor Clason, a man of great energy, a designer of rare taste, highly eclectic and refined, and often original, he stands easily a leader in the profession. Time and again is he called in as a judge in competitions, and as a forceful and elegant and epigrammatic writer and historian he stands in every way for that which is best and highest in his profession. In word and in deed Professor Clason has for years held the ideals of a real architect in the very limelight of publicity. And an educated public has come to back him. A new building, especially if it is public, attracts attention and the closest scrutiny. Woe to the luckless designer if he has nothing to say or if he says it in a bungling manner. And, again, the need of praise if deserved is not withheld. Honest criticism and honest praise, these are great things to spur any one.

OLOF Z. CERVIN.

PERPETUAL RESTRICTIONS UPON REAL ESTATE.

THE CASE OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

THE Massachusetts Institute of Technology, says the Boston *Herald*, can neither sell its land on Boylston, Clarendon and Newbury streets, on which the Walker and Rogers Buildings of the Institute now stand, nor build upon more than one-third of it, according to a decision rendered by the full bench of the Supreme Court, September 6.

Cecil P. Wilson and Mary I. Wells, owners of dwellings on Newbury street, opposite the Institute's land, are granted injunctions, sought by them, restraining the Institute from building upon more than one-third of the area it owns and occupies.

The Institute's land is held bound down by these restrictions, which were a part of the original grant of the land made to it and of the adjoining land of the Natural History Society, by the Commonwealth in 1861.

The Institute having outgrown its present quarters, found it must obtain larger accommodations. It had not sufficient means to buy land elsewhere and maintain its efficiency at present, so it decided upon a plan to erect new buildings upon the area it was granted in 1861, and sought legislative sanction of its plan. A bill offered in the Legislature of 1903 met with strong opposition by owners of land abutting on those streets which face the land of the Institute and the Natural History Society, but it was finally passed. It purported to release the Institute from the building restrictions, and gave it a right to sell its land.

The abutters carried the fight into court. Maintaining that the Institute's land was bound by equitable restrictions preventing it from building on more than one-third, and that those restrictions created rights of light and air in favor of their lots, they asked the court to stop the Institute by injunction from covering more than one-third of its land with buildings.

The Institute held that the restrictions imposed by the original grant were not for the benefit of surrounding lot-owners, but were only conditions of the Commonwealth's grant, and that the Commonwealth controlled the situation created by them and could clear it up, as it purported to do by the 1903 legislation.

The cases were argued last December, and after ten months' consideration, the lot-owners win a victory in a decision given by a majority of the court. Two of the seven judges—Judges Morton and Hammond—dissent. The opinion of the majority is written by Judge Loring. This holds that the original grant imposed restrictions requiring the square comprising the lands of the Institute and the Natural History Society to be "kept from sale forever," and confining the buildings of the societies to one-third of their respective areas. The Commonwealth could no more change the original grant so made, the court holds, than could an individual.

The Court says: "In construing this act (Stat. 1861, Chap. 183) the first fact and the most important consideration is that the grant to these two societies [M. I. T. and the Natural History Society] was not to cost the Commonwealth a penny, and that this was to be effected by dealing with the square granted to the societies in such a way as so to enhance the value of the surrounding lots that they would yield as much as, or more than, the aggregate value the two had under the conditions prevailing before Stat. 1861, Chap. 183, was enacted. And it is perhaps of some interest that this scheme was suggested to the Commonwealth by the petitioners for these grants, including among them the petitioners for the incorporation of the defendant Institute.

"It is stated in the report of the committee of the Legislature to whom these petitions for a grant of land were referred: 'According to the plan of the memorialists, sufficient space is to be reserved to leave wide openings around the buildings of the societies.' And again: 'Common experience shows that such open, ornamental grounds surrounding the buildings, together with the attractive exterior of the latter, could not fail to increase the value of the adjacent lands, and to this extent would reimburse the treasury for the space withdrawn from sale. As regards the amount of this enhancing influence, your committee has been furnished by the memorialists with a large array of facts derived from the sales of lands on the Back Bay and other open parts of the city, going to show that improvements of the kind contemplated have been found in every case not only to hasten the sale and occupation of the adjacent lands, but to add largely to their market value, making the net proceeds of the adjacent lands in most cases as great, or even greater, than the value of the total area, supposing no such reservation to have been made.'

"Stat. 1861, Chap. 183, adopted to carry into effect this scheme of the memorialists (including the defendant institute), provided, first, that the square in question 'shall be reserved from sale forever;' second, 'and kept as an open space, or for the use of the two societies,' and third, 'the above-named societies shall not cover with their buildings more than one-third of the area granted to them, respectively.' The plaintiffs contend that these declarations were addressed to the purchasers of the surrounding lots as the basis on which those lots were to be sold, and were made for the benefit of such purchasers, and that having bought on the faith of them these purchasers are entitled to have them specifically enforced.

"The defendant, on the contrary, insists that, on a fair construction of the provisions of the act, the Legislature intended to keep, and did keep, the control of all restrictions in its own hands, and that the value of the surrounding lots was to be enhanced by the square in question being physically laid out before they were sold, and that the square was to continue in that condition so long as the Commonwealth, having regard to the interests concerned, should think it ought so to continue, and no longer; that Stat. 1903, Chap. 438, was an exercise of the control so reserved, and brought to an end as of right the advantages for which the purchasers of the surrounding lots paid an enhanced price.

"When the defendant contends that in statutes of 1861, Chap. 183, the Legislature kept the control of the whole situation in its own hands, it relies on the fact that, having regard to the words 'further conditions' in Sec. 6, what are called 'stipulations' in Sec. 4 are really conditions, and being conditions, the subject matters covered by them are matters between the Commonwealth and the grantees, and between them alone.

"Were that the whole story, the result would not necessarily follow. The fact that a provision of a deed is put in the form of a condition, and in no other form, even when coupled with an express statement that the 'non-fulfilment or breach' 'shall work a forfeiture of the estate hereby conveyed and reinvest the same in the grantor,' is not decisive against it operating as an equitable restriction in addition to it operating as a common law condition. * * * The same principle would govern in case of a grant made by act of the Legislature. * * *

"We come then to the question of the true construction of the act, Statutes of 1861, Chap. 183.

"In the first place, it is provided (and this provision is in Sec. 3 and is not one of the stipulations of Sec. 4, nor one of the 'further conditions' of Sec. 6) that the square in question 'shall be reserved from sale forever.'

"It is true that the only thing here complained of is a threat by the defendant Institute to build over more than one-third of the area granted to it. But the right to build over more than that area, and the right to sell the whole area to others to be built over by them, is treated in Statutes of 1861, Chap. 183, as one and indivisible, and no distinction is made in Statutes of 1903, Chap. 438, between the right to build over the whole area and the right to sell the whole area to others to be built over by them. The two rights alike are granted to the defendant Institute by the act of 1903. The true construction of Statutes of 1861, Chap. 183, cannot be determined without considering the validity of the provision of Statutes of 1903, Chap. 438, which permits the sale by the defendant Institute of the whole area to others, to be built over by them.

"In construing Statutes of 1861, Chap. 183, we start first with the declaration that this square was 'to be reserved from sale forever.' And having in mind the purpose for which Statutes of 1861, Chap. 183, was enacted, we are of the opinion that this was a declaration addressed to future purchasers of surrounding lots, to induce them to pay for those surrounding lots more than they otherwise would pay for them.

"We next come to the declaration that the square which is 'to be reserved from sale forever' is to be 'kept as an open space or for the use of' the two societies, and that 'the above-named societies shall not cover with their buildings more than one-third of the area granted to them, respectively.' These provisions state the details of what is to be done with this square which is 'to be reserved from sale forever,' and like that declaration are addressed to future purchasers of surrounding lots. Being details, the duration of them is fixed by that of the main provision of which they are details, unless there is something to control that result. * * *

"Apparently, the Legislature thought that the best results could not be secured to the purchasers of surrounding lots unless some one person or body could act for all of them in the matters of detail, and for that reason it intrusted the matter of dealing with the details to the Governor and Council. Apparently, the Legislature further thought that the best way of enforcing compliance with directions as to details so made was to give to the Governor and Council a right of re-entry on non-compliance with the directions adopted by them; and it gave such a right of re-entry. But that did not interfere with the declarations (on which these surrounding lots were to be sold) constituting a right in the purchasers of them, namely, that this square was 'to be reserved from sale forever,' and if not used as an open space it was not to be covered by buildings to an extent greater than one-third its area. The result is that the design of the buildings to be erected, the laying-out of the grounds and the proper maintenance of both are matters left to the discretion of the Governor and Council. But the broad principles were not left to them.

"Under the Statutes of 1861, Chap. 183, the Governor and Council were authorized to approve such a building as they saw fit; and they might give their approval to what might be thought by others to be the laying out of the grounds in a way injurious to the surrounding residences, and they might allow the grounds to fall into what might be thought by others to be a deleterious state of maintenance. On these matters of detail their decision, honestly exercised, is final. But they have not now and never had jurisdiction to abridge the rights of the purchasers of surrounding lots, first, to have the square 'kept from sale forever,' and, second, in case it is not used as an open space, to have the buildings of the two societies not cover 'more than one-third of the area granted to them respectively.' Such, in our opinion, was the intention of the Legislature in enacting Statutes of 1861, Chap. 183, and that is what the Legislature provided by that act.

"It is true that the Statute 1863, Chap. 226, repealed Secs. 8 and 9 of Statute 1861, Chap. 183, requiring the two societies to make good the deficit in case the amount realized from the sale of the surrounding lots under Statute 1861, Chap. 183, did not include the value of those lots, plus the value of the square here in question before Statute 1861, Chap. 183, was enacted; and that all the lots (with the exception of those on Berkeley street, sold before the enactment of Statute 1861, Chap. 183) were sold after the repealing act of 1863. But the repeal of these sections was not intended to change the scope of the act (Statute 1861, Chap. 183). It was intended to release the societies from a burden which was assumed, and rightly assumed to have ceased to exist. As was said by the commissioners in their report of 1863, when speaking of the sales made in the previous year, 'the policy of this repeal was justified by the sale' on account of the great rise above the appraised values—a rise, which was created by the scheme of Statute 1861, Chap. 183, in favor of the surrounding lots.

"We are of opinion, on the facts stated, the plaintiffs have sustained the burden of proving that the surrounding lots generally and the lots now owned by them in particular, were sold and bought under Statute 1861, Chapter 183; and that they became entitled by such purchase to the benefits granted to them by that act, including the right to have the buildings of the defendant corporation confined to an area not exceeding one-third of the land assigned to it by Statute 1861, Chap. 183.

"Although the Commonwealth is a Sovereign State, it can no more change the grant thus made than can an individual. That has been the law, at least since Dartmouth College *vs.* Woodward, 4 Wheat, 518. * * *

"The plaintiffs are severally entitled to a decree, with costs, enjoining the defendants from proceeding with the erection of any building or buildings covering more than one-third of the area assigned to it by Statute 1861, Chap. 183. So ordered."

John C. Gray, E. L. Rand and Roland Gray for plaintiffs; George and W. L. Putnam for the Institute.

ILLUSTRATIONS

SUNDSVALL'S PRIVATE BANK AND ENTRANCE TO THE SAME, STOCKHOLM, SWEDEN. MR. G. WICKMAN, ARCHITECT.

THE PLUNGE-BATH AND PRIVATE GARDEN: CENTRAL BATHS, STOCKHOLM, SWEDEN. MR. W. KLEMMING, ARCHITECT.

ST. MATTHEW'S CHAPEL, STOCKHOLM, SWEDEN. MR. E. LALLERSTEDT, ARCHITECT.

BANK BUILDING, NORRKOPING, SWEDEN. MR. G. WICKMAN, ARCHITECT.—APARTMENT-HOUSE, STOCKHOLM, SWEDEN. MESSRS. HOGSTROM & EHMAN, ARCHITECTS.

THE HOUSES OF PARLIAMENT, STOCKHOLM, SWEDEN. MR. ARON JOHANSON, ARCHITECT.—ROSENBAD RESTAURANT, BANK, STORES, ETC. MR. FERDINAND BOBERG, ARCHITECT.

AN ENTRANCE, STOCKHOLM, SWEDEN.—ENTRANCE TO THE EHRENBORG RESIDENCE, STOCKHOLM, SWEDEN. MESSRS. LOFGREN & POHLSON, ARCHITECTS.

COURT-YARD: HOUSE OF COUNT VON HALYWEYLL, STOCKHOLM, SWEDEN. PROF. I. G. CLASON, ARCHITECT.—VARIETY THEATRE, STOCKHOLM, SWEDEN. MR. G. WICKMAN, ARCHITECT.

ENTRANCE TO APARTMENT HOUSE, STOCKHOLM, SWEDEN. MR. E. JOSEPHSON, ARCHITECT.—A BANK ENTRANCE, STOCKHOLM, SWEDEN. MR. G. WICKMAN, ARCHITECT.

Additional Illustrations in the International Edition.

HOUSE OF W. CAMPBELL CLARK, ESQ., BROAD STREET, NEWARK, N. J. MESSRS. HOWARD & CAULDWELL, ARCHITECTS, NEW YORK, N. Y.

NOTES AND CLIPPINGS.

THE BRITISH SCHOOLS AT ATHENS AND ROME.—For a further period of five years the English Treasury has renewed the annual grant of £500 to the British School at Athens. The promoters of the movement hope that an influentially signed petition for a similar grant to the British School at Rome may be favorably considered.

PHOTOGRAPHS OF RECENT FINDS.—In the interest of the public in France, as well as abroad, it is a great pity that the Academy of Inscriptions and Belles-Lettres is such an extremely close and conservative corporation in regard to supplying photographs of the objects brought to light in the course of these highly important excavations. The Academy, which in this respect pursues a dog-in-the-manger policy, absolutely refuses to allow the publication of any photographs until they shall have first appeared in its own regular official bulletins. This causes vexatious delay, and certainly takes the edge off the public appetite for these rare and highly valuable archæological treasures. The Delos Venus, for instance, is one of the finest works of ancient Greece, but the Academy of Inscriptions and Belles-Lettres, with rigid cast-iron regulations worthy of the tribunal of the Areopagus from which the venerable "Old Mortality" antiquarians who compose this society of modern archons draw many of their inspirations, withholds the photographs from the public in order to add to the brilliancy of its own reports, which, to use a nautical expression, make their appearance "a long way behind the lighthouse." This is greatly to be regretted, because the Academy, and notably the School of Athens, which labors under its auspices, is accomplishing splendid work.—*C. I. B. in N. Y. Tribune.*

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, SEPTEMBER 23, 1905.

No. 1552.

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IT is with particular pleasure that we learn that the plans for the first of the improved tenement-houses that are to be erected through the generous philanthropy of Mr. Henry Phipps provide play-rooms for the children of the tenants, space that will accommodate two hundred children having been set apart for them in the basement, to be furnished eventually with such simple and unbreakable apparatus as can reasonably be provided. This is a step in the right direction; but there is need for more than this, and New York, for instance, should not rest content with having provided a few open playgrounds, as many public baths—small or moderate in size—and a very few "recreation-piers." All of these sanitary aids of good morals are excellent, but they come into play, in the main, at those very seasons of the year when the children for whose well-being they are provided are living under relatively favorable conditions. The epidemic sicknesses that create such havoc are most active at the seasons when the outdoor playgrounds are unusable, and the problem the community ought to solve is how to create conditions for tenement-dwelling children as healthful in the close season as in the open. We use the word advisedly, since it is the closeness of the ill-ventilated rooms in which children now have to pass their hours at home that is the responsible cause of a long train of evils and a vast aggregate of expense to the community.

THE city could spend money in no wiser or more prudent way than in the erection of great communal recreation-buildings of many stories, wherein children between the ages of three and twelve years could enjoy the benefit of healthful conditions on week days, when out of school, on holidays and on Sundays. The proper care of the child is the starting point of all sanitary, moral, social and educational reform and, as modern progressists of all

kinds are turning their attention to preventive rather than to curative measures, this suggestion should have their support. Such recreation-buildings as we conceive, containing enough stories and rooms to allow a proper segregation by sexes and ages—or perhaps better by sizes—under the care of an efficient staff, which, of course, should include a resident physician, would be but the beginning of a vast and very real economical reform which would be felt indirectly by the entire community, felt, too, by its pocket-nerve. The physical effectiveness of the working population is, to a considerable and measurable degree, at the mercy of its children's health. No workman suffering from the strain of parental anxiety, or merely irritated by loss of sleep through the peevishness of a sick child in the same room, can do his work as satisfactorily and accomplish as much as if his natural rest had been undisturbed. As a corrective of the lassitude he feels, he seeks the saloon, and his doing so points out the close connection between the physical condition of the children in a community and the vast outlay demanded by the maintenance of the police and the penal institutions. In like way a more healthful body of children would effect a saving in the cost of providing and maintaining dispensaries, asylums and hospitals in ever-growing numbers; and, by keeping more of the children off the streets, the feelings of the chance passer on the street would escape being harrowed by so many "street accidents."

THE sanitary effect upon tenement-dwelling children of school-hours and school discipline is already satisfactorily great, except in the case of overcrowded schoolrooms where teachers and janitors are grossly disregarding of the sanitary rules and regulations they are supposed to observe, but these good effects are in part nullified because the children are now allowed to spend the rest of the day and night exposed to the less sanitary conditions that they find at home or in the streets. The problem of their being made more valuable commercial and economical factors in the community turns on the willingness of the community to increase the number of hours during which they may have the benefit of conditions and surroundings more conducive to physical and moral healthfulness than those which normally affect them in the small and crowded rooms of ill-aired and worse-kept tenements. Under proper oversight, communal recreation-buildings, such as we conceive, would have a far greater value than, while they might come to have something of the architectural significance of, the baths of Roman times.

THERE should be nothing to excite surprise in the news that the so-called Keep Commission, appointed by the President to ascertain the practicability of co-ordinating the routine procedure of those governmental bureaus and offices which have dealings with one another, had at length turned its attention to the office of the Supervising Architect; surprise would be proper in case so important a bureau had not been investigated. At the

same time, as Mr. Keep's committee—the Supervising Architect, by the way, is a subordinate official to Mr. Keep—is empowered to investigate and report on anything it deems to be amiss, architects will be unusually interested in knowing how far above criticism Mr. Taylor has been able to hold himself and those under him in dealing with the very important and often delicate matters over which he has control. The importance is easy enough to understand, but the delicacy probably can be appreciated only by those who have a real knowledge of the ramifications of "political influence" and how it seeks to control all things out of which a dollar can be made or which will help to perpetuate the controller's tenure of office. Still, as every one is cognizant of the fact that the post-office is the great treasury with whose "places" the politician, of high or low degree, hopes to pay his political debts, and as the Supervising Architect not only builds all the post-office buildings but selects and buys the sites upon which they are to be built, it is not hard to understand that Mr. Taylor has been brought into very close contact with the political exigencies of his superior officers, whether executive or sitting in Congress, and that a man so placed inevitably must dissatisfy some, while coming up to the expectations of others. It, then, would not be surprising if amongst those who feel they have reason for dissatisfaction some one should be able to discover colorable pretexts for preferring "charges" against the head of this important bureau, or his assistants.

JUST as the "Architectural Courts" in the Crystal Palace at Sydenham are objects of interest quite as much to the educated as to the uneducated sight-seer and holiday "tripper," so the Metropolitan Museum of Art in New York seems likely to give perennial instruction in architectural expression as understood in the nineteenth and twentieth centuries, through evidence afforded by its own structure. Already three architects have been employed in designing and building the fragment that exists, each doubtless fondly hoping that it would be his work, his preferred style, that would stamp this building with its final character, and now a fourth architectural firm has been called in to design the new wing that is to be erected to the north of the present fragment on Fifth avenue, and as its members are already amongst the elders of the profession it seems not unlikely that they, too, may have successors, and the Museum itself set forth the architectural preferences of half a dozen more architects. It is a curious way to handle an important building, and that building a Museum of the Fine Arts! Until now, we had believed it was a part of Mr. Hunt's task to prepare a design for a completed building, so that his successors would be called upon merely to supervise the execution of the design prepared by him, and it is not at all pleasant to have any ground for supposing now that such was not actually the case. With this example before our eyes, we can better understand how the cathedrals of Europe exhibit such a jumble of succeeding architectural styles.

AN article in *Le Génie Civil* draws attention to a paper by Mr. James C. Hain that appeared in *Engineering News* a few months since which it is worth while to

refer to, for the reason that, now and then, architects may have occasion, elsewhere than for engine-rooms in basements, to construct concrete floors that may be exposed to a greater or less degree of saturation with oil. Having his attention attracted to the disintegration of a cement briquette, upon which for several months a mixture of mineral oil and animal fat had accidentally and unobserved been dripping slowly, Mr. Hain conducted a series of careful experiments, using cements of different composition and mixed with sand in varying proportions, subjecting the test-pieces, after seven days' drying in the open air, to the influence of dripping oil of various kinds—animal, vegetable and mineral. In every case the effect of animal oils was the most marked and speediest, disintegration being effected in a period varying between a fortnight and three months, whether the cement were mixed neat or with sand, and whether it were made from a calcareous or a slag clinker. A mixture of animal and mineral oils was next in the order of its disintegrating power. Whale-oil and castor-oil followed, but at a distance, as nine months were required for the work of destruction by them. Petroleum produced no unfavorable results during the nine months covered by the experiments, beyond the essential saturation of the concrete. Linseed oil alone, as might have been expected, produced no effect whatever, as the oil dried and formed a protecting film before saturation had even begun. This latter fact is of no importance, as linseed oil is not used for lubricating machinery and, of course, the only way in which oils are likely to reach a concrete, or other, floor, save by accident pure and simple, is through what seems to be the irresistible wasteful carelessness of engineers and machinists, whose one idea seems to be to prevent friction, no matter at what cost or in how slovenly a fashion.

ONE effect of the late war for the freeing of Cuba is that the interest of our countrymen in opportunities offered in one or another of the Spanish-American republics, opportunities which, up to now, have been somewhat generally suspected to be taken advantage of most frequently by those of our former fellow-citizens who are fugitives from justice, is on the increase. As these opportunities are very real, and as the architectural character of some of the larger South American cities is of the highest, it is possible that some American architects, although not compelled to evade an outraged Justice, may be tempted to seek a new field for the exercise of their talents in Argentina, amongst other places. It is well, therefore, that they should know that a law, passed last June, now requires that all civil and mechanical engineers, architects, chemists, etc.,—just as previously all physicians and lawyers—must be the holders of diplomas from an Argentine university or technical school before they can be allowed to practise their profession. Even those who can exhibit diplomas or degrees granted by recognized foreign institutions must "re-validate" their claims by passing examinations at the native university or school on the entire subject-matter of their profession. Apparently the South Americans have seen our alien-labor and architects'-registration laws and "gone them one better."

THE AMERICAN ACADEMY AT ROME.

SINCE the scheme for establishing in Rome an American Academy is to be realized, it is worth while to say a few words about it and the form which ought to be given to this institution. The present skin-deep hostility of Italian artists that finds its motive in the feeling of partizanship for the author of the "Saturnalia" can have only an ephemeral duration. Italian artists have far more need of America than America has of them. Besides, such animosity has no true *raison d'être*. Whatever we may really think of the very audacious work of Signor Biondi and of the rurantism which ostracized it, there is nothing in the incident worthy of arousing a national resentment. Signor Biondi is perfectly at liberty to give to his work the form that best suits his own temperament and artistic instinct, and Americans have an equal right to give their artistic taste the direction that seems to them good, and consequently, if they so choose, not to admire Signor Biondi's work. There is nothing in such difference of tendencies that should be able to initiate war between the artists of the old world and the new. The American Academy at Rome, then, will begin its career with the sympathy of Italian artists, who will lose no time in forgetting, at least we will so hope, the bitter-sweet expressions of opinion that have been exchanged over the Atlantic apropos of the "Saturnalia."

What there is strange about the project of founding an American Academy at Rome is that its accomplishment takes place at the very moment when those countries which have up to now maintained such institutions in the Eternal City are asking themselves whether these academies are really useful, whether, such as they actually are, they really achieve the end for which they were created. You are not unaware, perhaps, that in France, for a long time, the usefulness and advantage of the academy which for centuries has occupied the Villa Medici, which serves as the dwelling-place for the pupils whom the State supports, have been disputed. Certain artists and critics, of indisputable authority, affirm that a sojourn in this official "brooder"—to make use of a poultry term—in place of developing the talent of the privileged artists who have conquered, by competition, the right of abiding there during four years, only serves in reality to repress it, or to give it a false direction by imprisoning it behind academic formulas.

A few words, first, about the Villa Medici. It lies upon the heights of the Pincian Hill, and the Tribunal of the Inquisition held its sessions within its walls at the time when it condemned Galileo; it is in one of the halls of this villa that the grand astronomer pronounced his famous phrase "*E pur si muove.*"

Towards the end of the sixteenth century, to be exact, in 1579, the Villa Medici passed into the hands of the great Florentine family whose name it has since always borne, while it was only at the beginning of the last century that it became the home of the Académie de France à Rome, which thitherto had housed itself in the Palazzo Salviati, on the Corso.

But before it was consecrated to the arts, the Medici palace was made celebrated by Queen Christina, of Sweden, who, after her abdication, came to Rome to do penance for her sins. Finding herself one day at the Castello San Angelo, she noticed on the other side of the Tiber the brilliant façade of the Villa Medici, and the fancy seized her to make use of it as a target. So she had the guns of the castle trained on the Villa and three cannonballs struck the bronze doors of the porte cochère, as the scars still witness to-day. One of the three projectiles is built into the fountain which stands in the Villa's grounds, in the centre of the porphyry basin that catches the water issuing from the fuse-hole of the historic shell.

One of the late directors, M. Hébert, once proposed a whole series of reforms intended to give satisfaction, in part, to the criticisms that had been formulated against the habits and practices which the Academy held in honor. The present regulations subject the *pensionnaires* to an almost cloistral discipline. They live like monks in a convent. Now, inspiration does not declare itself at a stated hour. Suppose a painter or a sculptor in the midst of sketching out a work: the awaited moment has come, the inspiration is here and the soul is in that condition when one stamps his work with the imprint of genius. Suddenly a bell sounds; it is the hour of repose. The artist abandons his brush, drops his chisel and inspiration, which is feminine, shrinks off, humiliated, and perhaps will not return when she is wooed anew.

There are at the Academy sections of painting, of sculpture, of architecture, and of music, but only one director. Now, this director, who can only belong, or at least has thus far belonged,

to one section—and he has almost always been a painter or a sculptor—can give to pupils in the other sections only theoretical advice, since he is relatively incompetent in all that pertains to the technique of their art. He is only an administrative director, concerned mainly with matters of academic discipline, his functions, that is, are not unlike those of the prior of a monastery.

What seeks a government that maintains an academy at Rome? Simply to assure to artists, who, in competition, have given proof of talent and good abilities, the means and opportunity of perfecting and ripening the faculties with which they are endowed. But this end ought to be achieved without crippling their originality or their individuality. Now, the almost exclusive contemplation, during four years at Rome, of Michael Angelo and Raphael, the adoration of the sculptures of a Pagan civilization and of the Italian Renaissance which are to be found in the Eternal City and in some sort dominate it, is not the best way to fortify this originality. This is so true that I, who, for thirty years, have closely followed the expositions of the works of the pupils of the Académie de France, I am able to testify that, year after year, these works reveal the crushing, all-enveloping influence of the masters of the Renaissance, an influence which should surely be felt, *en passant*, but with which one should not have continued contact, since that insensibly compels imitation, and imitation is one of the most unpardonable of crimes against art.

There are, in Italy, several centers of study for artists—Venice, Florence, Bologna, Naples—which the pupils ought to be able to visit and frequent in their turn. I maintain that for painting, Venice, and for architecture, Florence are far more important centers of artistic education than is Rome, which is, before all things, a center capially fitted for the study of archæology—provided always that the students who devote themselves to this branch of study are allowed to make frequent excursions to Pompeii, Pæstum and the sites of Sicilian cities.

I remember that while Gambetta was prime minister, M. Antonin Proust, Minister of Fine Arts, also elaborated a series of reforms intended to decentralize, so to say, the Academy of France at Rome, and to give to its *pensionnaires* greater freedom of movement. Without abandoning them absolutely to their own guidance, they might be entrusted with the garden-key, and, during six months at least, be allowed to seek their profit where they please, finding, like the bees, booty where they can. Italy is a vast garden where the honey that nourishes genius is to be found on every side.

From the moment United States thinks of establishing at the Italian capital an academy of art, those who are called to preside over the birth of the institution should take the greatest care not to introduce into its organic structure just those defects from which similar institutions at Rome already suffer.

Independence, as much independence as possible, that is the principle upon which, in my opinion, the nascent academy should be founded.

On the other hand, there should be included in the regulations a condition which is not included in the rules of the Académie de France, a condition which I feel to be indispensable, one that would act as a corrective of the liberty accorded to the students. Let them wander and seek their inspirations where they will, allow them the widest liberty, do not subject them to monastic control and the deadening affect of methodical communal life; but make sure, each year, that they are making proper use of the liberty accorded them and that the money granted by the State for their support is not wasted.¹ Consequently if a jury, appointed *ad hoc*, should report with unanimity that the work exhibited by a given pupil at the annual exhibition gives proof that he has wasted his time and that, in place of making progress, he is actually losing ground, then his income should be cut off and the opportunity for improvement should be transferred to some one more likely to derive benefit from it.

In any event there should not be committed the error of including in this academy a section of music, as has been the case with the Académie de France. There are cities of the second rank, Bologna for instance, where the musical life is much more intense than at Rome. The real home of music in Italy, however, is Milan.

I have here only jotted down, in summary fashion, a few of the ideas that have occurred to me as I have heard this new undertaking debated, though I should much like to make a more complete discussion of the matter. HONORÉ MEREU.

¹M. Meru assumes that the American Academy, like other similar institutions at Rome, is to be supported by Government grant and not by the income of its own endowment.—E.S.

HEATING AND VENTILATION.—XIV.

WROUGHT-IRON pipe is made "standard" weight, "extra strong," and "double extra strong." The standard weight is commonly used for all pressures up to 125 pounds per square inch. The heavier weights are often used for higher pressures, although exhaustive tests made by manufacturers seem to show that standard-weight pipe is sufficiently strong for all pressures used in ordinary power work at the present time. When particularly exposed to corrosion, it is well to use extra-heavy pipe. This applies to feed lines, sealed returns, underground return piping, etc., and to all lines which are to be run in inaccessible places. Nearly all of what is commonly known as wrought-iron pipe is in reality a mild steel. Wrought-iron pipe is not carried in stock to any great extent, and if it is to be used in any considerable quantity, should be ordered well in advance of the time when it will be needed.

There seems to be no especial advantage in using wrought iron in place of a good quality of steel, although some engineers prefer the former.

Cast-iron fittings, both screwed and flanged, are used for all classes of steam work. These are commonly made in three weights: the lightest, for low pressures, such as exhaust or condenser connections; standard weight, for pressures up to 100 or 125 pounds; and extra heavy for higher pressures up to 250 pounds. When pipes are to be joined permanently, couplings are commonly used; but if it is desired to make any part of the work removable, unions are employed instead. All steam and water connections with boilers, engines, pumps and other apparatus should be made up with unions. For small pipes the screwed brass union is generally used; but for larger pipes, say 2½ inches and above, bolted cast-iron flanges are employed.

For low steam pressures the flanges are simply screwed onto the pipe ends, a thin gasket of sheet packing being placed between them, and then drawn together with bolts. For higher pressures more care must be taken to make the joints tight and durable.

There are various methods of securing the flange to the pipe, in order to make a tight joint. One of the simplest and most satisfactory, considering first-cost, ease of repairing and freedom from leaks, is made by threading the pipe with a full taper, then screwing on the flange by power until the end of the pipe projects about 1-16 inch, and then facing off in a lathe.

Another method is to round off the face edge of the flange, and after screwing in the pipe, expand or peen over the end and then face in a lathe as before.

For high-pressure piping, with faced flanges, there is probably no better packing than gaskets of thin corrugated copper. These are usually made small enough to fit inside the bolt circle, which prevents them from being blown out.

Sheet packing is made in different grades, adapted to different pressures. The best pure sheet packing is composed of rubber and certain heat-resisting materials properly mixed and vulcanized. For high-pressure work, with faced flanges, the packing should not be over 1-16 inch thick; for low pressure work, and where the flanges are more or less uneven, it should be about ¼ inch in thickness.

There are a number of metallic and semi-metallic packings upon the market, each claiming its own particular advantages. Pipe bends of various forms are commonly used in making connections about boilers and engines for taking the strains due to expansion. Connections made up in this way are less rigid than when straight lengths are used, with cast-iron fittings. Pipe bends are often used in hot-water and steam work, where it is desired to reduce the friction in the pipe to the smallest amount. These bends are made to order to a minimum radius equal to five diameters of the pipe. From four to six inches of straight pipe should be allowed at each end next to the flange.

Hangers of various patterns are used for supporting steam and return pipes in overhead positions. When the ceiling construction is of wood, they are usually held in place by lag-screws, screwed into the beams or joists. When fireproof construction is used the hangers are either clamped to the lower flanges of the I-beams, or attached to iron plates embedded in the masonry above the arches. The requirements of a satisfactory hanger are that it shall be adjustable to the proper alignment of the pipe and have sufficient lateral movement to swing with the expansion of the pipe without straining. Hangers are usually placed from ten to twelve feet apart, with extra ones at bends, or where other special conditions require them. Where pipes run near the floor they are usually supported on rolls which rest

in small iron bases screwed or bolted to the floor. Rolls of this kind are sometimes carried on wall brackets.

In laying out a system of piping, care must be taken to provide for the expansion and contraction, in order to avoid excessive strains upon the pipe and fittings. In case of the smaller sizes, this may be cared for by means of offsets and bends, which allow the pipe to "spring" or "give." For the larger sizes this simple method will not be sufficient unless the offsets are of considerable length, and swivels or slip-joints must be used. If slip-joints are used on high-pressure work, some form of balanced valve should be employed.

The best form of conduit for carrying pipes underground will depend upon the circumstances in each particular case. One of the least expensive is formed of split tile. The lower half of the lengths of tile are laid in cement and properly supported in line. Iron castings carrying pipe rolls are bolted or otherwise fastened to the tile at regular intervals. After the mains are laid the upper portions are put in place and the joints tightly cemented. The space between the pipe and tile should be closely packed with some good insulating material, such as granulated cork. One objection to this form of conduit is the difficulty experienced in packing in the insulation closely enough, hence, after a time, it shrinks and the upper part of the pipe is liable to become uncovered. This may be obviated by covering the pipe with a good form of sectional-covering in addition to the cork filling mentioned above.

A brick trench with concrete bottom and covered with tight-fitting slabs of slate or concrete, with the joints well cemented, makes a good form of conduit and one that is easily packed with cork. There should be a filling of coarse gravel around the trench at the sides and bottom, and it should be underdrained with porous tile having a suitable outlet for carrying away the surface water.

Trenches are sometimes made of "kyanized" wood, or that which has been otherwise chemically treated. Conduits of this kind are not so durable as those of tile or brick, although the first cost is somewhat less.

For mains of large size it is better, if possible, to construct a masonry tunnel large enough for a person to pass through for purposes of inspection or repairs. The pipes may be supported from bars resting in the side walls, or from hangers embedded in the masonry overhead.

Pipes passing through tunnels should be insulated with some form of sectional-covering which is not affected by dampness, such as cork or mineral wool, and the outer canvas covering should be thoroughly protected with some good form of waterproof paint.

CHAS. L. HUBBARD.

(THE END.)

TAXES UPON BUILDINGS.¹

NO society that has been organized purely for the public weal has as splendid an opportunity or is so well equipped to point out the way to reform and to insist upon the betterment of conditions as the American Society of Municipal Improvement. We should join our forces to the other societies that have organized a campaign of education looking to the betterment of building. Publicity, everlasting hammering through the newspapers particularly, public discussion and such means, easily available to this society, constitute the best ways of securing the desired end. Let us clamor for the strictest building-regulations. They work no hardship upon honest men. Let those regulations be so stringent as to virtually bar the possibility of fire damaging the new buildings, and they should surround the old with such safeguards as to lessen their danger to the minimum and make their maintenance so expensive to the individual that, dull of comprehension as he may be, it will soon be evident to him that a good building is more profitable than a poor one. Forbid him to add stories to his old ramshackle, or wings of similar construction. If he is not willing to obliterate the danger that exists, at least prevent him from increasing that danger. Let the building-regulations be such as to prohibit experimental construction with its resultant collapses and loss of life. Clearly prescribe the right way and as definitely proscribe the wrong way of construction. Insist upon the executive officers, the building-inspectors, having due authority to enforce these regulations, then exert your personal and society influence to see that the right men receive the appointments to these offices, men who will understand the regulations and enforce their

¹Extracts from a paper by Mr. F. W. Fitzpatrick, Secretary of the International Society of Building Commissions, read before the Convention of the American Society of Municipal Improvement at Montreal, P. Q.

every requirement without fear, or favor, or political bias. Give attention to the sanitary equipment of those buildings, do not limit your interest to the taking care of the sewerage when it leaves the building, start it properly. Advocate sensible limitations in the height of buildings. A man is justified in increasing his building to its greatest reasonable productibility: but do not permit him to make a chasm of your streets. Get together and try and have your cities adopt some uniform code of building-regulations, the one offered by the International Society of State and Municipal Building Commissioners and Inspectors, the advantages are legion. Harp upon the necessity of some intelligent and artistic general plan of your cities. It isn't necessary to start in to-morrow making beautiful parks here and there and spending millions in new public buildings, but it is desirable to arrange a plan so that when a park is to be located or a building is to be erected it will merely occupy the place assigned it in that plan and will have some relation to the entirety. Let all the efforts that are made, until the final consummation of the plan, be towards its completion. If a park is in question, keep buying the property little by little as it is for sale. And when appropriations are available for municipal buildings, jealously safeguard not only their construction, but their artistic excellence, position and conformity to the general scope and scheme of true municipal improvement. It is your duty as citizens and doubly so, being members of this society, to devote considerable time and the greatest attention to all that concerns your city. Do not for one moment lose sight of the fact that we tried to establish at the outset of this perhaps too lengthy paper, that buildings constituted the largest part, the most prominent features of the municipality, and, therefore, deserves well of you.

One more thought, my lastly, gentlemen, and I will leave you to the consideration of perhaps more interesting papers, but certainly no more important subject. It is particularly fitting that I should mention this subject now and here, since the suggestion comes originally from Canada. You are much interested in taxation, in franchises, in the financial end of municipal business, hence is the matter of taxes upon buildings most pertinent. The municipality has the right to regulate, within certain well defined lines, its process and mode of taxation. It is to the municipality's best interests that there should be no stagnation, no fossilization, no ruins and few relics, within its borders. But what does it do towards eliminating or preventing these things? The municipality, without being philanthropic, must needs be socialistic. It exists by and for the people and not for the gain of the municipality as a governing body, or for any individual within it. Yet the whole system of municipal taxation could not be better devised were it planned to act as a drag, a deterrent of improvement. The more money you put into the betterment of any construction, or indeed the more business you do, the greater benefit you are to the municipality—and the more taxes you pay! In other words (and I quote my Canadian authority) "if a man taxes himself for the benefit of the public, it certainly is not fair to him to tax him again on the amount of his own taxation, but it would be quite fair to him and to everyone else to remit taxes to him on the basis of the account; and, inasmuch as taxes should be fluid and level up all hollows in the public estate, the displaced tax should find its settlement on buildings that are below proof in the matter of construction, fireproofing and otherwise. It is for them and because of them that the costly fire-departments and water-supplies have to be maintained, and they, and not the property which requires no protection, should pay for that maintenance." Would it not seem reasonable, therefore, to tax real estate along some well planned line of values as to location? As improvements are made upon the property, reduce the taxation in the ratio of that improvement's advantage to the municipality. If a citizen insists upon building a three or four store fire-trap apartment-house and the municipality has not been wise enough to make laws to prevent him from doing so, his tenants, in spite of him, have to be very carefully protected by the municipality. The city has to pay for that protection; his percentage of taxation is now exceedingly small compared to the amount of protection his property receives. On the other hand, suppose a citizen who is as public-spirited as he is wide awake to his own interests builds upon a similar piece of property a thoroughly well built, fireproof structure. It requires the very minimum of protection from the municipality and is of not the slightest danger to its enviroing buildings. That man is a distinct benefit to the city, his taxation should be the very lowest. In the course of years his building deteriorates but very little and the tax upon his building should remain level. The other man's property is deteriorating very rapidly and becomes a greater menace

as every year goes by. He doesn't tear down the building and rebuild it properly. He is satisfied with the interest he is making upon his investment and as far as the city is concerned, and his tenants, why, they may be hanged or burned for all he cares. That man's tax, I contend, should be increased year by year, for he is costing the city more every day that the structure remains as a menace. The question of ratios is not an insuperable one, and the plan is not only sane, but I also contend, eminently feasible, just and commendable. Utopian as many of you may think it, it would be a distinct, a great step in the all-comprehending progressive municipal scheme, and well worth inclusion in the splendid programme of endeavor of the American Society of Municipal Improvement.

OWNERSHIP OF ARCHITECTS' DRAWINGS.

AN architect enters into an agreement to build a house and to design the necessary plans. To whom do the plans belong in the absence of express agreement? This is, to architects, an important question, and all the more so that the law of England at the present moment appears to be against them.

It is naturally a well settled rule of law that if one employs another to do work and pays for it, the results of that work belong to the employer, and this would be the rule to govern the question of the ownership of architects' plans, were it not for an alleged special custom that the plans shall remain the property of the architect.

There is an elementary rule of construction that a written contract cannot be extended or varied by evidence of matters outside the written words of the contract. To this rule there is the following exception: "Where the contract is silent, parol (or verbal) evidence is admissible to show a custom; . . . but both parties must be cognizant of such usage, so as to be presumed to have contracted with reference to it, and the custom must not contradict the contract, and further, the custom must be reasonable." Thus the architect has three lines of defence to overcome. Firstly he must prove that there is a custom, secondly that the building owner knew of it, and thirdly that the custom, even if it exists, is reasonable. The first of these obstacles presents some difficulty. The custom was actually found to exist in 1870 by the verdict of the jury in *Ebby v. McGowan*, yet an architect gave evidence in that case that there was no such custom, and the Court before which the appeal came threw considerable doubt on the correctness of the verdict.

But assume that the architect succeeds on the first two points, even then, if a recent decision of the Court of Appeal is correct, he fails on the third; for the custom is said to be unreasonable. The courts of law appear to look with some suspicion upon special customs in general and on the customs of architects in particular. In the case of *Gwyther v. Gaze* in 1872² an architect was employed to build a warehouse and shop. Three tenders were sent in, but none were accepted, and the building owner employed another builder without a contract, paying for the work as it progressed. The architect claimed a payment of 2½ per cent. on the lowest tender, alleging that this was, by the usage of architects, the proper charge; the judge, however, held that the custom was unreasonable, and refused to follow it in assessing the payment due. So also a usage for contractors to rely on the specification furnished by the building owner's architect without examining it was held to be bad,³ and also in America a custom among architects to charge for preliminary sketches a sum representing more than the time actually spent in preparing them.*

All the authority directly on the question of the custom to retain plans is dead against the architect. In 1870, in the case of *Ebby v. McGowan*⁵ above referred to, the Exchequer Court decided that when the architect has been paid he must hand over the plans: there were, however, special facts in this case, and the decision may not have been meant to be of universal application. A clergyman asked an architect to prepare plans and specifications and get tenders for the erection of a vicarage house and other buildings; if the buildings were completed, the architect was to get 5 per cent. on the total expenditure; if tenders were given and the work commenced, 3 per cent. on the estimated value: if plans only were drawn and no building done he was to be paid 2½ per cent. on the estimated value. The building was never commenced, and the clergyman claimed to have the plans handed over to him; but the architect relied on the supposed special custom and refused to part with them. The court decided against the custom, but chief-

¹Building Contracts, Vol. I., p. 137.

²Times, Feb. 8, 1875; 2 Hudson 16.

³Thorn v. Mayor of London, 1 A. C. 120.

⁴Scott v. Martin, 56 A. M. Rep. 402.

⁵Hudson, Vol. II., p. 7; Times, Nov. 17, 1870.

ly on the ground that in this case the clergyman would get nothing for his money if he did not get the plans.⁷ Lord Chief Baron Kelly condemned the custom in these words: "It appears contrary to reason, good sense, and justice that in the event of a contract being put an end to, the architect should retain the plans for which he was entitled to be paid . . . the execution of the plans themselves formed the work and labor for which he charged the defendant." And Baron Bramwell condemned the custom with the somewhat exaggerated metaphor, that the custom was perfectly suicidal; so soon as it was brought into being it cut its own throat with its own absurdity.

American⁸ and Canadian⁹ courts have also decided against this custom, and if the architect turns for comfort to the similar customs of other professions he is met by the same uncompromising denial. Estate agents have claimed to retain plans, and solicitors their rough drafts, but both have been defeated. The decision against estate agents was based upon broad principles of the law of agency. In *Lady Beresford v. Driver* (1852),⁸ land agents were employed by Lady Beresford's husband for many years to survey and collect the rents of her estate at Waterbeach. Lady Beresford afterwards ceased to employ them and demanded delivery up of all papers, plans, and documents connected with the estate. The agents, however, claimed to retain certain rough maps, plans, and notes made by them for their own convenience in connection with their work of surveying the estate. It was held that all these documents having been made by them while acting as agents for Lady Beresford and her husband must be given up to her.

The solicitor's case is *Ex parte Horsfall*⁹ (1827). One Lythgoe had been employed for several years by the plaintiff's father as his solicitor. On the death of her father the plaintiff applied to have all deeds and papers in Lythgoe's possession delivered up to her, and offered to pay his bill of costs. Lythgoe delivered up all the original deeds and documents, but claimed a right to retain the drafts and copies. In this claim he was defeated.

In spite of these adverse decisions it seems still to have been the general view of architects that where a building is actually completed the plans belong to the architect, and the recent decision of the Court of Appeal in *Gibbon v. Pease*¹⁰ has come upon them as an unwelcome revelation. The facts are stated in the report as follows:

The plaintiff was the owner of certain houses in Bayswater, which he was desirous of converting into residential flats. The defendant was an architect and surveyor, and was employed in that capacity by the plaintiff upon the work necessary to the contemplated alteration of the houses, on the terms that the defendant should receive for his services five per cent. on the contract price of the works to be executed. The defendant prepared plans and specifications and superintended the work, which was completed. The plaintiff paid to the defendant the stipulated fee, and claimed to have the plans and specifications handed over. This the defendant declined to do, and this action was brought to recover possession of them. At the trial, evidence was tendered on behalf of the defendant of a custom under which an architect in circumstances like those of this case was entitled to retain the plans and specifications as his own property. The learned judge refused to admit the evidence, being of opinion that the custom proposed to be established by the evidence was unreasonable, and judgment was entered for the plaintiff.

The defendant appealed.

The Court of Appeal decided that the custom, even if proved, would be unreasonable, and therefore bad. They expressly followed *Ebdy v. McGowan*, and refused to see any distinction between the two cases. Lord Justice Cozens-Hardy also relied on the solicitor's case, *Ex parte Horsfall*.

These authorities, as they stand, are absolutely fatal to the architects' custom. It is still possible, however, that "*Gibbon v. Pease*" may be overruled by the House of Lords, and it is therefore interesting to analyze the previous authorities and consider whether upon principle the recent decision is justified.

Ebdy v. McGowan is not likely to be set aside after thirty-five years, even by the House of Lords; but it is not by any means conclusive. The building in that case was not even commenced, and all the judges rely upon that fact as the basis of their decision: the argument pervades the whole of their judgments that if the building owner did not get the plans he would get nothing for his money. American and Canadian cases are not binding in this country, and need scarcely be considered for this purpose, and the decisions against the estate agents and solicitors really raise quite

different points. An estate agent is a general agent, employed to manage an estate, and, in consideration of the commission paid him, to do everything necessary for the proper conduct of the estate; all acts, therefore, that he does, he does as agent for the owner, and he would have no power or authority to do them if he were not acting as such agent. It is reasonable, therefore, that the employer should be entitled to the results of all that is done. Again, a solicitor's bill of costs is quite a different matter from an architect's contract. A client who requires a deed is charged in the bill of costs separately for the drafting of the deed, and separately also for the engrossing, and for any additional copies that may be required. Here, too, it would be unreasonable that the client should be refused possession of documents, for each one of which he has specifically paid; and Lord Tenterden expressly decided the solicitor's case on the ground that "He who pays for the drafts by law has a right to the possession of them."

An architect, on the other hand, is employed to build a house, and is not paid by the number of plans he draws. Suppose a plan drawn and completed, which then fails to satisfy the architect himself; he draws another, and the building is completed according to the latter. - Could it be reasonably contended that the first plan is the property of the building owner, because the architect had that owner's house in his mind when he prepared it? If not, then it seems to be the house and not the plans for which the architect is paid.

In the judgment of *Gibbon v. Pease*, the contract was compared to a commission given to an artist to paint a picture; but the true inference from that comparison seems to have been overlooked. In such a comparison the building really corresponds to the picture, and the plans to rough sketches made by the artist. It may possibly be the law, but it certainly is not the everyday practice, for an architect to hand over to the purchaser of a picture all the rough sketches or studies on which the picture is based. In fact they are practically always retained, and are freely used by the artist if occasion requires.

The only reference to abstract principle and common sense to be found in the judgments is contained in a passage from the judgment of Cozens-Hardy, L.J.: "Unless he (the building owner) has the plans, how is he to know where the drains, the flues, and many other things are?" It is doubtful whether this would prove a serious objection in practice, most of such items being apparent on the face of the building, and it is probably very seldom that the plans are used for this purpose. The fact alone that the owners have in the past overcome such difficulties without the plans seems to show that it cannot be a matter of any great importance.

For the present moment, however, the law is against the architects. Even so there is no real cause for dismay. A little extra care in the original contract would avoid all the evil effects of these decisions. So long ago as 1870 Lord Bramwell stated in open court that the question could not be said to be one governing the future, because the parties to contracts might make their own bargains. Where the warning of so great a judge has been neglected it can hardly be hoped that this article should have a better fate, but it cannot be too strongly pressed upon the notice of architects that the remedy lies in their own hands. The architect should expressly reserve to himself the ownership in the plans drawn by him as one of the terms of every contract into which he enters. The reply will probably be that architects do not as a rule make formal contracts, but set to work on their commissions with no other evidence than the letters between the parties. If so, the remedy is simpler still; a printed note on the writing paper used by the architect for professional purposes would be effectual to give him all the protection he needs.

Again, the right of the architect to make and keep copies of his plans is not affected by these decisions. Whether the expense of taking copies of the plans prepared would be too great to justify the practice is a question for the architect himself; but, if not, again the remedy is simple; for although the question of copyright in plans is implicated in perhaps the most chaotic branch of English law, the better opinion seems to be that the copyright in the plans is vested in the architect, and he would therefore be at liberty to retain and use copies of them. A "plan" is a "book" for the purposes of the Copyright Act, 1842;¹¹ the copyright of a book is the property of the author and his assigns;¹² and an assignment must be in writing. Therefore it would appear that unless the copyright in the plan is assigned to the building owner in writing, it remains the property of the architect. There is, however, a complicated section of the Act which contains these words: "Where any person . . . shall be the proprietor of . . . any

⁷Kults v. Pelby, 37 Mass. 65.

⁸Moffatt v. Scott, 8 Lower Canada, Jur. 310.

⁹20 L. J. Ch. 476, 22, 407.

¹⁰B. & C. 528.

¹¹1905, 1 K. B. 810.

¹²115 & 6 Vic. c. 45, sec. 2.

¹³Sec. 3.

book . . . and shall employ any person to compose the same . . . on the terms that the copyright is to belong to the proprietor, it shall belong to the proprietor."¹³ The terms referred to in the section need not be expressed, and it is a question of fact in each case whether they are to be implied. In the case of articles written for a magazine, it has been recently decided by the House of Lords that mere payment by the proprietor of the magazine raises the presumption of an agreement under Sec. 18 that he is to have the copyright.¹⁴ The wording of this section appears at first sight to apply equally to the building owner, for he is by the decisions under discussion the owner of the plan or "book." The decision, however, is based on the argument that if the proprietor of the magazine did not get the copyright, it would be impossible for him to get any return for his outlay; an argument which could not be applied in the case of architects' plans. Consequently, even if the adverse decisions stand, and no express contract is made, an architect would probably be within his rights in making for his own use and retaining copies of plans.

Whether architects as a body rely on these suggested methods of evading the law, rather than boldly endeavor to turn the law in their favor, is a question for their own pockets. It is, perhaps, only right to conclude with the warning that in the bold endeavor they would by no means be certain of success.

Alfred F. Topham, in the *Architectural Review*.

COMMUNICATIONS.

TWO WAYS OF LAYING UP A WALL.

Sept. 1, 1905.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs:—The inclosed photograph may be of interest to the readers of the AMERICAN ARCHITECT. The section of wall to the right of the cross was built by an Italian workman. The



stones are beautifully fitted together—an example of true Cyclopean masonry. The wall to the left of the cross was built by workmen of another nationality and is a good example of how not to build a wall.

Yours very truly,

WILLIAM ATKINSON.

A WALL OF MINIMUM THICKNESS.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs:—The article on "Invention of One Form of Fire-proofing" reminds me of what one can do when forced to do so. I had an old five-story building, not fireproof, to remodel, and arranged the new stairway within a square surrounded by brick walls and the elevator inside, with the usual iron open-work enclosure, to which the Building Inspector made no objection. But about the time the contract was ready to close, he said that the elevator itself must be surrounded by brickwork. With the walls of the required thickness, this would have reduced the elevator shaft so much that radical changes in the plan would have been necessary, so I studied out a substitute for the thick walls as follows, which was accepted:

Angle-irons on the corners, horizontal iron bars every 16 inches in height and metal lath, covered both sides with hard plaster, the whole not over 2 inches thick. The only disadvantage in this arrangement is that the elevator car will always require artificial light. Respectfully, C. A. WALLINGFORD.

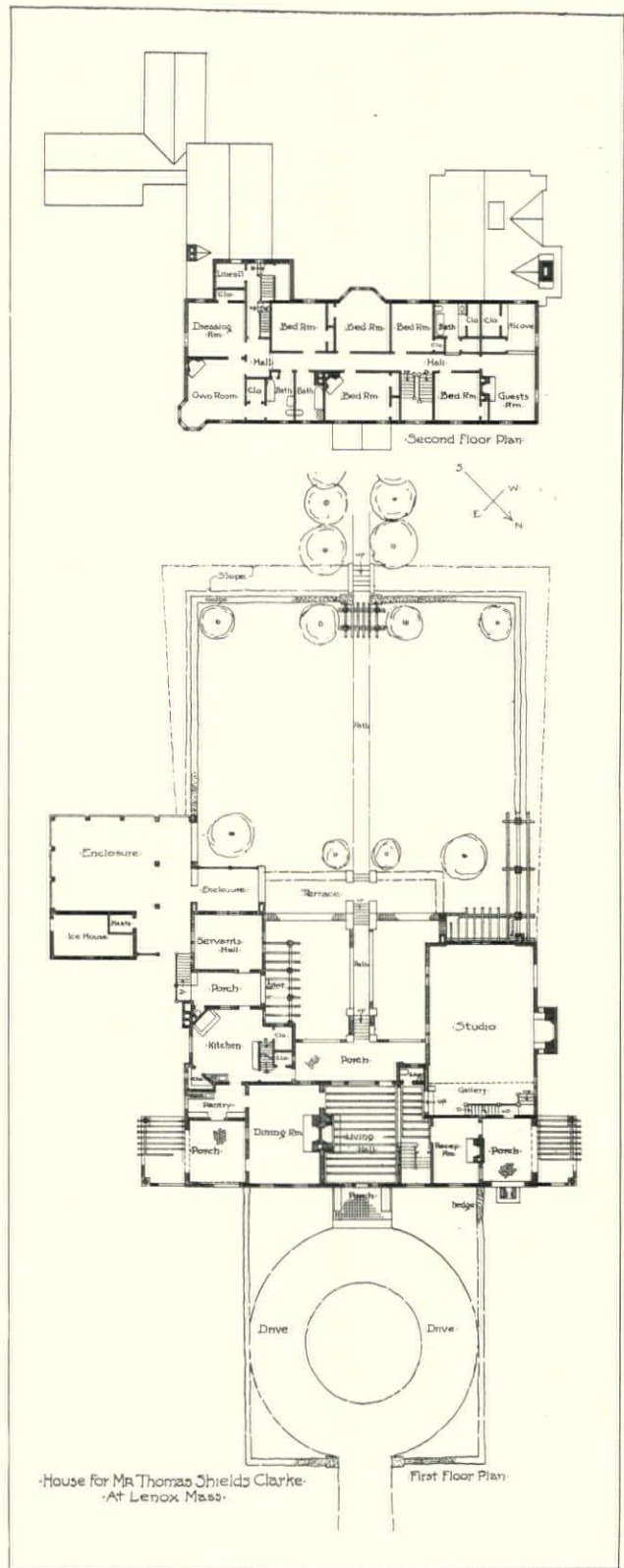
ILLUSTRATIONS.

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A NOOK: 240 TULPEHOCKEN STREET, GERMANTOWN, PA.

SKETCH FOR HOUSE FOR MR. THOMAS SHIELDS CLARKE, SCULPTOR, LENOX, MASS. MR. WILSON EYRE, JR., ARCHITECT, PHILADELPHIA, PA.



HOUSE OF MR. THOMAS SHIELDS CLARKE, SCULPTOR, LENOX, MASS. MR. WILSON EYRE, JR., ARCHITECT.

GARDEN FRONT OF THE SAME.

FRONT AND VIEW ACROSS LIVING-HALL OF THE SAME.

¹³Sec. 18.

¹⁴Lawrence & Bullen, Ltd. v. Affalo (1904), A. C. 17.

HOUSE OF E. H. BAKER, ESQ., GREENWICH, CONN. MR. N. C. MELLE, ARCHITECT, NEW YORK, N. Y.

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HOWARD SAVINGS INSTITUTION, BROAD STREET, NEWARK, N. J. MR. GEORGE B. POST, ARCHITECT, NEW YORK, N. Y.

NOTES AND CLIPPINGS.

BARREL-VAULTS IN IRISH CHURCHES.—The stone roofs of Ireland have been compared to those in Central Syria (described and illustrated in De Vogüé's *Syrie Centrale*), which are at all events earlier than 634 A.D. But the construction of the Eastern examples is (except in the pyramidal roofs crowning tombs) not very similar, and they are at least not double. Of the double stone roof the building called "St. Columba's House" at Kells, County Meath, affords a very interesting example. Its length (internally) is 19 feet with a breadth of 15 feet 5 inches; it is 38 feet high to the ridge of the roof. The walls are 3 feet to 4 feet thick, and the crown of the vault is 23 feet above the floor. The building had three stories, a wooden floor dividing the two lower ones. This is now gone, but its place is marked by a recess in the wall and by the original entrance, which was in the west wall 8 feet from the ground, reached, no doubt, by a ladder, as in the Round Towers. The whole would form a complete monastic establishment on a small scale, at the same time admitting of passive defence—to annoy the assailants would be almost impossible, and this is to a large extent the weakness of the Round Towers as well. The ground floor was the chapel; the altar appears to have been away from the wall towards the middle of the floor; there are recessed seats for the principal and assistant priest in the west wall. The first floor, covered by the barrel vault, would be the refectory and living room; and the uppermost story, between the vault and the outer roof, was, no doubt, the dormitory. This vault is of a kind which continued to be built without any important change, at least down to the fifteenth or sixteenth century in Ireland (though it is not confined to that country), and it was in general constructed as follows: A centering of the required shape was made of stones, or earth, or both—or of timber—and was covered with wattles. Upon this more or less wedge-shaped or merely flattish stones—roughly shaped perhaps, but not cut—were laid, edge downwards, lengthwise to the building, smaller stones being inserted into the intervals, where necessary, so as to give the radiation, until a complete vault was formed. Upon this half-liquid mortar was poured until the gaps between the stones were filled; in many cases the lower face of the vault is more or less covered with the mortar—often the print of the wattles (and sometimes bits of them) can be seen in it. If this mortar was good, as it generally was, the result would be a sort of solid concrete arch; and even if the cement perished the construction was generally sound enough to hold up the vault, though a few of the smaller stones might drop through from time to time. The sides were then filled up so as to make a flat floor above; at the same time, by thus weighting the sides of the vaulting, its outward thrust was counteracted. Lastly, the propping was removed, and the wattles broken or burnt away. Above such a vault as this the high-pitched roof was built—the stones being wrought to the proper shape and simply laid one above another in mortar—and closed at the top on the inside with flags, the ridge of the roof being completed outside.—*Arthur C. Champneys, in the Architectural Review.*

ANECDOTE OF ALFRED WATERHOUSE.—It would be affectation to ignore the fact that among the younger school of architects and artists Mr. Waterhouse's architecture was not regarded with favor or sympathy. He was quite aware of this himself. In a letter to a friend, excusing himself from undertaking something in which his assistance had been asked, he observed, rather pathetically, "I am not a *persona grata* in the artistic world." Occasionally his critics overdid it so far as to give him an opening for an effective reply. An enthusiastic architectural critic in a certain paper, after praising various buildings in a university town, contrasted them with "the rampant commonplace of Mr. Waterhouse's ——— hotel," or something to that effect. Mr. Waterhouse replied in a short and dry, but perfectly good-tempered letter, in which he expressed his admiration for the literary talent and artistic enthusiasm of the critic. "But," he added, "he is weak in his facts. The ——— hotel is not my architecture."—*London Times.*

CHICAGO FREIGHT TUNNELS.—The commission of engineers, John M. Ewen, Edward C. Shankland and Louis E. Ritter, appointed by the Commissioner of Public Works to examine the underground tunnels in Chicago, has made its report. As to the effect of the tunnels on the streets and buildings, it says:

The work in the down-town, or loop district, may be properly divided into two parts: First, the construction of the tunnels built chiefly between 1900 and 1902, which were constructed under air pressure. Second, the construction of the connections and by-passes from these tunnels which have been built more recently and without air pressure.

The Commission has been unable to find any evidence of any settlement due to the first part of the work, that is, the building of the main line tunnels under air pressure.

In regard to the settlements due to the second part of the work, that is, the building of connections, by-passes and new drifts without air pressure, the evidence is at hand, and convincing. A number of cases of settlement of streets and buildings were traced to this part of the work, and unless some other means of operation are adopted, or the greatest care be taken in construction, there may be further settlement.

On July 31, 1905, there had been completed 173,510 feet, or practically thirty-three miles of tunnels, and the work is now proceeding at the rate of about 500 feet a day.

TERRIERS.—It is understood that the Bishop of Manchester during his visitation will make inquiries relating to the "terriers" of the different parishes. The word is now supposed to relate to ecclesiastical property alone, but investigation would show that it was also used in connection with secular possessions. Apparently it was not always easy in the good old times to obtain the services of a surveyor. Schoolmasters had occasionally to serve, as Goldsmith describes in the "Deserted Village." But lawyers got over the difficulty by an elaborate description of the ground, stating what properties adjoined, the roads, streams, buildings, etc. That, we believe, was the origin of the terrier, and it was generally applicable. The ecclesiastical terrier relates to much else, for it can comprise church plate, vestments. There is a difficulty at the present time in France owing to the absence of such schedules, for it is supposed examples of ancient art have been bartered for new products. In England there is not so much portable property as may be found in foreign churches, but what remains should be carefully conserved, and the bishops would do well if they could initiate a new and more perfect "terrier" than now exists.—*The Architect.*

RESTORATIONS AT DELHI.—Lord Curzon has commissioned an Italian "mosaicista" from Florence to go out to India to restore the panels of inlaid black and colored marbles in the wall behind the great throne in the Diwan-i-Am, at Delhi. These marbles in *pietra dura* were the work of Florentine artificers, under the superintendence of Austin de Bordeaux, employed by the Mogul emperors Jehangir and Shah Jehan. Many of these panels fell to pieces through neglect, but the majority of them were picked out during the Mutiny. Some of these were identified at the South Kensington Museum, and recovered at the instance of Lord Curzon, who had them replaced in the wall of the audience-chamber. There are now over one hundred panels to be restored, and the work will take at least two years.—*The Athenæum.*

CIRCULAR ROOMS AND MENTAL DISEASE.—Experts in mental diseases who have made a study of conditions at the Minot Ledge Light attribute the unusual prevalence of insanity amongst the keepers of this lighthouse to its peculiar form of structure. There is no point, they say, on which the eye may rest, so it travels round and round in a maddening whirl. They therefore suggest that some means be devised for filling the curves and producing corners and angles. In support of their theory they cite instances of men who have lost their mental balance during long confinement in circular prisons, but have quickly regained it on being transferred to an ordinary room of corners and angles. Baron Trenck spent much of his time in prison making marks and corners to break the circularity of his surroundings, and keep his reason from slipping away on the whirling and encircling walls. Casanova, an Italian engineer, who was imprisoned in a round tower, gives much the same testimony. He says he felt great mental relief on being moved to an ordinary square room.—*Chicago Journal.*

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, SEPTEMBER 30, 1905.

No. 1553.

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A VERY frank blowing of its own trumpet by the Art Institute of Chicago makes a recent advertising circular sent out by the institution rather breezy, as well as instructive, reading. Having within a day or two had the fortune to see photographs of some of the modelling done by certain members of last year's sculpture class, we should be ready to admit that there was justification for a feeling of self-satisfaction, if not self-gratulation, even without any previous knowledge of the remarkable work that has been accomplished by Mr. W. M. R. French, and the capable men he has succeeded in gathering about him. We may smile at the commercial instinct that exhales from the circular before us, but we must respect it, since it is justified in its works. An American institution giving instruction in the fine arts that is able to exhibit an annual muster-roll of more than two thousand pupils is something that, a score of years ago, no one dreamed of as a possibility. Considering the purpose of this document, we are not surprised at finding statements narrating the prowess of past members of the school who have entered on the world's work—though these are interesting and notable. But for one thing we were quite unprepared, and we find that thing at once notable and pregnant with promise and meaning. Knowing that Chicago enjoys the privilege—or endures the burden—of being one of the largest racial mixing-grounds in this country, and knowing, too, that American art and art industries of to-day owe very much to the inborn artistic instincts of the immigrating peoples, we expected to find that the majority of the names of the past pupils who are achieving distinction in the field of art would have a discernibly foreign air, and that we must seek an explanation for their success in the fact that

this one was of German, that one of Italian and the next of French extraction. But, to our pleased surprise, the majority of the names mentioned are unmistakably American—that is such names as might be found in the earliest of the directories published in America. Curiously enough, while this is true of pupils in painting and sculpture, the majority of the architectural students seem indisputably to be of European extraction.

IF the new School of Fine Art which is to be carried on by the National Academy of Design, the Metropolitan Museum of Art and Columbia University is to take a leading place and not be outranked by the Chicago institution, we suspect it will have to adopt some of the breezy methods in vogue in Chicago and Pittsburgh; forget, for a few years, dignity and tradition and jealousies, and devote itself to teaching the coming generation as the coming generation wishes to be taught. We fancy that the satisfying of the reasonable preferences of the pupils is to a large degree the secret of success at Chicago. At any rate, the teachers there have discovered the secret of holding the interest of their pupils, and we do not believe that pupils can be interested and enthused in the doing of merely "academic" routine work to the exclusion of work that appeals to the feelings and needs of the day and hour. Now that the vacation season is over, active steps are being taken by the friends of the new undertaking to assist the National Academy of Design to secure the five hundred thousand dollars needed for the new building that is to house the new school, for it is understood, of course, that the Academy will maintain intact the funds now in hand against the time when it discovers the proper opportunity and place for erecting its own and commodious home.

ARCHITECTS are, or may be, directly interested in the matter, for it appears that, although there are not now, nor, so far as we know, have ever been any architect-members of the National Academy of Design, architects have, by the by-laws, always been eligible to membership. Amongst the things seriously discussed is the coalition of the National Academy of Design, the Society of American Artists and the Ten American Painters, and after this takes place, and the delicate matter of enlarging the number of Academicians, and determining who they shall be and who shall for a while be merely Associates is finally adjusted, steps may be taken to round out the artistic brotherhood by electing a certain number of architects to membership in both grades.

WE have, in view of the lamentable and disgraceful ineffectiveness of the enforcement of building-ordinances in the city of New York frequently urged the adoption of some modification of the district-surveyor system that has done such excellent service in London for many years. The system is not only good in itself,

but it has the advantage of providing partial incomes which would enable many a trained and worthy young architect to maintain himself in independent practice instead of being, as now, so often obliged to close his office and return to the draughtsman's drawing-board in some architectural "plan-factory," or in a contractor's workroom. We are led to mention the matter by noting that an English architect, Mr. Edward Knightley, F. R. I. B. A., who died a few weeks since, was for forty-eight years the district-surveyor for Hammersmith, a term of office-holding which our own present system of municipal administration would not admit. It stands to reason, however, that not only the man himself must have been satisfactory to his fellow-citizens, but that the district-surveyorship system also must have produced satisfactory results. The long list of Mr. Knightley's architectural work proper shows that the demands of his surveyorship did not absorb all his time, and the fact that he was eighty-two at the time of his death—having taken a partner only four years ago—shows that the dual function of architect and surveyor can be discharged by one and the same man without overstrain.

THAT there is crying need for reform in the administration of the New York building-laws can be discovered by anyone during an afternoon's walk through the streets of Harlem and the adjacent sections lying on the north side of the Harlem River, where there is going on this season such an enormous quantity of building. If one sets out with an examination of the methods and materials used in the new buildings being erected for Columbia University and for the College of the City of New York and then goes on to observe how other buildings, of equal area and to which an approximately equal number of lives are to be intrusted, are being built not far away, the inference is patent that, if compliance with the law is being had in one case, its unrebuked avoidance has in some way been achieved in the other, and no citizen can be so stupid as not to know where observance has been had and where it has been avoided. The explanation in part is that in one case the building is intended to endure, while in the other it is meant, primarily, merely for sale. The laws, imperfect and out of date as they are in many respects, are stringent enough to secure reasonably substantial buildings if their stipulations were always enforced by the public inspectors, which is very far from being the case. Architects, who desire to comply with legal requirements and so, voluntarily, keep themselves in frequent contact with the officials of the Building Bureau find themselves as much hampered as ever by official red-tape, while the speculating builder is allowed to do practically what pleases him. In other words, official attention is spent so largely upon operations that do not need anything but the architect's own supervision that there is not enough time left for attending to matters that really require watching. The present head of the Bureau, Mr. Hopper, is said to be anxious to retire, and we do not wonder that he experiences a feeling of discontent; but he is largely responsible for the condition of things which he seems to find unsatisfactory.

MR. HENRY FRANKLIN KILBURN, of New York City, whose name and work has for many years been familiar to our subscribers, died during the current week, after a prolonged illness. Although his practice was distinctly of the "general" class, as had to be the case with men of his generation, he designed and built a greater number of churches than, perhaps, fall to the share of the average practitioner. Amongst these churches may be mentioned the Park Presbyterian Church on Amsterdam Ave., New York, and the West End Presbyterian Church a few blocks above it. In secular architecture, one of his most successful buildings was the club-house for the Colonial Club on upper Broadway, New York, now deserted because of the insolvency of its owners.

AMONGST the few architectural books already published by the founder of this journal at the time it was established was Colling's "*Gothic Foliage*," a book which had a most unhappy influence on American architecture of the day. This was not the book's fault, for it was an excellent one and usefully filled a place in the entire body of the literature of Gothic architecture. The trouble was that, being one of the small list of architectural books published in this country, it had, naturally, an unnatural vogue, and the designers of the day were tempted to consider it as the treasury of Gothic ornamentation and felt that, if they worked into their façades a bit of carving copied textually from one of Colling's plates, they had accomplished a perfected Gothic design. We are reminded of this by the death of its author, James Kellaway Colling, F.R.I.B.A., a few weeks ago. Although as a practising architect Mr. Colling did some very commendable work in the sixties and seventies in England, his reputation rests mainly on his books, or series of illustrations of Gothic architecture, "*Details of Gothic Architecture*," 1852; "*Gothic Ornaments*," 1853; "*Art Foliage*," 1865, and "*Examples of English Mediæval Foliage and Colored Decoration*," 1874.

WHEN, last winter, that rather notable hysterical outburst of wounded national vanity occurred in Italy against Professor Waldstein's project for the disinterment of Herculaneum, we felt that that was the end of the matter, since there seemed to be no great probability that the Italian Government would take effective measures in the premises any more than it had during the last eighteen hundred years. But the steadfastness of the German character, particularly when it has been brought into close contact with the push and dynamic energy of American men and methods, forms a very valuable asset for a "promoter," and it is a satisfaction to know that Professor Waldstein has not abandoned his undertaking, but has been working upon it persuasively and quietly until, now, he is able to announce that the obstacles seem likely to be overcome, and that the proposed excavations may actually be undertaken. Although the results will probably be found more curious and interesting than really valuable and indispensable, it is good news that the secrets of the buried city may, at length, be disclosed by mining.

THE FEDERAL PALACE AT MEXICO.

MEXICO is advancing with a progress appreciated perhaps by few, under the wise administration of the president, General Porfirio Diaz, and the administration has now turned to the important subject of how to beautify the cities and country with works of art. President Diaz has determined that his nation shall be governed from a palace worthy of its future, and his Minister of Finance, Señor José Y. Limantour, has ably seconded him in this good work. The duty of executing these ideas has fallen to Señor Leandro Fernandez, Minister of Public Works, and it is with his authorization that we have published the architect's drawings for the Federal Palace of Mexico.

Architects have not forgotten the Phœbe Hearst competition for a plan for the University of California, and all will remember the winning design by M. Émile Bénard, Grand Prix de Rome in the seventies, when he was the author of that familiar design for an art palace which has been so universally studied and copied. In the competition of the University of California, M. Bénard was awarded the first prize by an international jury of leading architects, and that fact is so widely known that it is not unnatural that when the present Mexican administration were seeking a design for their chief monument they should turn to the winner of the Phœbe Hearst competition and appoint M. Bénard as architect of their Federal Palace. To the good judgment of Señor Fernandez, to the ability and enthusiasm of M. Bénard, Mexico will be indebted for the palatial home of its seat of government.

After the close of the University of California competition, in 1900, M. Bénard prepared preliminary studies for the Federal Palace for Mexico, and at the present time the general working-drawings and studies of the details have been completed. These are the drawings and sketches which have appeared recently in the *American Architect*, exhibiting an edifice which promises to become one of the finest of modern monuments. To quote from a criticism of the preliminary sketches which was published in *El Mundo Ilustrado*, June 7, 1903: "Providing the construction conforms to the sketches, one may obtain from these drawings an idea of how colossal and magnificent will be the edifice, as well in the arrangement and the beauty of its forms as in the richness of the material which will be introduced into them. Such magnificence is worthy to be the natural representation of a free people."

The building is to measure 670 feet by 500 feet in plan. The main floor, elevated 23 feet above the level of the ground, is reached by a series of broad steps, the *gran escalata*, composed of several runs separated by large platforms. The plan exhibits many of the chief Grand-prix characteristics, as will be noted at a glance by graduates of the Paris school. It is simple in arrangement and provided with frequent vistas from points of vantage obtained upon the chief axis. The vestibules and main staircases are expansive and the Salle des Pas-perdus is enormous in comparison with the size of the building, thereby promising an effect more imposing than any we have at Washington. In our Capitol, grand as it is, the lateral views alone are impressive.

To examine further into the qualities of the plan of M. Bénard, we progress along the main axis to the rotunda beneath the central dome and find that, at this point of vantage, the three important halls of the edifice lie before us. Not alone is there the dome above, but in front lies the largest hall, the Chamber of Deputies, while upon the left is the Senate, and upon the right the Library. About these the architect groups suites of offices, each suite adjoining the hall upon which it depends, and all easy of access by corridors freely supplied with connecting stairs and exits. The large halls mount to the roof, for air and light, while the smaller rooms and corridors are in several stories but are well lighted, the offices from the exterior, the passages from large courts. One looks into this plan and feels that each unit is in its proper place and that each fulfils its duty.

The style of the exterior is distinctly French Renaissance, an adaptation of the classic styles. Moreover, in the frieze of the portico the hand of Bénard is distinctly seen in his Grand-prix motive—truly his own motive and not a copy. The drum of the dome is set well up on a high plinth, while the dome itself is rather low and is surmounted by a low cupola, or lantern, which is well in scale with it. Seen from a distance the dome should appear approximately as in elevation and, on account of the position of the surrounding pavilions of the edifice, it can be seen in no other way. This is probably the reason why a more lofty composition has not been used: as shown in elevation, its proportions appear excellent. The general colonnade motive sur-

rounding the lower pavilions is simplicity itself and, with the pediments which occasionally rise to break the monotony of the long cornice line, the effect should be dignified and grand.

The interior decoration is to be much more elaborate than the exterior. This is usual with the French school and, if not overdone, seems quite proper. We have here a danger however, and it is to be hoped that a simple architectural effect, with but occasional slight decorative treatment in color, may signalize the interior. The drawings give good promise, particularly those of the grand staircases, but a few traces of the late Renaissance seen above the tribune in the Chamber of Deputies might be modified to advantage. This the author is likely to do in the later study of detail.

The construction will be decidedly unusual. The site is very poor and the engineer has been called upon to find some stable system of construction which will not be expensive. There is fortunately to be had an admirable material called *tezontle*, writes M. Bénard, a porous lava, very strong and weighing only 27 pounds per cubic foot. With this and cement mortar one is able to make a cheap masonry capable of great resistance, although weighing but 75 pounds per cubic foot, laid in position. All masonry, viz., foundations, walls, floors, etc., is to be built of these materials, and then all will be encased with marble, granite or bronze.

From calculations which have been made, it is estimated that, in spite of the expense of the external materials of the constructions, the building will be erected at a cost no greater than that which would be incurred were it built of the ordinary stone of the country. M. Bénard tells us that he has borrowed this idea of construction from the Romans, adapting its uses to his needs. One innovation, however, the idea of the architect, merits particular attention. It will be noticed that the columns of the central peristyle are to be of bronze. At first the intention was to make them of polished granite, similar to the Ionic columns, but upon calculating the superimposed weights and their effects upon foundations constructed upon this clay soil, M. Bénard suggested that they be built of cement concrete with a strong steel core, and then be surrounded upon the exterior with bronze. In Mexico, bronze acquires a clear and luminous green tint and, in order that this color may be still more effective, portions of the bronze, as the edges of the flutes, the reeding in the lower portions of these flutes, the bases and the caps, will be gilded. This scheme of construction is apparently an adaptation of the principles of reinforced concrete and, should the final result in color prove a happy one, it promises to be a step forward in the study of polychromatic design. To the people of a northern clime such decided differences in color as are obtained with marble and gilded bronze may seem rather too striking. But in Mexico these tones may prove none too strong to contrast well with the varied tints of a highly colored scenery.

It is expected that the edifice will be completed for the centennial anniversary of the declaration of the Mexican independence, September 16, 1910, and for its proper completion, as M. Bénard is reported to have said: "*Il n'y a pas de temps à perdre.*"

P.

THE ANCIENT ART OF NORTH AFRICA.—II.

TOMBEAU DE LA CHRÉTIENNE, OR DE LA REINE.

THE Arabs call this monument *Kubr-er-Roumia*, or the tomb of the woman. It resembles in its style of building the Medrassen, the tomb of the Numidian Kings near Constantine, and the El-Djeddar in the province of Oran; but it is the only one mentioned by an ancient author.

Pomponius Mela, in his work, "*De Situ Orbis*," written in the middle of the first century A.D., mentioning "*Cesarea*" [Cherchell] and "*Icosium*" [Algiers], writes "*monumentum commune regie gentis.*" It is so planned that, although seen from afar, it is hidden from Cherchell itself by the mountain of Chenoua, probably to prevent the King from having his tomb in sight from his palace windows. The tomb was built by Juba II., King of Mauritania, presumably in imitation of the Medrassen where his ancestors lay.

This Juba II. was the founder of Cesarea, the modern Cherchell. His physiognomy may be gazed upon in the museum of the modern town and also in the African room at the Louvre. His type is the same as that presented by the modern natives—high cheek-bones, flat short nose, full lips; but while the modern Algerian is handsome, this ancient King of Mauritania, on the contrary, is nearer allied to the negro. Still, must he not have been better looking than his busts, when we remember that he

was chosen worthy to be the son-in-law of the beautiful Queen of Egypt? for his wife was a daughter of Mark Antony and Cleopatra, by name Cleopatra Selene.

Juba was a barbarian, given to war, massacre and pillage. But what a barbarian! His reputation in the ancient world was that of a scholar, learned in history, the natural sciences, art, grammar and poetry. He wrote essays and built a city; he copied all the famous sculptures of Greece for the decoration of his temples and his palaces. Having been brought up in Rome, in the palace of Augustus, he could write in Latin, in Greek and his own African language; and, although the culture of Rome dominated the Africa of his time, his country partook of the civilizations of Egypt, Phœnicia, Carthage and Greece.

The tomb is an enormous mass of stone formerly 131 feet high, now only 100 feet 8 inches. The base is 198 feet in diameter. The circular wall is ornamented with sixty engaged Ionic columns, 2 feet 5 inches in diameter, surmounted by a cornice. Above the cornice is a series of steps. There are four false doors. All the capitals of the pillars are destroyed. It is supposed that it gained the name of Christian from a tradition that the beautiful daughter of Count Julian was buried in it; but the Turks called it "*Maltapasy*" or "*Treasure of the Sugar-loaf*," a name which no doubt led to its being rifled more than once.

The constant rifling of the contents of the mausoleum has naturally led to much destruction. Whether Juba's son Ptolemy was buried in the *tombeau* is not known, but, as he was killed in Rome by order of Caligula, it is improbable. He was the last King of Mauritania, Juba's only other child being Drusilla, the wife of Felix, governor of Judea, whose "convenient season" to listen to S. Paul's arguments has become a bye-word.

S. BEALE.

STEPS AND THEIR TREATMENT.¹

STAIRS do not come within the scope of this paper, nor shall I deal with methods of construction. A consideration of the broad aspect of the architectural treatment of steps will, I think, provide sufficient matter, and within these limits I propose to confine myself. There are so many points to be considered, if the subject is discussed in detail, that it is impossible to deal effectively with more than general principles in a short paper such as this.

The variety of treatment to which simple steps lend themselves is as amazing as the endless melody to be obtained within the limits of a two-octave board. The scales upon which both are based are in a way parallel. The incidents and adaptations which



THE QUEEN'S TOMB, COLEA.

In 1555, Salah Rais tried to pull it down in order to find its treasure; but wherever stones were raised poisonous black wasps issued from under them, causing death to every one whom they stung, and naturally the work was given up.

At the end of the eighteenth century an effort was made to batter it down by means of artillery. But during the reign of Louis Napoleon a successful breach was made in the walls which displayed an interior passage leading to the central chamber and regular door. Below the eastern false door is a smaller one leading to a vaulted chamber. Above the door is a rudely sculptured lion and lioness. From the passage a large gallery is reached by a flight of steps. In the wall are niches for holding lamps. The gallery is 2 metres broad, 2 metres 42c. high, and 149 metres long, winding round spirally until it reaches the centre, where two sepulchral chambers are found, one 4m. 45c. x 3m. 45c. and 3m. 45c. high; the other, 4m. x 1m. 50c. and 2m. 75c. high, separated from each other by a short passage, and from the winding passage by stone doors consisting of one single slab of stone sliding up and down like a portcullis. The lining of passages and chambers is made of beautifully cut masonry.

produce the variety, however, are in the former cribbed within comparatively narrow limits.

The stepped pyramid at once lays down a fundamental scale upon which to fashion our compositions. The broad and simple conception forms a grammar of expression, beyond which we must not trespass too freely.

If we can fancy a monument at the apex of the pyramid, the steps or terraces assume a different meaning. Some Persian monuments are of this type, notably the tomb of Cyrus, which is raised upon the platform of a truncated pyramid.

In Central America the teocallis, or houses of God, were built in a like manner, as were also many palaces. The palace at Palenque is an interesting example of a variation upon this treatment. The building is a simple parallelogram on plan, and is raised on a platform, which, instead of being stepped, is sloped inwards. Access is obtained by a huge flight of steps cut into the slope extending almost the whole length of the longer side.

¹A paper by Mr. A. C. Dickie, read before the Architectural Association Discussion Section, on Feb. 1 last.

The Teocalli of Tusapan shows an attempt to add greater prominence to the steps as a feature in the design.

The Persians raised their palaces upon a base of great stone terraces, and each terrace was provided with two flights, the steps being set at right angles and housed into the wall at one end. The plan of the Palace of Persepolis shows this arrangement.

The use of steps in this way is always splendid, and their sober simplicity commends itself to the cultured and uncultured alike. The monument on a tumulus, or the city on a Tel, are each inspired by the same feeling. The conception being primitive is therefore reasonable. This layer-like arrangement of the base commended itself to the Greeks, and their appreciation of its value is shown in their use of the stepped stylobate to their temples. In this treatment is the use of steps made perfect as an integral part of the design. They are the plinth to the building. There is no other arrangement which could possibly be so satisfying, and it is impossible to imagine anything more reasonable.

Of course, the proportion of these steps was relative to the column of the order, and their convenience as footways was a secondary consideration. In the Temple of Zeus at Olympia, as in other examples, the large proportions of the steps forced the introduction of a minor flight leading to the central intercolumniation. In adapting Greek work to modern uses the difficulty must be got over in some such way. The portico of St. George's Hall, Liverpool, illustrates an effort—unsuccessful, I think—to solve the problem. Here there are three minor flights introduced, with the result that the breadth of line, which is the whole charm, is entirely lost. In the Olympian example the flight occupies only a very small part of the whole, and the dignity and rest of the base is not seriously affected.

Precedent in all things dies hard, and none more so than in architecture. The fragmentary retention of a feature which is beautiful because of its entirety is unwise. It becomes a makeshift, and is an unwarrantable mutilation of a beautiful thing.

This broad understanding gave way—by reason of demand—to a littleness of conception, much in the same way as the beautiful serenity of Greek sculpture gave way to the petty prettinesses of the sculptor's imagination.

The Romans saw the difficulty and solved the problem by simply reducing the proportion of the steps. In the styles which followed, the increased variety of buildings caused a still further breaking away. This broad feeling has never again been echoed except, perhaps, in those great buildings of mediæval times which were floored at the ground level, thus enjoying even greater inheritance. Steps became catalogued as a separate item in the minds of architects and were treated as such.

The stepped stylobate becomes more rare. There are a few later examples, however, notably the cathedral at Orvieto, which stands on a projecting platform surrounded by continuous steps.

Except in minor features, such as porticoes, returning steps were abandoned. Indeed, they departed with the peristyle which they served. Flights in one great line, extending the whole width of the façade, and protected at the ends, were substituted. The Temple of the Sun at Baalbec, the Madeleine (Paris), and the British Museum are some of many examples of this type.

A modification of this often occurs by breaking the flight into intercolumnar flights, starting the first step in line with the base plinth, as at St. Sulpice, Paris.

The great flights to the west portico at St. Paul's are a most satisfying treatment. The two great flights are treated differently; the lower flight returns on itself, and the upper flight is protected at the ends. The semi-circular steps to the north portico are equally satisfying. Here the effect of the unbroken rings is charming. It is much more effective than the south portico on account of there being eleven risers, instead of five, thus emphasizing the feature more strongly against the intercolumnar steps.

The portico of London University, Gower Street, is a beautiful example of returning steps around the three sides.

In St. George's, Bloomsbury, the flight is contracted, and embraces only four of the six columns of the portico. The result is unhappy, and its meagreness detracts considerably from the general effect. The "New Church," Berlin, illustrates the same peculiarity.

The theatre at Malta shows an unusual arrangement. A parapet is carried across the front of the platform, and the traffic is divided by the returning flights at the angles, which are themselves sub-divided by the introduction of angle piers. From the landing reached by these flights the portico is approached by a broad flight passing through the intercolumniations.

The broad use of steps as a great street approach to a building

is shown in the Piazza di Spagna, at Rome, which leads up in continuous flights to a landing, from which minor ways sweep to the right and left around to the entrance.

Stepped streets have a peculiar fascination, and there are no more splendid examples than those in the Island of Malta. They are arranged in simple flights, which vary in length as necessity demands. Seen from below, the vista and the ascending figures on the great ribbed incline is an imposing and picturesque sight. Clovelly furnishes another example much nearer home. The way to the Colonna Romana at Brindisi is an example of the same without intermediate landings. There are many examples of what may be called the "public way" use of steps. The stepped way from the Temple area to the Pool of Siloam, at Jerusalem, is of more than usual interest. The steps near the Pool were originally cut in the rock, and are arranged in narrow and wide treads alternately. They are not at right angles to the rock scarp upon which they butt, and this peculiarity has been explained by Mr. Crace as a method to drag the traffic away from the unprotected edge of the Pool scarp. This would not, however, apply to ascending traffic.

The great flight of steps descending through the piers of the north aisle of a later church built over the street is an interesting and unique arrangement.

The Renaissance gives unlimited variations of the use of steps; some of them grandiose to the utmost extravagance and many of sober modesty.

In France the greatest freedom of line in planning is observed. Double-ogee flights occur in the court of the Louvre, and many more unreasonable forms are to be found elsewhere. The varying radii make it extremely difficult to preserve the balance of the body, and the effect is not sufficient reward for the inconvenience. The great double flight to the entrance of Fontainebleau is another specimen of this class. It has nothing to recommend it. Of itself it is a shapeless, ill-conceived mass, bearing no relation to the façade it so sadly mars. From the top landing you descend in devious ways, first round a semi-circle, then across a square landing, and finally you are screwed round a sharp ogee almost into the opposite flight, where you scarcely know whether to stop or go up again.

Compare this with the steps to the Caprarola, which so admirably fit the building. In the directness and simplicity of the plan lies its propriety. A more elaborate use of the same is seen in the façade of Palais du Sénateur. It will be difficult to find a more perfect adaptation of steps to building fulfilling in every respect the demands of the mind and the eye. It is part and parcel of the base story, and carries the harmony of the design through the whole width of the façade.

In an example at Monte Caprino the flights are arranged at either side of the façade, and the plain, raking sides of the step walls are used as architectural features flanking the design. The crude effect of this raking line against the perpendicular is cleverly got over by the batter in the wall, from the junction of the step wall, and the perpendicular of the angle turrets. There is no overstraining, it is simply reasonable; the only effect required to bring the two into harmony being the introduction of the batter to the side walls.

The Giants' Staircase in the Court of the Doge's Palace is a beautiful and simple arrangement of two direct flights with intermediate landings. Personally, I confess inability to raise much enthusiasm for it as appropriate to the building. In spite of the most respectful consideration of it from all points of view, I cannot help doubting its propriety, and wishing it was elsewhere. It has the appearance of an afterthought. It lies awkwardly in the angle of the building, and the manner in which the steps are cut into the upper landing seem to indicate considerable scheming on the part of its designer to get over the want of space.

Michael Angelo's famous steps to the Bibliotheca Medici, at Florence, are the most strikingly original of all the endless varieties. The three flights side by side are fashioned by some uncanny skill and artistic power into a thing so fascinating that one scarcely cares whether it is of use or not. As a treatment in harmony with the façade, it is altogether satisfying. As a problem, it is most difficult of treatment.

At Siena is a staircase with two flights, the lower one returning round an octagonal column up to the landing from which the upper flight rises. Whether there is any practical reason for subdividing the traffic in the lower flight I do not know.

In a palace at Genoa is a flight of steps broken into three by the columns supporting the roof. The use of sculpture to get over the unhappy attenuation of the pedestal at the first step is the principal lesson to be learned here.

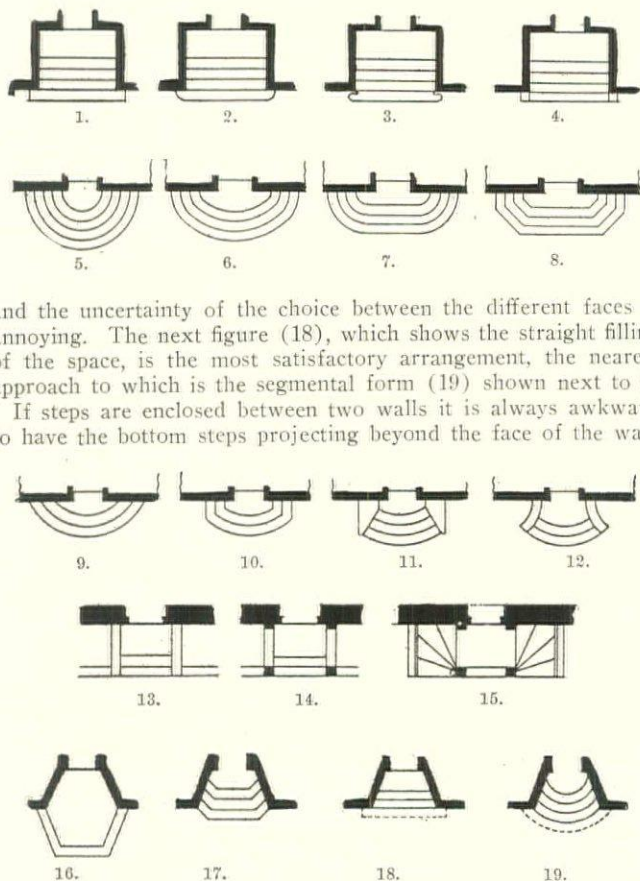
English domestic work provides many examples, especially in houses of the palace type. The artistic value of steps to houses and to terraces around these houses, as well as their uses in formal gardening, has been realized to the utmost. Flights are usually direct, and the segment is more common than the ellipse. The loose lines of the French examples are seldom seen, and I think we can lay claim to the fullest appreciation of the limits within which step design must be confined.

It is difficult to imagine anything more serenely beautiful than the steps to the garden front of Prior Park, Bath. The flights are divided at fitting stages, and the great sweeping flights to the first landing are used as a screen of the greatest value, both practically and artistically. The arrangement is altogether simple, and the effect of the great stepped height is retained, while its practical inconvenience is minimized.

Another well-known example is Lord Burlington's house at Chiswick. Here the problem and its solution are altogether different. The flanking zig-zag flights are very beautiful of themselves, but it is questionable whether they add to the beauty of the façade. The moving lines rob the base of its rest, the double bottom flights seem unnecessary, and it is worthy of discussion whether it is anything more than an interesting failure.

In the smaller and more modern class of domestic steps the variety is proportionately great. I have drawn rough diagrams of some arrangements which are common. Figs. 13 and 14 are the usual London-house steps; one is uncovered, and the other is covered by the usual portico. Both are equally appropriate. Fig. 15 is slightly more elaborate, and shows a double flight of wheel steps. This is from a house in Oxford Street, where a limited projection is allowed. I pass the house every day, and am always struck by the delightful privacy given to the entrance.

Let us suppose a doorway in a deeply splayed ingoing such as that shown. The first plan (16) shows the steps projecting from the opening and forming the other three sides of the hexagon. As the completion of the figure is not conveyed in actual execution, it becomes merely paper architecture, and falls with the rest of its class. Another method which is to be seen in old work is that shown in Fig. 17. The practical effect of this is to make it impossible for two to walk abreast, the mitres are awkward,



A few of the commonest ways of making the best of it are shown (Figs. 1, 2, 3, 4), none of which look well. Semi-circular steps (5) always look well if they are not too numerous. When they exceed four or five in number they become obtrusive. Segmental steps to a large radius are objectionable on account of the un-

happy line at their junction with the wall (9). This is sometimes got over by cutting the ends back on to the wall (10). An elliptical form (6) is more satisfactory than any of these when the number is considerable. In many of the Venetian examples this form has been adopted.

The proportion of tread to riser is given by Tredgold as 2 risers + 1 tread = 24 in., and I fancy some compromise of this is a safe standard. It is unnecessary to give figures and instances. Personally I believe that, if the tread is never less than 12 in., an inch out or in in the riser is not of serious consequence. Whatever they are they must be all alike in each flight. The astonishing readiness with which one instinctively adapts one's step to any particular proportion is reflected in the suddenness with which a change in that proportion is felt.

Steps should not only be safe, but they should also appear safe. It must be remembered that we not only go up, but we also come down. It is the descent which shows the defects. Even the most nervous can ascend without fear. To descend, however, where there is any degree of incident occurring causes concern in spite of the most intimate acquaintance. This uneasiness exists until the incident is past. The ideal descent is that which can confidently be made without thought or consideration of your footing. To do so the flights must be straight and the steps of equal number and proportion, and the landings of equal width.

A number of flights in one straight line, although architecturally imposing, have the disadvantage of appearing too formidable. In dealing with a problem such as this we must pay careful attention to staging. The more interest that can be added to each stage the less is the ascent felt. At the same time the effect of the great steep must be preserved as much as possible. Prior Park may again be instanced as a happy compromise of these two claims.

Zig-zag steps to a great height are altogether convenient, but never imposing. The man with a "heart" would much rather face the series of returning flights which decoy him to the top than he would a long straight ascent. The momentary rest which pivots him round the newel is a distinct relief.

The object of steps is to give access with the least exertion, and to provide egress with the greatest safety. This object must always govern architectural treatment; at the same time it must make terms with the broad laws which govern architectural expression.

Steps of sufficient width on a segmental plan of sufficient radius are comfortable going, and one swings up or down with a feeling of equal pleasure and safety. Of all forms perhaps this is the most pleasant. There is something in the desire to see round the newel of a narrow, circular stair which draws you upwards like the cotton wool in a ventilator model. There is no other form which can allure men to such heights. This is departing from the subject somewhat, but it may illustrate the principle, which is the same in its more generous application.

A three-sided form to steps is undesirable unless the proportions be very great. The mitre is ominous and distracting.

Steps unprotected at the ends are not to be recommended. No matter how wide the flight may be, it ought to be as comfortable at the sides as it is in the middle. The same nervousness which turns one from a giddy height draws one instinctively to the centre of the flight. If not protected, steps should always be returned at the sides.

I believe that with some such fixed principle of step planning their fitness to the building would come naturally. The question of architectural treatment would then be comparatively simple.

Of course such an argument lays itself open to the answer that it is based upon a principle which disowns the responsibility of circumstances. The nature of the approach leading to the steps, the use of the building, and the many demands which militate against proper architectural conduct must be considered.

Let me say in reply, an argument that such-and-such a solution is the best that can be made under the circumstances is in no way an acquittal. It is only an excuse, and admits a makeshift. If one is confronted with a problem which imposes conditions beyond all sense of decency, surely the responsibility becomes limited. To arrive flea-like at certain levels in positions already fixed can only be done at the expense of one's self-respect, and is only possible by complete abandonment to these conditions.

The difference between the successful and the unsuccessful treatment of steps is that the former belongs to, and is an integral part of, the design, while the latter is an unfortunate appendix which, were it practicable, we should like to cut off.

It ought not to be felt that the building is only reached when

we have arrived at the entrance landing. We ought to feel that, with the first step, we have already arrived.

A friend put the whole question in a nut-shell the other day: "By some steps you wish to get there, by others you've got to."

SOME PRECEPTS FOR THE DESIGNER.¹

I SOMETIMES feel that it is a little misleading to speak of designing for one material and designing for another, as if there were various ways of designing—different means of arriving at the goal. Every artist, I am confident, will agree with me that there is only one way, and that through the narrow portals of invention. That, without doubt, is the first and great essential.

By using the word "invention" I mean that you must be able not only to see your subject as it presents itself to your mind's eye, but by some curious and subtle process you must have the power to arrange that the actors in your subject shall adapt themselves to the exigencies of the space which is to be decorated. It may be round or square, regular or irregular, but there must be no feeling of a picture which has had pieces cut out of it to fill the space. The grouping of the composition must look unconscious, without the slightest hint of posing or extravagance of attitude. At the same time the whole machinery of design must be hidden away, so that while line and color adapt themselves to the peculiar shape of the panel, yet ease, simplicity, and directness combined is the aim of the artist. That, in short, is design, whether the scheme is for figure or ornament.

There is another side to the "making" of designs—a tendency to allow the subject to come from the tip of the pencil rather than from the brain, with the result that "mannerism" is achieved. Certain attitudes, sitting or standing, tricks in reproducing drapery, repetition in the placing of hands and heads, unconsciously reproduce themselves, and occur over and over again with dangerous facility, unless we are ever on the watch. In fact, if you find your design comes easily at first, eye it suspiciously, and test it in every conceivable way until it proves itself sound and good. It is so easy to turn out graceful curves and twists, especially to-day when so much licence is given to an erratic growth.

Mannerism is often confounded with style—that is, the way that an artist does a thing, and which is a part of himself. No two men can put onto glass or paint on canvas the same object treated in exactly the same way. The very nature of our being renders this impossible. Consequently technique in art is as diverse as handwriting, even when we have purposely set ourselves to follow the work of some master, *i.e.* apart from mere copying. The great and golden rule which will help us to steer clear of mannerism—the dangers of unconscious trickery in drawing or painting—is to study, draw, and observe always.

Now by this I do not advise mere sketching, which, I believe, is often a useful way of forgetting. There are certain things in nature which can *not* be sketched; they must be studied and stored up in the memory. A hasty sketch often blurs the clearness of your perception at the time, but if you draw it afterwards from memory you will be amazed to find how mere hard looking has helped you, and how well the details are remembered. It is not always possible to stop and draw everything which appeals to you—some detail of ornament, some delicate harmony of color, or valuable grouping of figures. It is therefore necessary to cultivate drawing from memory, otherwise much that is invaluable to your practice will be lost. When you *can* stop and draw, do so; but I would advise you to *draw*, not to sketch. If there is a difficult bit, analyze it and keep at it until you have thoroughly mastered every detail. For instance, take a piece of stationary drapery, make a hasty sketch, and then try and use it in your cartoon or painting; you will find you have missed just the useful part. On the other hand draw it in such a way that you have exhausted all its resources, studied every groove, cast shadow, and reflection, and when you turn again to your cartoon the work is more easy for you, and you are able to adopt and simplify almost without reference to your study. The Japanese artist will sit for a whole day looking and studying without touching pencil or paper. Of course I know that there is no law. The method of one designer—as we have already noted—is not the method of another, and after the rudiments of technique, the handling of pencil and color, have been acquired, you must find out the rest for yourselves. There is no recipe for designing. You may know every line of "historic ornament," and yet be unable to evolve the simplest pattern.

¹Extracts from a paper on "Designing for Mosaics and Stained Glass," by Mr. J. Eadie Reid, read before the Northern Architectural Association.

It is just possible to draw too much and look too little, and in so doing we lean upon "convention," which is supposed to point to an easy way out of our difficulties, so much so that design and convention are popularly supposed to be twin sisters. We hear of a conventional rose, a conventional figure, which generally means that neither object recalls what it is intended to represent; as far as nature-study is concerned, they are first cousins to the weird forms with which we adorned the margins of our school books. The lines are more pleasing and resolve themselves into agreeable forms such as we find in the latest fashion of ornamental design. Nevertheless convention has done loyal service, and by putting the best construction on the word we find that the ill-used term really stands in the relation to design that impressionism takes in painting. Where the latter deals with the mysteries of atmosphere, the former embodies the recollection of a given form which is influenced by the chisel or brush, by the more or less playful treatment of the material in which we work. It is wrong convention when we attempt to reproduce in a less congenial method. What can easily be rendered with one pat of the brush is infinite labor with the etching needle, and *vice versa*.

The laws of design, however, are as unchangeable as those of the Medes and Persians. It is not until we have fixed our ideas, invented our scheme, that we can begin to adapt it to our materials of glass, pigment, or carving. This may sound heretical, but in truth it is the only way to arrive at success. The knowledge of the medium which you begin to bring upon the design when once conceived is a thing by itself, and no unimportant factor. Half the ingenious designs which are drawn every year are lost to the world for want of actual knowledge of the methods they are presumably designed for. Your message may be an important one, but surely if you wish it to be told you must learn the language. There is a false confidence, a belief that the workman will put it right, which often ends in disaster. Again, in the desire for originality of eccentric form, the idea is overlooked in the effort to astonish.

If an artist has the sense of design and the ability to execute, there is no reason why he should endeavor to emulate, no matter how skilfully, the works of past ages. The mission of the artist is to see, not only the things around him, but to render with all the knowledge and skill which have been given to him the imaginings of his brain; in short, all that is embodied in the word "design." If these things are hot within him, if he feels them so strongly that outside influences do not affect him, he must perforce put them down upon paper or canvas imbued with his own individuality and in his own peculiar style. There will be no halting to think how Giotto would have done it, or how Titian would have colored. He will see with his own eyes, paint as he feels until he has realized the mental images, color, and treatment in sympathy. This does not merely apply to painting alone, but is the essence of all art, be it glass or mosaic. When once the knowledge of the material has been acquired it is simply a recognition of the limits and courage to cut down details. The artist will be governed by the lead or the tessera, and there will be no emulation of the miniature painter. In stained-glass the wealth and richness of color will appeal to him, the value and quality of light will suggest and tempt him on to new combinations and harmonies, until we are again in a position to rival the great masters who have left us such perfect models of windows. It is not lack of fine glass or want of workmanship—you can get both. It is rather the danger of imitating certain periods of glass design, and, I might add, not the best periods; a timidity in designing a window which does not look like another stained-glass window; and a fear of color, while glass and yellow stain with a touch of ruby and a point of blue seem to be as much as the modern will allow himself. It is not so in domestic glass; why should it be so in church? Have we forgotten the glass in the Duomo of Florence, the windows in St. Francis of Assisi, not to mention scores of others, both at home and abroad? The subject opens out many roads to discussion and variance of opinions. I can only speak as a humble worker, Design and Color being my motto.

ILLUSTRATIONS.

STAIRCASE DETAIL AND THE ROTUNDA: FEDERAL PALACE, MEXICO
MEX. M. E. BÉNARD, ARCHITECT, PARIS, FRANCE.

CHAMBER OF DEPUTIES: FEDERAL PALACE, MEXICO.

THE HENRY COFFIN NEVINS HOUSE FOR THE AGED AND INCURABLE,
METHUEN, MASS. MR. H. M. STEPHENSON, ARCHITECT, BOSTON,
MASS.

THE DINING-ROOM: HOTEL WALTON, PHILADELPHIA, PA. MR. ANGUS
S. WADE, ARCHITECT, PHILADELPHIA, PA.

MAIN ENTRANCE-HALL: HOTEL WALTON, PHILADELPHIA, PA.

VIEW OF THE SAME AT NIGHT.

"THE BARN": HOUSE OF MR. MANTLE FIELDING, ARCHITECT, GER-
MANTOWN, PA.—HOUSE OF DR. ALEXIS S. SMITH, GER-
MANTOWN, PA.

The first of these subjects derives its title from the fact that Mr. Fielding remodelled for his own dwelling one of the old stone barns that date from the early part of the last century.

Additional Illustrations in the International Edition.

INTERIOR OF THE SCALA THEATRE, LONDON, ENGLAND. MR. FRANK
VERITY, ARCHITECT.

PROSCENIUM DETAIL: THE SCALA THEATRE, LONDON.

NOTES AND CLIPPINGS.

RUSSIA BUYS VERESTCHAGIN PICTURES.—The Government has purchased for the Alexander Gallery a collection of pictures of Vassili Verestchagin, the Russian painter, who went down in the battleship Petropavlovsk at Port Arthur in April of last year. The collection includes a number of Philippine sketches.—*Exchange*.

WATTS'S "PHYSICAL ENERGY."—The ultimate destination of Watts's fine statue of "Physical Energy" is not the Matoppo Hills, but Cape Town. Cecil Rhodes wanted no monument over his lonely grave, but expressed a wish to have his own name inscribed on the base of the statue as one who had faith in the completion of the Cape to Cairo Railway.

DAVID D'ANGERS'S STATUE OF JEFFERSON.—Ambassador McCormick, M. Jusserand, French Ambassador to the United States, and officials of the Department of Fine Arts attended the ceremony of the dedication of the statue of Thomas Jefferson at Angers, Maine-et-Loire, on Sept. 16.

It is a replica of David's statue of Jefferson. Congressman Jefferson M. Levy, of New York, presented it to Angers, David's native town.

EARLY EGYPTIANS IN FRANCE.—There has just been laid before the French Academy of Sciences a well-authenticated case of prehistoric Egyptian remains found among the prehistoric remains of ancient Gaul. The connection between Gaul and Egypt was established in this way: A card of cut flints of the neolithic period was obtained from Egypt and a card of exactly similar flints found on Rijou Island, nine miles from Marseilles, was shown with them. At the spot on the island where these flints were excavated there were found lying nearest the surface some Roman pottery; below that Greek pottery, with Ligurian and Egyptian still lower, and below these again masses of marine shells, pottery and flints, different from any yet discovered. The remains found go back at least five thousand years.—*London Globe*.

FLASHING FOR GLASS PAINTING.—Besides enamels and stains, artists, whenever the subject will allow of it, make use of panes colored throughout their substance in the glass-house melting-pot, because the perfect transparency of such glass gives a brilliancy of effect which enamel coloring, always more or less opaque, cannot equal. It was to a glass of this kind that the old glass-painters owed their splendid red. Instead of blowing plates of solid red the makers used to flash a thin layer of red over a substratum of plain glass. Their process must have been to melt side by side in the glass-house a pot of plain and a pot of red glass. Then the workman, by dipping his rod first into the plain and then into the red glass pot, obtained a lump of plain glass covered with a coating of red, which, by dexterous management in blowing and whirling, he extended into a plate, exhibiting on its surface a very thin stratum of the desired color. In this state the glass came into the hands of the glass-painter, and answered most of his purposes, except when the subject required the representation of white or other colors on a red ground. In

this case it became necessary to employ a machine like a lapidary's wheel, partially to grind away the colored surface till the white substratum appeared. The material employed by the old glass-makers to tinge their glass red was the protoxide of copper, but on the discontinuance of the art of glass-painting the dependent manufacture of red glass, of course, ceased, and all knowledge of the art became so entirely extinct that the notion generally prevailed that the color in question was derived from gold. In 1793 the French Government actually collected a quantity of old red glass with the view of extracting the gold by which it was supposed to be colored. Le Vieil was himself a glass-painter employed in the repair of ancient windows, and the descendant of glass-painters, yet so little was he aware of the true nature of the glass that he even fancied he could detect the marks of the brush with which he imagined the red stratum had been laid on.—*The Architect*.

THE ORIGIN OF LITHOGRAPHY.—Lithography, in common with many of the most important inventions in every branch of the arts, owes its origin to an accident arising from the necessitous circumstances of the inventor. Aloys Senefelder, an actor at one of the theatres at Munich, was the individual who was thus enabled to immortalize his name as the inventor of an art. Senefelder's histrionic pursuits do not appear to have been a source of any material profit to him, for he describes himself as being in a state of great pecuniary distress. In the year 1792 he added the title of author to that of actor, by publishing a tragedy which, from the delay in getting it printed in time for the Leipsic fair, produced little or nothing more than the expenses. This circumstance induced the desire to be the printer of his own productions; but his means being too limited to admit of his purchasing a press and other necessary materials, he had recourse to a variety of expedients to supply the deficiency; and among others, that of etching his writings on copper-plates. While so engaged, he was induced to make several experiments in the composition of ink or other writing materials best adapted for correcting any mistakes he might make in his writing on the copper, the result of which was the adoption of a composition of wax, soap and lampblack. This appeared for some time to promise success; but the expense of the copper-plates was a serious objection to Senefelder, who was as yet only practising the art of writing in inverted characters on copper, preparatory to the application of his plan to the publication of his works. It occurred to him that he might perhaps be able to use a flat piece of Kellheim stone, which he had procured for the purpose of grinding his colors, with as good effect for this practice as the copper; and having discovered a method of cleaning off the writing from the stone when done with, he availed himself of the stone as a substitute for copper-plates, without, however, contemplating the possibility of taking impressions from it, or of its application to any other purpose than that of a substitute for copper on which to practise inverted writing. It chanced, however, that he was one day applied to by his mother to make out a list of clothes for the laundress; neither ink nor paper was at hand, but the piece of stone had just been polished from the last writing, and had not been covered with the varnish preparatory to a new one, and in the hurry of the moment he dipped a pen into his composition ink and wrote the required list on the stone, intending to copy it off at his leisure. When, however, he prepared to do so some hours afterward the writing appeared so firm and good on the stone that it occurred to him to try what effect would be produced by biting-in the stone with aquafortis and taking an impression from it. He did so, and found to his surprise and joy that at the expiration of five minutes the stone was eaten in to the depth of a one-hundred-and-twentieth part of an inch, and the writing consequently elevated in an equal degree. He then applied his composition printing-ink to the writing, and with much less force than was requisite to take off an impression from the copper obtained a perfect reversed impression of his writing. Thus he perceived that this Kellheim stone possessed an inherent property of imbibing and retaining grease so as to admit of an impression being taken of anything written with such materials after the writing had been rendered prominent by the other parts of the stone being eaten away with aquafortis. From the discovery of this property proceeded the invention of lithography. The first efforts of Senefelder to improve upon his new discovery were as laborious as they were inefficient, but by dint of that ardent and unconquerable perseverance, which was the leading characteristic of his mind, he at length attained his long-sought object, that of tracing characters in his composition-ink upon the stone and taking perfect impressions of them.—*The Architect*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, OCTOBER 7, 1905.

No. 1554.

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BECAUSE of the different interpretations put upon the postal-regulations by the post-masters at Boston and New York, it was found to be, on the whole, desirable to abandon the publication of our *Topical Architecture Monthly* as a serial issued at regular intervals. The step was a regrettable one to have to take, since the periodical was esteemed not only by ourselves, who understood the final working of its rather complex scheme of publication, but by the subscribers to it. As the publication of collated series of classified detail is of too great usefulness to be altogether abandoned, it has been decided to continue the undertaking by incorporating such illustrations in one of the issues of the *American Architect* itself each month, and, consequently, the first plates of a new series, "Minor Châteaux," appear in this issue.

THE official interpretation of postal regulations has always been a puzzle to publishers, who, in fact, are specifically advised by the authorities never to attempt to interpret them, but to come to headquarters each time and ask for a verbal or written interpretation of apparently easily understandable rules. We have just had new evidence of the ease with which new interpretations may be discovered at any fortuitous moment. After enjoying the hospitality of the Canadian mails for more than a quarter of a century, and without having given the slightest occasion for offence, the *American Architect* has, with thirty-seven other periodicals—a very incongruous assemblage they prove to be—been excluded from the "pound-rate" privilege of the Dominion's mail-service. On seeking the reason for this act, we are informed that exclusion is to be enforced because the illustrations enclosed are not "necessary for the purpose of illustrating the reading-matter." That is, because we do not waste our restricted space in saying that Mr. X.'s house is built of stone and

brick, which is patent on the face of things, or that Mr. Y.'s house has hardwood floors, with a fret border in darker woods, which the illustration could not show, and would be of no interest to any one but Mr. Y., if it could, the *American Architect* must now pay stamped postage in the Provinces. It would be more logical, but no more reasonable, if the Canadian authorities should say the reason was because the text did not have enough connection with the illustrations which, of course, are published in that graphic language—as true a language as English, French, Italian or German—which is understood by architects of every race and by all those who practise the decorative arts, so that a Japanese subscriber is served as well as an American and a Mexican as intelligibly as a Canadian. The unreasonable nature of the ruling needs no comment; but, unfortunately, it finds support in a literal interpretation of the laws which allow only of the inclusion of "illustrations which form a necessary part of a publication as illustrating reading-matter." Still, the authorities may yield to argument and explanations, and in that case our contributors may aid us to maintain our good standing, when recovered, by taking the trouble to send us with the material they offer for illustration enough descriptive matter at least to comply with the exactions of officialdom.

TWO cases in which we have given our readers occasion to take an interest have lately been settled in ways that seem to us unsatisfactory, but upon which we will make no further comment now, merely reciting the facts for the sake of completing the record. Owing to the efforts of his fellow-prize-winners in the first competition for the Wisconsin State-house—Wisconsin firms both—Mr. Cass Gilbert, who won first place, is not to have the pleasure of carrying his design into execution. A second competition is to be held, with which, however, some of the commissioners in charge of the first affair now refuse to have anything to do. The second case, that of the protest of Messrs. Rankin, Kellogg & Crane, against the base for Mr. Niehaus's statue of President Harrison, designed by Mr. Harry Bacon, has been decided by the Supervising Architect in favor of the protesting architects of the Post-Office Building. Very naturally, Mr. Bacon, supported by Mr. Niehaus, declines to change his design, and the only thing to do is to seek elsewhere in Indianapolis for a suitable site for the monument. Clearly, if States rights win in the first case they lose in the second.

THERE is some possibility that the current insurance investigation, with its absorbingly interesting revelations, may have an unfortunate influence on building interests in New York. The Equitable Society has announced its withdrawal from the devious paths of high finance and advertises the fact that it desires to lend its surplus on good mortgage security, and this step will naturally encourage real-estate improvers to negotiate further building-loans. But already there has been loaned

on mortgage in Manhattan and the Bronx in the first six months of this year the enormous sum of four hundred and eighty-eight million dollars, a sum that more than doubles the loans for similar purposes during the corresponding period last year, while the cost of the buildings for which permits have been issued during these six months exceeds the cost of those projected during the entire year 1902 when building was also active. Thus far the building movement seems to be a healthy one, at least the new buildings do not seem to be left unoccupied over long; but whether it can continue to absorb fresh loans in safety, without seriously affecting the rental returns from the older buildings, is open to question.

TO be sure, statistics prove that the city is growing rapidly in population and the Board of Health has just concocted a census of the city, on a system of averages satisfactory to itself, which gives the total population of Greater New York as something over four and a quarter million persons, and the annual increase of population as something less than two hundred thousand. These new people, not all babes by any means, of course need to be housed; still, reckoning only fifty persons to a building, they would require but four thousand new dwellings each year. The fact that during the second quarter alone of this year forty-six hundred and seventy-three buildings were completed seems to indicate that the proper average quota of dwellings for one year is already more than supplied, for we assume a low enough per capita of occupancy to discount the fact that all the buildings erected are not dwellings. If the present rate of building not only continues but is further stimulated through the greater accessibility of the insurance funds, there seems to be suggested the possibility of an over-inflated building-boom, followed shortly by the collapse that always attends the satisfying of a glutinous greediness.

THERE are few things more surprising than statistics, as everyone knows, and yet, familiar as we are with Paris, we cannot but feel surprised that M. Charles Turquet has been able to list only one hundred and six statues or monuments erected upon the streets or public places of that city to the memory and in the honor of the great men of the French nation. The list does not include statues in galleries or attached to buildings, but consists of what properly may be considered public, or rather civic, monuments. Few as these monuments are, there are no less than twenty-six of them whereof a mere bust is the significant feature, and amongst these we presume must be counted the bust of Charles Garnier, for, as said, only a single architect has been thus monumentally honored; and yet, if our memory may be relied on, the statue of M. Alphand is already erected. Only seven monarchs—of kinds—have been allowed by communists and republicans to cumber still the streets in bronze or marble, the rest of the *gens*, such as have not been wholly destroyed, being in storage at the Garde Meuble. The gratitude that people feel to those who do more than others to make the hours of leisure both pleasant and profitable is evidenced by the fact that statues erected in honor of great writers outnumber, three to one, the statues erected in the honor of soldiers, or politicians,

or painters. It speaks well for the modesty of sculptors and architects, the very men who create these monuments, that so few memorials have been erected in their honor, two of sculptors and one, as we have said, of an architect; and yet it may but signalize their commercial common sense, as it is more profitable to work for other people than for one's self.

UNDER the direction of the League for Political Education and with the coöperation of the various societies of artists throughout the country, a new and sustained effort to bring about the repeal of the tariff on works of art is to be made during the next session of Congress. If it were not for the proclaimed belief of the dominant party that it is not possible to attempt remedial legislation for one schedule without so exciting the hostility of partisans favoring revision of another schedule as to produce a complete legislative dead-lock, there would be a fair chance that the League could effect something, since, so far as we know, the tariff on art is not defended and upheld by anyone on its merits. We hope that, if he gets a chance, Senator Dryden may give his fellow-Senators as convincing information about the aims and desires of American painters and sculptors as he did last spring about the habits and customs of architects.

THE amusingly ingenious but too long-drawn-out newspaper discussion of a few years ago over the actual date of the termination of the last-century finds a curious parallel in the discussion that has recently sprung up in Washington over the proper Roman notation to be used in identifying this year of grace. Messrs. Carrère & Hastings have offended some purists by having the date cut in the corner-stone of the new office-building for the House of Representatives as MDCCCLV., which they prefer to the shorter, and we believe the more scholarly, form MCMV. Both forms are recognized as correct, and perhaps all that may fairly be said for the shorter one is that it is surely less expensive to cut than the other.

IN fear, seemingly, lest she may not have any territory she can call her own, Chicago, alarmed because the heirs of the Polish volunteer patriot Kosciusko are about to bring suit to recover for themselves the entire site upon which the western metropolis is built, has in her turn just begun suit to secure for herself a new site, to which she can move after the dire catastrophe has eventuated. This suit is laid against the Illinois Steel Company, to recover the title to some two hundred acres of land, valued at four million dollars, which the Steel Company has reclaimed from the Lake and the Calumet River and utilized as the site of some of its yards and buildings.

ALTHOUGH most American architectural students who seek a foreign education in their art prefer the courses at the École des Beaux-Arts in Paris, there are now and then some who seek to enter the Bau-Akademie in Berlin. It is of interest, then, to know that, for the present at least, Prussian educational hospitality is chilled, and the Ministry of Ecclesiastical Affairs and Education will pass on each application, with a general understanding that foreigners are not greatly desired.

CHICAGO FOUNDATIONS.¹

HORACE says, in "De Arte Poetica," "It is difficult to treat common topics with originality." There has been so much written regarding foundations for high buildings in Chicago that it is difficult to write anything that is not trite, and it is practically impossible to say anything new. The soil on which Chicago is built consists of loam and made ground down to datum, about 14 feet below street grade, then comes a layer of hard, stiff blue clay 6 to 12 feet thick; below this the clay, while generally of the same character as the hard stratum above, becomes softer, and remains soft to a depth of 60 to 70 feet below street grade. This soft layer, as a general thing, only differs from the hard layer above in the amount of water it contains, and the buildings in their settlement squeeze out this water, thus increasing the thickness of the hard layer.

When the foundations of the new Post Office were put in, extremely hard clay, that had to be cut out with draw-knives and thrown into the wagons with pitchforks, was found down to a depth of 35 or 36 feet, although when buildings near it were built soft clay was found at about 20 feet below grade.

It was found early in the use of spread footings that it was not advisable to dig into the hard stratum at all. The foundations were placed upon this hard stratum wherever it was found, and this in some cases only allowed a clear height in the basement of 7½ or 8 feet. Before the Masonic Temple was built the soil was tested by supporting a tank on a plate having an area of 2 square feet. This tank was gradually filled with water. The final load was 5,650 lbs. per square foot. Two tests were made, each lasting about 100 hours. In one test the plate rested directly on the top of the hard clay. In the second test the plate was placed at the bottom of an excavation in the hard clay 2 feet 4 inches deep. The total settlement in test No. 1 was 1 13-16 inch, and in No. 2 4⅞ inches. Below this clay comes a very hard, compact clay, frequently containing boulders of various sizes, some of them being 5 or 6 feet in diameter. This clay continues down to either the rock or a layer of sand and gravel of varying thickness which occasionally overlies the rock. Rock is found in the down-town district at about 100 feet below street grade. In an artesian well sunk at the Chicago and North Western office building now being completed this limestone rock started at 100 feet below datum and continued down to 434, then came a layer of blue shale 53 feet thick, then 350 feet of limestone, then 160 feet of soft white sandstone, then 300 feet of limestone and finally at 1,400 feet a white sandstone was found which contained water in sufficient quantity, rising to within 100 feet of the surface.

The old masonry foundations of the four to six-story buildings erected after the fire were, of course, spread foundations, and their load on the clay ran from 8,000 to 15,000 lbs. per square foot. There must have been great settlements, but with the streets varying so much in grade, as they did, and with the masonry buildings, it did not make much difference how much they settled. However, as the heights of buildings increased and more room in the basements for mechanical plants became a necessity, it was found that some other kind of foundation was required, and the spread footing made of layers of beams embedded in concrete followed naturally. The settlements of buildings supported upon these spread foundations were considerable, ranging from 8 inches to as much as 30 inches. This settlement is anticipated when construction is begun by raising the level of the bottom of the footings by the amount it is thought the buildings will settle. This causes the sidewalks to be steep at first, but they approach their proper slope as the buildings settle. The foundations of the Great Northern Theatre were raised 9 inches.

It has also been found that the tall buildings with spread foundations do not stop settling. This continual settlement is caused by the wind tending to reduce the pressure on the soil on the windward and increasing it on the leeward side. Some of the tallest buildings erected twelve to fifteen years ago are still settling—very slightly, it is true, but the movement is enough to be detected. Another fact noted is that all the tall steel buildings lean north and east. This is due to the fact that in the spring and summer, when the buildings are being erected, the prevailing winds are from the south-west, and as the greatest settlement occurs during erection, this constant pressure against the unfinished structures is sufficient to cause them to lean slightly.

The following incident will show how great is the initial settlement:—In the Masonic Temple four of the main columns, near the lifts, carry heavy loads and have large footings, and between

them are two small columns which only carry the stairs. As these had much smaller footings than any others in the building, they were given a higher load per square foot. During the construction of the building the four columns had received the greater portion of their loads when the erection of the stairs was begun. It was found at once that the connections on the stairs would not fit those on the columns, the latter being too high. Levels, taken to ascertain whether the small columns had been forced up, showed that they simply had not settled with the rest of the building. About 75 tons of pig-iron were then loaded on both footings and allowed to remain for a week. Although the load then amounted to 7,000 lbs. per square foot, twice the load on any of the other footings, the column only settled about 1 inch, less than one-half the desired amount, and so the connections had to be changed all the way up the stairs.

It was found early in the history of floating foundations that live load must not be considered when designing foundations. The reason for this is that the foundations get the dead load immediately, but the live load does not come on until the building is finished and the greater part of the settlement has taken place.

One of the finest buildings in Chicago—a wholesale warehouse built nearly thirty years ago—was designed by a Boston architect. He proportioned the foundations for the same live and dead load he used in designing his columns. The result was that the outside walls, where the percentage of dead load was very great, settled at once, and the interior columns, where the percentage of live load predominated, did not settle. If you go into that building to-day you will see porters helping the regular truckmen to wheel their trucks up the hills caused by the curve in the floors.

The great settlement of buildings on these floating foundations and the necessity for increased basement height, owing to the increasing use of water-tube boilers and other improvements in the mechanical plant, led to the gradual abandonment of this style of foundation, notwithstanding its cheapness. But the chief reason for the change and the discarding of the spread footings was the building of the tunnel by the Illinois Tunnel Company. This was a remarkable piece of work. Thirty miles of this tunnel 40 feet below street grade have been completed and the whole work has been carried on without any tearing-up of the streets. Indeed, very few people in Chicago knew it was being built until it was practically completed. Shafts were sunk at curb line, and the dirt was hoisted through these shafts and carted away at night. This tunnel, together with the present agitation about subways for the street car lines, render the concrete wells going to rock the only safe method of constructing foundations for high buildings in the business district.

Many of the buildings now being erected have basements going down to the level of this tunnel. A great deal of the clay excavated in foundations of buildings is now taken out to the lake through this tunnel, saving the teaming of it through the streets.

While most of the large warehouses along the river are on piles, and a few in the business centre rest on piles, yet a very large percentage of the buildings put up in the past five or six years rest on concrete caissons. Concrete wells would be a better name, as they are simply holes dug just as ordinary wells are and filled with concrete. These were first used in Chicago in the Stock Exchange erected in 1892, but two years before this the City Hall in Kansas City was built upon steel shells going down to rock, excavated and filled up with hard brick laid in Portland cement. Excessive loads were carried on Z-bar columns passing through the centres of the piers and going down to rock. The site of the building was formerly a ravine between abrupt bluffs. These had been so cut away and leveled as to leave a 50-foot filling of rubbish under two-thirds of the building and a solid clay bank under the other third. The fill was made by its use as a public dump. This is the first building I know of to make use of this kind of foundation.

The concrete wells as now built are put down 4 or 5 feet and then lined with wooden lagging 2 to 3 inches thick, tongued and grooved, and either 4 feet or 5 feet 4 inches long. Each section of this lagging is held in place by two steel bars, generally 4 inches wide by ¾ inch thick, made semi-circular, in two pieces turned up at the ends, so they can be bolted together. If the ground is unusually soft three rings are used in each section, and the sections are made shorter. After the first section is lined a new section is dug and lined up, and so on down to the hard clay 60 to 70 feet, or to the rock, as the case may be.

Where the wells are only carried down to the hard clay they are belled out at the bottom to twice the diameter of the shaft, but if carried down to the rock, which is the better way, they are not belled. When the holes are excavated to the bottom the concret-

¹A paper by Mr. E. C. Shankland in the *Technograph* of the Engineering Societies of the University of Illinois.

ing is begun and the rings are taken out as the work of filling progresses. Sometimes the lagging is also taken out, but this is not done as a general thing. When soft, swelling clay is found, or where the well is close to a high building previously erected on spread footings, both the rings and lagging are left in as a means of safety.

It is sometimes necessary to use iron shells for lagging for a portion of the distance. In the Chicago Edison Building recently erected at the corner of Market and Washington Streets, a very soft sand stratum full of water was discovered at a depth of 85 feet. It might also be called quicksand. It was necessary to get iron shells and drive them down ahead of the digging, as that was the only way the water could be kept out by the pumps.

These wells do not settle in themselves; still, they cause some settlement to adjoining buildings. This is due to the impossibility of digging the clay so that the lagging will fit close to it. There are bound to be vacant spaces back of the lagging which will be filled up later by the earth pressure, and this movement will show itself in the settlement of the foundations of the buildings close by. Slight settlements in a building across a 40-foot street have been known to occur, presumably from this cause.

With spread footings the maximum load on the clay was 3,500 lbs. per square foot; generally a load of 3,000 lbs. per foot was used. Concrete wells are proportioned for a load of 40,000 to 45,000 lbs. per square foot at the top. This means for a belled well about 14,000 lbs. per square foot on the clay and about 60,000 lbs. per square foot if it is carried down to rock. For piles the maximum load allowed by the city ordinance is 25 tons per pile, but generally the load does not exceed 20 tons per pile, although 50-foot piles, driven to a stand, are good for 50 tons. One great advantage of concrete wells is that they can be constructed before the old building is taken down.

Another form of foundations which has not been mentioned is concrete piling in places where wooden piles or spread footings cannot be used and concrete wells are too expensive. Wooden piles have to be cut off at or below datum, which is 14 to 15 feet below the surface of the ground. This is all right where there are basements, but in some cases a basement is not required. Then if wooden piles are used, the footings will have to be excavated to datum, the piles driven and cut off at datum or lower, and a stone or concrete pier built up to the basement floor. This is very expensive.

TESTING OF NEW MATERIALS IN NEW YORK.

THE Bureau of Buildings of the Borough of Manhattan, New York, have considered what specifications should govern the acceptance of the newer building materials. This was made necessary by the introduction of such new materials as sand-brick, cement-brick and hollow concrete blocks. Common building bricks having been accepted as having sufficient strength, they were taken as the basis on which to fix the specifications, and the Bureau proceeded to find what strengths were indicated by the common building brick. The tests were carried out by Professor Ira H. Woolson, Adjunct-Professor of Mechanical Engineering at Columbia University, New York City.

Professor Woolson finds as a result of the tests that figures for transverse strength given in engineering books show results from 20 to 50 per cent. too high. There also seems to be no conformity between the transverse and crushing strength, or between strength and absorption.

As a result of the above tests the following regulations have been formulated by the chief engineer of the Bureau of Buildings, and approved by Isaac A. Hopper, the Superintendent of Buildings:

1. The regulations are to apply to all such new materials as are used in building construction, in the same manner and for the same purposes as natural stones, brick and concrete are now authorized by the Building Code.
2. Before any such material is used in buildings an application for its use and for a test of the same must be filed with the Superintendent of Buildings. A description of the material and a brief outline of its manufacture must be embodied in the application.
3. The material must be subjected to the following tests: Transverse, compression, absorption, freezing and fire. Additional tests may be called for when, in the judgment of the Superintendent, the same may be necessary. All such tests must be made at some laboratory of recognized standing, under the supervision of the engineer of the Bureau of Buildings. The tests will be made at the expense of the applicant.
4. The results of the tests, whether satisfactory or not, must be

placed on file in the Bureau of Buildings. They shall be open to public inspection, but need not necessarily be published.

5. For the purpose of the tests at least five samples or test-pieces must be provided. Such samples must represent the ordinary commercial product. They may be selected from stock by the Superintendent of Buildings or his representative, or may be made in his presence at his discretion. The samples must be approximately 8 inches long, 4 inches wide and 2 inches thick. In cases where the material is made and used in special shapes or forms full-size samples may also be called for and tested in such manner as may be directed by the Superintendent of Buildings to determine the physical characteristic specified in Regulation 3.

6. The samples may be tested as soon as desired by the applicant, but in no case later than sixty days after manufacture.

7. The weight per cubic foot and specific gravity of the material must be determined.

8. These tests shall be made in series of at least five, except that in the fire tests a series of two (four samples) is sufficient. The transverse test shall be made first on full-size samples (8x4x2 in.). The resulting half samples are then used for the compression and absorption tests, but in no case must both halves of the same piece be used in any series. Half samples may also be used for the freezing and fire tests under the same restrictions. The remaining samples are kept in reserve, in case unusual flaws or exceptional or abnormal conditions make it necessary to discard certain tests. All the samples must be marked for identification and comparison.

9. The transverse test shall be made as follows: The sample shall be placed flatwise on two rounded knife-edge bearings set parallel 7 inches apart. A load is then applied on top, midway between supports, and transmitted through a similar rounded edge until the sample is ruptured. The modulus of rupture shall then be determined by multiplying the breaking load in pounds by twenty-one (three times the distance between supports in inches), and dividing the result by twice the product of the width (approximately four) in inches by the square of the depth (approximately two) in inches.

10. The compression test shall be made as follows: The sample must first be thoroughly dried to a constant weight. It must be carefully measured, then bedded flatwise in plaster of Paris or blotting-paper to secure a uniform bearing in the testing-machine and crushed. The total breaking load is then divided by the area in compression in square inches.

11. The absorption test must be made as follows: The sample is first thoroughly dried to a constant weight. The weight must be carefully recorded. It is then placed in a pan or tray of water, immersing it to a depth of not more than $\frac{1}{2}$ inch. It is again carefully weighed at the following periods: thirty minutes, four hours and forty-eight hours respectively from the time of immersion, being placed in the water in each case as soon as the weight is taken. Its compressive strength, while still wet, is then determined at the end of the forty-eight hour period, in the manner specified in Regulation 10.

12. The freezing test is made as follows: The sample is immersed as described in Regulation 11 for at least four hours, and then weighed. It is then placed in a freezing mixture or a refrigerator, or otherwise subjected to a temperature of less than 15 degs. Fahr. for at least twelve hours. It is then removed and placed in water, where it must remain for at least one hour, the temperature of which is at least 150 degs. Fahr. This operation is repeated twenty times, after which the sample is again weighed while still wet from last thawing. Its crushing strength should then be determined, as called for in Regulation 10.

13. The fire test must be made as follows: Two samples are placed in a cold gas furnace, in which the temperature is gradually raised to 1,700 degs. Fahr. in one hour. One of the samples is then plunged in cold water (about 50 or 60 degs. Fahr.), and results noted. The second sample is permitted to cool gradually in air and the result noted.

14. The following requirements must be met to secure an acceptance of the materials: The modulus of rupture must average 450, and must not fall below 350 in any case. The ultimate compressive strength must average 3,000 lbs. per square inch, and must not fall below 2,500 in any case. The percentage of absorption being the weight of water absorbed divided by the weight of the dry sample, must not average higher than 15 per cent., and must not exceed 20 per cent. in any case. The reduction of compressive strength must not be more than $33\frac{1}{3}$ per cent., except when the lower figure is still above 3,000 lbs. per square inch the loss in strength may be neglected. The freezing and thawing process must not cause a loss in weight greater than 10 per

cent., nor a loss in strength of more than 33½ per cent., except that when the lower figure is still above 3,000 lbs. per square inch the loss in strength may be neglected. The fire test must not cause the material to disintegrate. (Note—No great stress will be laid on this last test.)

15. The approval of any material is given only under the following conditions:

a. A brand-mark for identification must be impressed on, otherwise attached to, the material.

b. A plant for the production of the material must be in full operation when the official tests are made.

c. The name of the firm or corporation and the responsible officers must be placed on file with the Superintendent of Buildings, and changes in same promptly reported.

d. The tests must be repeated at any time when called for on samples selected from the open market, when there is any doubt whether the product is up to the standard of these regulations.

e. In case the results of tests made under this condition (d) should show that the standard of these regulations is not maintained, the approval of this Bureau will be at once suspended or revoked.

THE MINOR CHATEAUX OF FRANCE.—I.

TO the younger architectural student, there is so much that is of interest in the well-known itineraries, that it is scarcely a temptation to depart from them, to learn, here and there, that "there is a charming example of a Francis I. château, three kilometres away," as the guide-books have it. And, too, the older traveler and the student familiar with the better-known examples often hesitate to risk a day's journey on the mere assertion of the guide-book, wherein every château is either a "beautiful example" of a certain style or, at least, "picturesque."

A visitor to a well-known château is never allowed to forget for a moment that a franc is due after the visit, if, indeed, it has not been demanded in advance. Moreover, the best-intentioned guide cannot put interest into a story told numberless times a day, nor can modern restoration or barren walls greatly aid one's imagination in picturing the past. But at smaller châteaux, found nearly everywhere in France, a visiting-card, accompanied by a polite request and the inevitable franc to the concierge, generally means an open door, and in many cases the pride of the owner makes him personally the guide. However, one's journey is not all beer and skittles, as long, dusty roads, obdurate servants and wretched inns too often reward the wanderer from the beaten track.

Although they have each sprung from a *château fort*, or been incorporated in a fortress, there is little save in their salient military features to indicate that the Grand Châteaux belong to the same family. Their architectural evolution was handicapped by strategic questions, and even the best of the large and small châteaux were designed with some consideration of defense, though it was often masked with an architectural veil.

The smaller châteaux reproduce all the features of the large ones—the internal arrangements, however, being apparently free from the defensive measures of the larger buildings. In the small Château de Martainville, Nos. 3 and 6, the rooms of the corner tower are *square* in plan though circular outside—the real defense lying in the enclosing wall and moat, which is commanded by towers like a miniature mediæval city.

The smaller châteaux, built at a single time on new ground, unhampered by existing walls and foundations, are units in plan, easily comprehended—pages to be read at a glance and, when bound together, an illustration of evolution of plan and an exact expression of the civilization of their time, the study of which is full of interest and fruitful to the architect of to-day.

The materials of these Gothic examples vary, brick or stone or both being used. The château at Martainville is of brick, the dark headers forming the deeper patterns on walls and tower, all so faded that they produce almost no effect, while at Boos, a few miles away, is found a pigeon-house, doubtless all that remains of a larger château than at Martainville, in which the brick used is so perfect, the colors of the glazed brick in the cornice so unfaded that one is only convinced of its age when the evidences of wear and tear at grade are noted.

There are two centers from which these smaller châteaux can be visited—Rouen and Tours. The best guides available for these small buildings are the little "*Géographies Joanne*," of each Department of France, with their maps and directions of communes, and the "*Guides Joanne*." Freedom from railroad time-tables is essential, and a wheel or automobile makes one his own master,

the bicycle giving greater freedom than the horseless carriage. Flint roads, however, are the *bête-noir* of both vehicles and a full mending-kit is an absolute necessity.

A single glance at an illustration, no matter how small the picture, tells more than pages of description. So these illustrations of the minor châteaux of the Renaissance have been strung together, accompanied by such notes as were obtainable, in the hope of interesting the architect and traveler in the beauty of these smaller buildings of the Renaissance in France.

In arranging these illustrations we have considered they would be of more immediate value to the architectural student grouped as to styles rather than geographically, although it happens many of our first illustrations, the Gothic examples, lie in Normandy or Brittany, many of them in the Department of Seine-Inférieure. In summing up, we shall publish a map showing the location of each of the buildings illustrated.

W. T. P.

THE GLAMOR OF CROOKED BUILDING.

AS our readers know, we, while admitting frankly that there is a good deal that is probable and still more that is plausible in Prof. Goodyear's very interesting theories as to the real purpose of the variation of vertical lines in Gothic buildings, which his patient investigation has established, have been very far from giving adhesion to all his views. But, as what we have said in the past may be held rather to support than to controvert his contentions, it seems worth while, for the sake of presenting both sides, to give here the editorial that appears in the current issue of *The Builder*, evoked, be it observed, not by the very impressive collection of photographic enlargements recently on exhibition in Edinburgh, but by an examination of the very admirable catalogue issued by the Edinburgh Architectural Association, an illustrated volume of some hundred and fifty pages, which gives a very fair presentation of Professor Goodyear's arguments, and the illustrating data by which he seeks to support them.

"We have received from the Edinburgh Architectural Association a copy of the large and finely printed illustrated catalogue of Mr. Goodyear's exhibition at Edinburgh of photographs and drawings, in illustration of his opinion as to the employment of alterations from the straight vertical or horizontal line, in Mediæval and Renaissance buildings, with the view of producing refinements of architectural effect. We are glad to have the catalogue, which is a curious and interesting document, but we fear that it will not persuade us that the exhibition renders Edinburgh for the moment a kind of Mecca to which the architectural pilgrim is bound to repair. We have in fact followed all Mr. Goodyear's illustrated publications on this subject from time to time in American magazines, and therefore know pretty well what his position is; and we can hardly think that the collection at Edinburgh will avail to convert us to a belief in what has always appeared to us to be, in the main, a laborious and fanciful twisting of facts to fit a theory which is itself improbable; and which, if accepted, would only go to prove that the architects of the buildings concerned were elaborate blunderers, who made calculated distortions in their buildings on no principle and which could serve no intelligible purpose. We admit that there are or may be exceptions to this category, but that we take to be the general truth of the matter.

"The catalogue itself, however, affords a basis for some comments which may serve to explain and probably, with a good many readers at all events, to justify our scepticism. And first with reference to the unquestionable and scientific refinements of Greek architecture. We heard the argument the other day—since it is undoubted that the Greeks did employ curves and other delicate adjustments in their temples, or in some of them (the refinements of the Parthenon are by no means universal even in the examples that remain), was it not likely that this idea should have survived? Such a question shows a total forgetfulness of the facts of European history. Between the Greeks and the Mediæval period is an interregnum of absolute intellectual darkness; a gulf across which nothing could be handed down. And in the Renaissance period even, space as well as time was a barrier. People traveled little; it took an artist all his time to get from one city in Italy to another, if he did not get knocked on the head *en route*; and there is no evidence, and no probability, that the Italian architects of the Renaissance knew anything of the monuments of genuine Greek architecture on Greek soil. From the middle of the XVth century Greece was an obscure country, the spoil of the Turks; a very unsafe and undesirable place for respectable people to go to. The unearthing of Vitruvius, a little later, might have taught them something as to some of the refinements practised by the

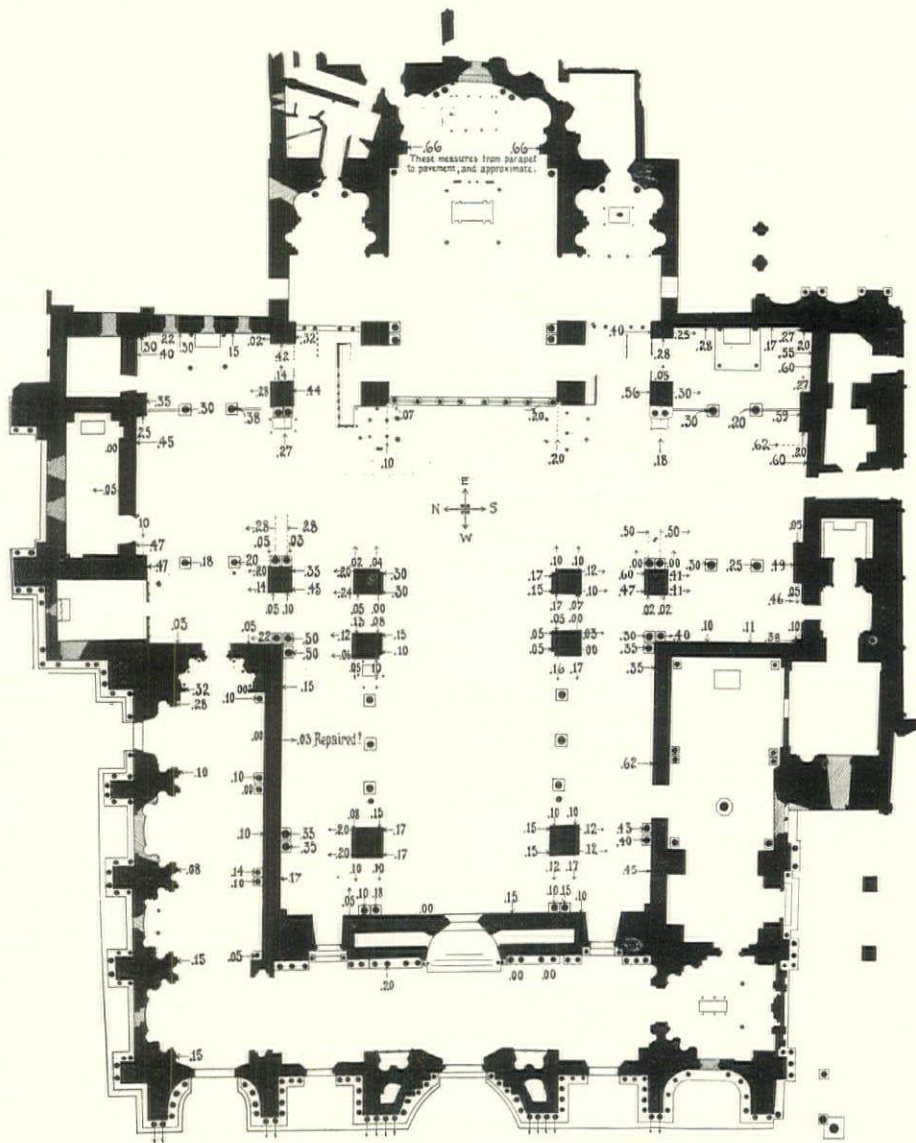
Greeks, as transmitted not very accurately through the mind of Vitruvius; but this particular chapter of the expoundings of Vitruvius does not seem to have attracted much attention, or to have been adopted in the columnar Orders of the Renaissance architects.

"Not only therefore is there no historical connection between the refinements of the Greeks and those which Mr. Goodyear claims for the Mediæval and Renaissance architects, but there is absolute contrast in their method; or rather, in the method of the former and the want of method of the latter. In the Parthenon the meaning and object of the principal corrections of line is quite evident; they point in one direction; they are part of a consistent system. We say advisedly the 'principal corrections,' viz.: the curves of steps, columns and cornice; the leaning inward of the axes of the columns; the slight enlargement of the angle columns, etc. Some minor details such as the slight differences in the width of the metope openings, which Penrose measured and figured, we have always declined to believe in as intentional or of set purpose, because they display no guiding motive or principle and serve no intelligible purpose; we can only think that Penrose, logical and clear-headed as he was, suffered to some extent from the weakness, incident even to able men who give themselves up to the study of a special subject, of a tendency to see that particular thing everywhere. But apart from these minor and doubtful details, the Greek system is consistent and intelligible. But what is there consistent or intelligible in the medley of distortions of all kinds which Mr. Goodyear brings before us and asks us to accept as architectural refinements? There is no principle whatever in them. Looking through

Mr. Goodyear's catalogue and his comments, it seems that any deviation from the straight line anywhere, whether inward or outward, is to be taken as evidence of artistic purpose; any bad setting-out of a plan, or any freak of irregularity in a plan, possibly due to some local difficulty in the site, is to be regarded as an instance of the adjustment of lines for architectural effect. Whether the lines go in or out does not seem to matter the least. In one place we are told of buttress finials and gables which overhang to the extent of so many inches, obviously to avoid the foreshortening effect of perspective; to which we may reply at once, if in certain places, why not in all? On another page we are shown in a drawing how the upper portion of the pilasters in the nave of St. Mark's falls back from the vertical line. If features are set forward to avoid perspective distortion, why are they set backward here? O, we are told, that is to give a greater look of space to the upper portion of the

church! Its real effect, of course, would be to diminish the apparent perspective height. A worse feature in architectural treatment could hardly be seen, and if we could believe that the builders did this on purpose, the natural comment would be, then the greater fools they. The tendency of long horizontal or vertical lines in architecture is to look hollow; hence the entasis in the Greek column and the curve upward in the Parthenon steps; hence also the slight convex horizontal curve which Pennethorne said he had discovered in some of the long Egyptian cornices, and which would have been a logical refinement; indeed, one is surprised not to have found it in the Parthenon, considering the extraordinary care bestowed on the lines of that wonderful building; but we cannot find that Penrose noticed or measured any such correction. Hence also the frequent employment of entasis in Mediæval spires, of which there are many samples in this

country; that was an obvious and common-sense correction, the need for which must have been early forced upon the eye of the Mediæval architect by the study of his own buildings after completion. But Mr. Goodyear shows us triumphantly the fact that the façade of St. Mark's, generally taken as flat, has a horizontal curve inward of 10 in. Suppose it has, what the better is it for that? It is simply making a natural optical defect worse. Similarly, we have a view along the cloister of the Celestines, Bologna, with a tape stretched along to show that the line is slightly hollow. The same criticism applies; it is the worse, not the better, for being hollow, and in our opinion it is merely a case of careless setting-out. Again, we are given the elevation of a row of wall-arcading in the cathedral of Troja, with the widths between the pilasters carefully



GROUND PLAN OF ST. MARK'S, VENICE.
Measurements in decimals of a foot for Venice from the Campanile, with a line of 12 ft. in the North, and of the Campanile, and of 12 ft. 6 in. in the South Campanile.

given in feet and decimals—7.03, 7.02, 7.44, etc.; and this is called 'Asymmetric Scheme in Arcades.' It is not a scheme at all; there is no rule or purpose in it; if the spacing was wider at the middle and narrower at the ends, or the reverse, there would be something in it; but the differences are quite irregular, and without any system at all, and we are convinced that they are simply carelessness, or a conviction that it was not worth while to divide them equally. That itself, no doubt, may be called in a sense a principle; it may be argued that a little irregularity is better in a repeating series than strict regularity; but we do not think there is much in that. To our thinking, if a repeating series is used in architecture, it should be one thing or another; either be set out correctly, or the widths should be obviously varied with intention. A series which looks regular but is found, on measuring, not to be quite so, only conveys the impression of clumsy or careless workmanship.

"The singular thing is that Mr. Goodyear does not seem to perceive the distinction between a definite and obvious treatment with a view to a perspective effect and the vagaries of plan which he brings before us and to which he seeks to attribute a scientific object. He refers to Fergusson as the first modern authority who noted an intended perspective illusion in a Mediæval church, the Cathedral of Poitiers. But what is it that Fergusson refers to? He gives the plan of the cathedral in question, which is a perfectly symmetrical plan, arranged so as to grow narrower from west to east, and Fergusson notes that the vault also sinks towards that end, so that a false perspective effect is produced; and he (quite rightly) condemns it, and says that the Northern architects were 'right in rejecting all these devices.' But this is an instance of an open and obvious attempt, which everyone can see for himself at once, at the production of a very commonplace form of illusion. The symmetrical narrowing of a building to produce an effect of added perspective is a poor and trumpery architectural trick, totally unworthy of anyone but a theatrical scene-setter; but it is a definite and recognizable project, totally different from the vagaries in plan which are included in Mr. Goodyear's illustrations as having some special architectural intention.

"As an illustration of this point, and as supplying a further basis in our argument, we give a reduced reproduction of the plan of St. Mark's, Venice, attached to the catalogue, and which is the result of Mr. Goodyear's painstaking and careful measurements. We give it as large as our page admits, on a scale on which the irregularities of the plan can be pretty well realized, though not in so much detail as in the large folding plan in the catalogue. This plan, which we may assume to be accurate, is a valuable contribution to our knowledge of St. Mark's, and the architectural world should feel indebted to Mr. Goodyear for it. But it is, in our judgment, an almost fatal commentary on his general theory. No one who looks at that plan can pretend, we think, to discern any guiding motive for the irregularity of the directions of the walls; nor, as far as we understand him, does Mr. Goodyear venture on any such suggestion in regard to it. It is manifestly a case of careless and indifferent setting-out on the ground; and in this respect it exactly corresponds with the description we had the other day of the plans of Byzantine churches from an architect who has spent some months in measuring them. There was not, he said, a right angle or two parallel walls to be found in them; and this plan of St. Mark's answers to the same description. And now for the reason we have drawn attention to thus. The figures all over Mr. Goodyear's plan represent in decimals of feet the vertical leanings of walls or piers over those points; all which he maintains to be intentional and for optical purposes. Now just consider the contrast between this assumption and the character of the plan. When we look at the plan of a columnar Greek temple we see a perfectly symmetrical plan laid out and spaced with the most accurate care, and we need not feel surprised that in a building thus carefully laid out there are very careful refinements also in the elevation and the details. But is it credible—is it even common-sense—to suppose that builders who were so careless in setting-out a plan as they are shown to have been here, should in erecting it have gone into delicate refinements of setting back and setting forward for the sake of optical effect; that while setting-out a plan with an almost wild disregard of rule or regularity, they should at the same time have carefully made an inward curve of 10 in. in the line of the facade? As we have shown, even if they had done so it was a mistake in regard to effect; but in regard to the character of the rest of the plan, is it credible that they even thought of this? St. Mark's is a church tumbling about every way from bad foundations, and we are asked to believe that all this is the result of forethought and contrivance. Everything is pressed into service by Mr. Goodyear's theory; he sees curves everywhere. Illustration No. 174, for instance, showing the front of the north gallery of the nave of St. Mark's from a photograph, is labeled 'Curve in Elevation.' There is no such thing as a curve to be seen; the balustrade of the gallery was intended to be level—obviously is practically level for five-sixths of its length, and at one end a panel has dropped slightly. There is no evidence of intention, and if there were, there is not the slightest advantage in it; it would in that case be a deliberate blemish with no reason or excuse whatever. In short, our conclusion is that in his theory of the imaginary corrections in St. Mark's Mr. Goodyear has discovered the greatest architectural mare's nest since Street made his extraordinary discovery that the floor was laid in waves on purpose—which everyone now laughs at.

"We observe that Mr. Goodyear lays much stress, in several instances, on the fact that where pilasters or piers are found

leaning outwards the arch between them has not parted, as he says it ought to have done if the movement had been due to settlement. It seems as if one ought to expect that, but we doubt if the argument is as strong a one as Mr. Goodyear thinks. With a very slow and gradual settlement it is quite possible that an arch may accommodate itself to the movement to an extent which would, on first consideration, hardly be expected. And we can name one notable instance of it; that of the portico of Peterborough. Those who saw it before the repairs may remember that, in spite of the moving out of the front arcade, the contemporary vault between it and the main building showed no large or noticeable rupture—nothing in the least comparable to the extent of divergence of the arcade from the perpendicular. But we forget that Mr. Goodyear has not yet turned his attention to English architectural monuments. Whenever he does, we have no doubt, he will discover that the west front of Peterborough was deliberately built leaning outwards, for considerations of architectural effect."

ST. MARK'S, VENICE.

ANYONE visiting Venice at the present time and seeing a church after church invested with scaffolding might be tempted, says a correspondent of the *Morning Post*, to form very pessimistic views about the stability of the City of the Lagoons. Special alarm has been expressed as to the condition of St. Mark's, and I have therefore thought it desirable to go over that fabric with an architect of recognized eminence and to have his opinion as to the condition of the noble church.

The whole of the west end of the building is now occupied by scaffolding of the most massive description, which goes up to within nearly 6 feet of the roof and has been erected at a cost of nearly £1,500. The cracks in the mosaic are very noticeable when one ascends by a series of ladders to the highest platform of this scaffolding, and it is calculated that eighteen months must elapse before that portion of the church has been put into a proper state of repair. The work is naturally of a very delicate character and the men employed must be skilled and well paid. Fortunately, like the workmen engaged in the excavation of the Roman Forum, they are keenly interested in their work, and, being Venetians, are proud of Venice and her magnificent past.

The rise of certain parts of the floor, which led to a person breaking his leg over a projecting fragment of the paving some months ago, has necessitated relaying in a few places. This has, however, been done with the utmost care; it led to the discovery of a tomb belonging to a very early period and of traces of old foundations. To level the floor would be an impossibility architecturally, besides being an act of vandalism unworthy of a Venetian.

It is not considered that the present cracks in St. Mark's are due to the effects of the fall of the Campanile. There have been in operation for centuries certain causes which have slowly but surely weakened the structure. As short a distance as five feet below the floor there is water, which has had a bad influence on the foundations in the course of ages. Worse still, the salt air of Venice, especially during the winter, when cold mists are prevalent, has a destructive effect on all iron work. The Venetian Republic would not, it is true, allow any iron bars to be placed as supports in a visible position in St. Mark's; but along the galleries are numbers of iron fastenings, put there by Sansovino when he executed repairs at the church. A further cause of the cracks is the vast weight of the materials superadded to the original structure when the church was richly decorated and altered without any increase in the strength of the foundations.

The question of expense is not serious. During the Austrian occupation St. Mark's enjoyed an annual donation of £2,400, and this liability was taken over by the Italian Government in 1866 and continued since then. As the work of repairs must of necessity proceed slowly, and long preliminary studies were required, so far the cost has been relatively small. Unforeseen cracks may, of course, render the task of repairing the building more arduous, for Venetian edifices are full of surprises. My informant does not, however, share the view expressed in some quarters that St. Mark's is doomed. The present plan of repairs will, he thinks, save it.

Extensive works are also going on at the church of San Giovanni e Paolo; the side of the Doge's Palace adjoining the Bridge of Sighs is shored up by means of huge planks and beams; the campanili of both Sta. Maria Formosa and San Giorgio Maggiore are enveloped in scaffolding; and that of Burano is still rent and unrepaired. In short, Venice is in the hands of the workmen, and some years must elapse before she emerges from her crutches and splints.

ILLUSTRATIONS.

THE BIRMINGHAM TERMINAL STATION, BIRMINGHAM, ALA. MR. P. THORNTON MARYE, ARCHITECT, ATLANTA, GA.

This building covers a very long frontage, and the parts have been disposed so as to separate the different usages that a railroad-station building is usually put to. The center of the main building contains the main waiting-room, with telegraph, Pullman and ticket offices; on the side toward train, in view of persons entering from the streets, and to the front at right and left are placed the men's smoking-room, toilet-room and barber-shop and the ladies' room and toilet; to the rear and left of the ladies' waiting-room is the station-master's office and a broad, spacious stairway to the subway below. The circulation is taken care of by three large entrances opening into the main waiting-room, and from that into the "midway," and on either side of the main building are wide concourses for free egress from incoming trains. At the right of the right-hand concourse is the waiting-room, toilets, etc., for colored persons, convenient to main ticket-offices, and the parcel, baggage and mail rooms in the extreme right wing. On the left of the main building is the main dining-room, lunch-room, kitchens and serving-room, and in the extreme left wing is placed the express department; this arrangement separates the express and baggage rooms distinctly from the passenger service, at the same time being in close proximity to the latter, and externally affords independent and ample approach for wagons, cabs, etc. The building is to be built with a granite base, gold-flashed brick wall and white terra-cotta trim, roofs to be red Spanish tile with terra-cotta finials, the interior to be finished in mosaic and marble with ornamental plaster walls and ceilings; the rest of the building to be first-class in every particular.

The train-shed, 700 feet long, running almost the entire length of the building, will cover the tracks. All the modern appliances, safety and otherwise, will be used to make this station one of the best in the country.

SOME PHILADELPHIA DOORWAYS: 1921 AND 1923 WALNUT STREET; 1816 RITTENHOUSE SQUARE. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

THE GYMNASIUM OF THE UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA. MESSRS. FRANK MILES DAY & BROTHER, ARCHITECTS, PHILADELPHIA, PA.

THE SAME FROM FRANKLIN FIELD.

"MINOR CHATEAUX," NO. 1.—THE NORTH SIDE: CHATEAU DE MAINTENON, EURE-ET-LOIRE, FRANCE.

"MINOR CHATEAUX," NO. 2.—THE PALAIS DE JUSTICE, BEAUVAIS, OISE, FRANCE.

"MINOR CHATEAUX," NO. 3.—THE REAR [RESTORED]: CHATEAU DE MARTAINVILLE, NEAR ROUEN, FRANCE.

"MINOR CHATEAUX," NO. 4.—CHATEAU D'O, MORTREE, ORNE, FRANCE.

MINOR CHATEAUX, NO. 5.—CHATEAU DE MONTIGNY, NEAR VENDOME, LOIR-ET-CHER, FRANCE.

"MINOR CHATEAUX," NO. 6.—THE MAIN FRONT: CHATEAU DE MAINTENON.—GENERAL VIEW: CHATEAU DE MARTAINVILLE, NEAR ROUEN, FRANCE.

"MINOR CHATEAUX," NO. 7.—CHATEAU D'AVISE, INDRE-ET-LOIRE, FRANCE.—CHATEAU D'AUFFRAY, SEINE-INFERIEURE, FRANCE.

"MINOR CHATEAUX," NO. 8.—CHATEAU D'ETELAN, SEINE-INFERIEURE, FRANCE.—THE SO-CALLED HOUSE OF LEONARDO DA VINCI, AMBOISE, FRANCE.

Additional Illustrations in the International Edition.

"THE TOWERS," PANGBOURNE, ENGLAND. MR. JOHN BELCHER, ARCHITECT.

NOTES AND CLIPPINGS.

THE GREAT ZIMBABWE.—The *Times* correspondent reports a lecture on the Rhodesian ruins delivered by Mr. MacIvor before the British Association at Bulawayo, which tends to upset previous theories as to the origin of these remarkable structures, and to rob them of the immemorial antiquity claimed on their behalf by previous explorers such as Mr. Bent and Mr. Hall, whose paper on the subject read last April, will be in the recollection of members. The lecturer went to Rhodesia last April, under the auspices of the Rhodes trustees and the British Asso-

ciation, and made a detailed study of Zimbabwe and other ruins. After careful investigation he decided that none of the ruins in Southern Rhodesia is older than the fifteenth or sixteenth century, and that they are the handiwork of African natives of the negro or negroid race, under the dynasty known by the collective name of Monomotapa.

The buildings are essentially of a native kind or type common to-day; nearly all retain some original wooden stakes embedded in the walls; there is no trace of inscriptions on any of the ruins; stone and iron implements were found together; neither the buildings nor the other articles found show traces of early Oriental or European influence; finally, the discovery of pieces of blue and white Nankin china and other articles of mediæval manufacture in the lowest parts of the foundations proves that such commodities were the object of barter before the buildings were erected. In the case of Zimbabwe, he controverts the statements that the foundations show a series of layers of different periods; but he admits that in one layer of sand charred wood found some way below the previous excavations may indicate an earlier period, though this is unlikely. Mr. MacIvor maintains that the ruins were originally fortified places, usually enclosing a kopje built in the form of a rough ellipse following mainly the contour of the surrounding country. The so-called slave pits, described as pit dwellings, were originally citadels of their strong places round which concentric circles of walls were built. Zimbabwe, as the residence of the Monomotapa, was more carefully and elaborately built than the others, but its plan is essentially the same. The elliptical temple would therefore be a trial fortress. The soapstone birds discovered by Mr. Bent represent totems. A race still exists—Kaffir tribe—with an eagle totem.

On the publication of the summary of Mr. MacIvor, Dr. Keane sent a letter to the *Times*, controverting his arguments and strongly maintaining the views of the original explorers as to the extreme antiquity of the ruins.—*Journal of the Society of Arts.*

STATISTICS OF NEW YORK BUILDING.—Signs of building are on every side of the citizen of the metropolis, says the statistician of the *New York Tribune*, and yet, as a rule, he little realizes at what a tremendous pace the new structures are going up. As a matter of fact, a house is built every fifty-one minutes. In the whole city last year 10,122 buildings of various descriptions were erected, of which 1,402 were built in Manhattan, 1,671 in the Bronx, 5,793 in Brooklyn, 919 in Queens, and 337 in Staten Island. Yet, although Manhattan fell behind the Bronx and Brooklyn in the number of buildings constructed, it spent more than all the other boroughs put together. The people of all New York spend \$4.65 a second for new buildings, and of this sum \$2.40 comes out of the pockets of Manhattanites. In the last year in Manhattan the bill for buildings amounted to \$74,932,000, while that for the Bronx was \$23,144,500; Brooklyn, \$39,872,740; Queens, \$7,983,437, and Staten Island, \$996,241. As much money is spent in buildings in five days in Manhattan as on Staten Island in all the year.

Should the expense of building be equally distributed among all the inhabitants of New York each would have to contribute ten cents a day.

MASPERO'S LATEST FINDS AT KARNAK.—The *Temps* publishes a letter from the famous archaeologist Maspero, who is superintending the excavations at Karnak, near Thebes, in Egypt, in which he declares that a veritable mine of ancient statues and monuments has been discovered. It is in an immense hole, near the famous temple, which is now filled with water and mud, and from which in a little over a year have been recovered more than 700 monuments of stone and 10,000 pieces of bronze.

"Among the objects found," the scientist says, "are entire statues, fragments of others, mutilated figures, heads without a body and thrones on which only the feet are remaining, many statues of the Pharaohs and of the queens. It is an entire ancient population which is now seeking shelter in our museums." It is the opinion of some archaeologists that the priests of the temple, fearing an invasion of enemies, dug the immense hole and threw therein all statues and monuments of the temple.

It is possible that gold and silver ornaments and statues may be found later, although some, among them M. Maspero, are of the opinion that these finds were all votive offerings and that they had become so numerous that the priests had to get rid of them. Not wishing to destroy the property of the gods, they buried it in the immense hole, where it has remained for 3,000 years.—*N. Y. World.*

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, OCTOBER 14, 1905.

No. 1555.

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IF we may rely on the newspaper accounts, a rather interesting lawsuit has just arrived at a conclusion—for the moment—which is not only interesting, but rather unusual, since, after hearing the testimony, the judge decided not to submit the question to the jury, but pronounced judgment in behalf of the plaintiff architect, awarding him his claim in full, with interest and costs. The rights of the defendants were, however, safeguarded by his granting a sixty-days' stay of execution in order that they might appeal, if they saw fit. The case was that of Mr. George Edward Harding, of New York, who sued St. Peter's Roman Catholic Church, at New Brighton, Staten Island, to recover nearly three thousand dollars in unpaid commission. Judge Garretson, of the Supreme Court for Richmond County, N. Y., gave the case to the plaintiff, because it appeared that all other claims than his had been paid by the church, and that these payments of the contractors and so on constituted a ratification of the doings of the church's authorized agent, Mr. Harding, and that as his acts had in this way been ratified there was no good reason why he, too, should not be paid.

THE case appears to present in a very aggravated form the vexed matter of the limits within which an architect is bound to adhere to the estimate of cost he has furnished to his client. The stricter French procedure allows the architect small leeway, if he would avoid paying out of his own pocket the excess of expenditure he has authorized; but in the looser practice of English and American courts, it has sometimes been conceded that an increase of as much as twenty-five per cent. in the total cost might still be considered as substantial adherence to primary estimates. In this Staten Island case, however, the final cost, according to the defendants' contention, ex-

ceeded the cost as stipulated at the time the commission was given to Mr. Harding by more than one hundred per cent. and yet the court gives its decision in favor of the claimant architect. The parishioners understood that the church was to cost about seventy thousand dollars, whereas they have actually paid one hundred and fifty-five thousand dollars. Possibly Judge Garretson's ruling may stand; but we hope that no architect may rely on it as justification for exceeding by more than one hundred per cent. his client's anticipations as to cost. It is obvious, of course, that Mr. Harding must in some way have had the support and authorization of his building-committee for what was actually done by him, an inference that is plainly supported by the fact that all the accounts have been liquidated.

WE cannot imagine what might have been the cost of the New York Hall of Records, if Messrs. Tweed, Sweeny, *et al.*, had ruled that city to-day, but some one has succeeded in making that building a very costly piece of municipal property, standing as it does upon a site for which very nearly a million and a half of dollars were paid. Including the cost of the site, the Controller now estimates that the cost of the building, complete—two years hence—and furnished, may be set down as not less than \$7,836,146.73, and he evidently will not be surprised if it costs "even dollars," after all. Of this sum there is charged out \$355,457.38 as commissions paid to the architects and engineers. If the several architects have been paid a full five per cent. commission on the cost of the finished and furnished building—though it is said very little of the finish and furniture is to be from "special design"—it appears that the engineers were paid only \$73,500, or about half as much as, we understand, constructing engineers nowadays feel they should be paid for their work on such a building of such cost. If the final building-cost of the Hall of Records proves to be six and a half million dollars, one can draw all sorts of interesting deductions by comparing its cost with that of other well-known buildings, public and private.

THE public building that is most fairly comparable with the Hall of Records, both in the matter of cost and that of intended architectural and sculptural embellishment, is the Library of Congress at Washington, for which the Government paid out \$6,920,081. Upon the Treasury Building in Washington there has been expended since Robert Mills designed it, about 1836, the total sum of \$7,484,503, while the Post Office buildings at Boston and St. Louis have cost, to date, respectively \$5,507,637 and \$5,838,502. Very presentable buildings, built at public expense too, can be had for much less money than the Hall of Records will have cost. For instance, the Rhode Island State-house, including the site on which it stands, occasioned the outlay of but \$3,114,402, while the Allegheny County Court-house at Pittsburgh cost only \$2,450,000. Just how much money will have to be spent on the New York Public Library is not

now known, yet, though this is a building of such general importance to the entire community that any expenditure would be justifiable, the figures at hand seem to indicate that its cost will be probably rather less than that of its contemporary downtown. The fact is that the methods employed in the building of the New York County Courthouse, the Philadelphia City-Hall and the Capitol at Albany have been so thoroughly learned by those who seek a living out of the manipulating of public contracts that it is almost impossible for architects and public commissions to keep the outlay on public buildings in the same class, as to cost, with private buildings of similar character.

AS to the cost of private buildings, the present insurance investigation affords some timely information. According to sworn testimony, it appears that the total cost of the great Plaza Hotel in New York—torn down within a month—was but \$3,096,549, and many will remember that, through the failure of the contractor, the mortgagee, the New York Life Insurance Co., had to finish the building itself, and at increased cost. Moreover, considering the great labor-cost of finishing a modern hotel, its superabundance of plumbing, lighting and heating fixtures, such a structure is not an unfair representative of the cost of large private buildings. Testimony from the same source, given at the same time, throws light on the cost of large office-buildings, for it appears that the New York Life Insurance Company's buildings at Kansas City, Minneapolis, St. Paul and Montreal, all of them ranking high for their day, cost, respectively, \$1,901,781, \$1,028,752, \$922,440 and \$318,000.

LAWYERS seem to take such special delight in making unfortunate architects bear the full burden of the blunders for which they are responsible, through giving misleading advice to their clients, that many an architect has envied them for the way in which they themselves seem to escape all accountability for their own errors of judgment. Many an architect will rejoice to learn that the tide is turning, for the Supreme Court of Germany has recently declared that a lawyer is liable for the legal consequences suffered by his client through having acted on incorrect legal advice carelessly given. The injured client, be it observed, must prove the advice was given carelessly. The court reasons that, by accepting pay for his advice, the lawyer assumes the position of a debtor to his client, and unless he discharges the debt with due care, he must be responsible for the results. When this new precept obtains in this country, lawyers will perhaps be less willing to encourage architects to embark in lawsuits they are sure to lose.

THE wits of the daily press have been making much, and amusingly, of the fact that some clerical critic had discovered that Mr. Gutzon Borglum, sculptor, had modelled as feminine all the angels to be used in decorating the Belmont Chapel of the Cathedral of St. John the Divine, in face of the fact that Holy Writ states that two of them, the Angel of Annunciation and the Angel of the Tomb were males. The sculptor, although he could marshal to his support abundant testimony that angels have almost universally been assumed to be feminine, has

waived this point, and in smashing the two figures has destroyed real works of art and made fruitless many an hour of his own patient and loving labor. The incident has a permanent value in drawing attention to the greater potency of the graphic over the verbal arts, when it comes to imparting information to the young. It was our fortune to be brought up, in the matter of instruction in religious art, on a large assortment of illustrated Bibles and Mrs. Jameson's "*Sacred and Legendary Art*," and, quite apart from what the text actually declared to be the case, we can now conceive that, while it was plain the angel with whom Jacob wrestled must have been a male, our own sense of modesty must have convinced us that the Angel of the Annunciation, at least, was a female, and from that day to this the wrestling angel and Raphael's Michael have been for us merely the exceptions to the rule.

IF any one has misgivings as to the effective parallelism between architecture and the "Paris gown," he needs but to look about him in New York and see with what ruthlessness the dictates of mere fashion are being obeyed. As we watched the really fine Romanesque stone carving on the old Knickerbocker Athletic Club's building disappearing under the hands of the workmen who are preparing the building for the occupancy of the Tiffany Studios, we could not but liken their work to that of some lady's maid rudely ripping from her mistress's frock some fine Brussels point, say, to be replaced, of course, with something finer and better, but to the utter destruction of the excellent and respectable original lace. A few blocks away, a brick front, carefully painted to keep out the moisture, is now being chipped off with mallet and chisel, the new surface presenting a more agreeable color and texture to the eye, surely, but one which suggests an increase in the doctor's bills of the occupants. Another brick building, banded here and there with light-colored sandstone, without any real artistic propriety, with carved window-heads that are far from bad, is now receiving, bricks and stonework alike, a coat of red paint, is being redded up [good old English phrase] like a hearth, that is, and it is surprising how the building gains in dignity by being reduced to monochrome.

TO those who have made a practice of reading the papers prepared for and the discussions had by the Société Centrale des Architectes Français, the name of M. Charles Lucas has been familiar for many years, and they may regret that death has removed so active and interested a worker in several walks of professional endeavor. Besides the energetic part he took in the affairs of the Société Centrale, M. Lucas was also very actively concerned in the doings of the Caisse de Defense Mutuelle, being in fact the general secretary of that association. Because of these activities he was probably better known than by his work as a practising architect, yet he was Inspector of the Paris Service Municipal d'Architecture and in that capacity designed and built several important school-buildings, the present Prefecture de Police, the headquarters building of the Sapeurs et Pompiers, etc. But his significant work was done in literary and educational rather than in what may be called structural directions.

PEEPS AT EUROPEAN MOSQUES.

PERCHING high on ledges of dun-colored rocks, behind which the mountains rise, full of the mysteries of a brigand-land, Uscub city stands, a dream-city fresh from the Arabian Nights, the last of the real Orient in Europe. Domes and spires there are none, at Uscub, but instead, everywhere, there stand out the tapering minarets with one, two or three balconies, from which the muezzin summons the faithful to prayer. The muezzin's wail is the national song of the Nearer East. Rising gradually longer, it has in it the pathetic, the note of sadness at the decline and coming fall of the great Moham: medan world-power. Softly, silently, the Turk comes in obedience to the call, to worship at the mosque.

Just how a mosque differs from our churches is a matter that most of the un-traveled do *not* know. In the first place, the mosque is rather unnecessary. The Koran permits the Turk to pray where and when he will. Only, it is recommended that the "mosque is the proper place for prayer." The mosque is sanctuary and holy ground, and there in the olden days, merchants might leave their most precious goods, knowing well that no man would dare to commit the sacrilege of stealing from its premises. So the floor of the mosque was made broad and ample, and pillars were seldom allowed to mar its great, broad stretch. That the mosque might not be defiled, the wise Mohammed made the rule that the Turk must wash his feet as well as hands and face, before prayer, and so, before entering the shrine, the Moslem stops to perform his ablutions. Mosques in Turkey are Government institutions, supported by the State, and hence the collecting of contributions is unnecessary. Well-to-do agas, however, for the better repose of their souls, delight in making presents to the mosques, and often these will take the form of a fountain in the court-yard, where the worshipper may draw his water, and the poor, likewise, their drink. The "cup of cold water" is not figurative, by any means, in the Nearer East, for there drinking-water is ever sold—men hawking it through the streets, in great brass urns, as do the lemonade-peddlers of Italy, and on the railways, at stops, children pass along outside the cars selling glasses of water.



OLD TORTURE TOWER, SALONICA.

entered any and every mosque we had the slightest inclination to, and have seen therein whatsoever there was to see. The Koran prescribes hospitality, and with a little backsheesh in the way of "coffee-money" and a due observance of the proprieties of a church, one may go anywhere in the mosques of Turkey.

At the large mosques in the tourist cities there are appointed guides; otherwise any Turk will willingly show one over the building. Usually the prime interest centers in the decorations. The Koran forbids the depicting of anything animate, on the principle that unless one may give life to such object it should not be imitated, and so not even floral patterns are admitted, with the one notable exception, the great Adrianople mosque, the second largest in the Empire. A second feature is the rich matting that covers the floors of the mosques and allows one to slide over them noiselessly. The third is the ornaments, suspended from the series of concentric iron rings, beneath the dome, to which the little oil-cup lamps are affixed.

At one side is the pulpit, or as it is sometimes called, the "ambon," of the church, where the reader of the Koran has his place. Usually the "ambon" stands high above the floor, with a flight of stairs, straight as a die, and with two heavy railings, reaching it. There are spots reserved for the Koran and the great candles as well, and another for the burning of the incense and perfume.

Prayer-rugs are scattered about in the smaller mosques, and beside these the worshippers stand, then bend to the ground, kneel and pray, facing toward Mecca ever. In certain of the mosques, little low railings enclose small areas of the floor, and inside these, though for absolutely no benefit other than elsewhere, the Turks may likewise offer prayers.

Great mosques will occasionally have a screened balcony for the women, and another reserved for high dignitaries of the State, should these chance to visit. From behind these the stairs ascend into the minarets, round and round like a cork-screw.

The exteriors of the mosques is what differentiates them largely, the interiors are much alike and as here described. At Adrianople, the old capital of the Turkish Empire, there is one great mosque built of sandstone blocks, cemented together with a



A MOSQUE COURTYARD, MACEDONIA.

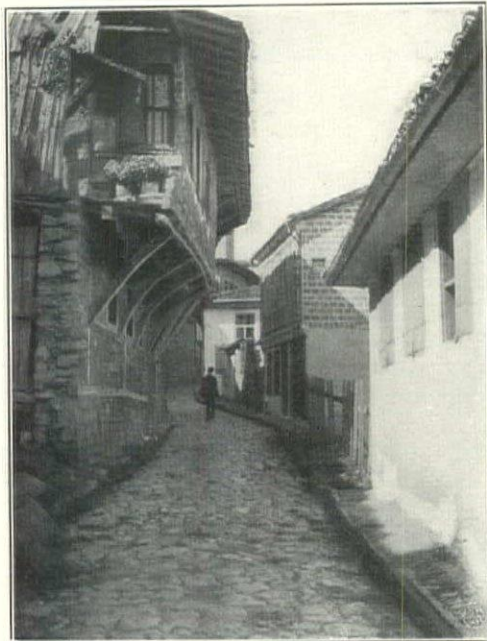
In Turkey proper, the great latticed doors that one sees in the mosques of Asia-Minor are unknown, a heavy portiere—usually of leather, stitched in like a mattress cover—hangs in the opening, and before this, in a row, are the shoes of the devout then inside. Christian visitors, in view of fees, are furnished with cowhide sandals to slip over their shoes when visiting the mosques, but woe betide them should these fall off.

The legend, common with American architects, that there are only a few mosques open to the Christian in European Turkey, is misleading. In all Macedonia and all western Turkey, we have



OLD MOSQUE AT SOFIA, BULGARIA.

red concrete that offers a most curious color effect to the passer, increased by the addition of a bluish slate cover to the cupolas. Courts of the mosques, in this maze-like city, frequently form the streets, people and mules passing through the doorway in the wall, and over the flag-stones to the other side, in order to emerge at a given quarter. In fact even the konak, or city hall, is to be reached best in such-wise. There is another mosque, or "dschamia," as the Turks call them, at Adrianople, which is interesting for its fluted minarets. Everywhere, over the city, minarets arise, but non: so artistically picturesque as these. Most



A BULGARIAN STREET.

convent thereto, which will be a little, square building, with an area that reminds one of a small circus-ring. In this arena the whirling or howling dervishes perform their rites, and the corners or vantage-points for overlooking the spectacle are carefully allotted, the street-Arabs in one corner, the Turks in another, Turkish officers holding a third position, and strangers in the last. At one place a latticed balcony overhangs, for the women, that these may remove their veils and overlook the performance without being seen by men. Still another balcony is constructed for the band.

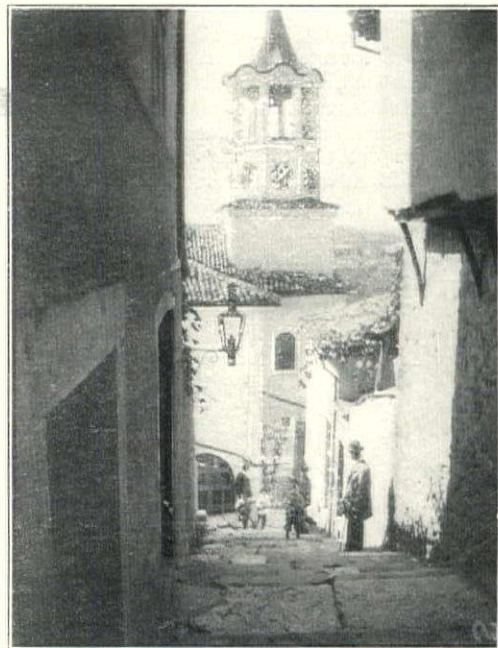
This Mosque of Murad is especially pretty for its mural decorations; with a color-scheme of green, the sacred color, and red. On the wall, upon this, huge Arabic words are painted in black, so large that the tail of a single letter will have double the thickness of a man's body. To the "ambon" there is a wall of faience of dark green and dark blue, that reminds one of some ancient Delft. The whole interior has a richness that attracts, but which, in the light of the poverty of the land, causes an American to wonder, instinctively, if the money could not have been invested to better purpose. The names of the other mosques of Adrianople are interesting. There is the Utsch Scherifili Dschami, now a military magazine, but still bearing four queer-shaped minarets; the Mosque Murad IV., of four minarets and nine domes; the Bojesid Jilherimis, standing on a high situation, with attractive cupolas, and two huge minarets to attract from afar, and the Muradiéh Dschami, which dates to the time of the great Mohammed.

Salonica, the old Thessalonia, has its great mosques, but few of other than historic interest to the visitor. The great mosque of Salonica is the Hagia Sofia, originally a Christian church, built by Justinian, on the plans of the Hagia Sofia at Constantinople, and later usurped by the Turks, who added a since-fallen entry. In the cupola of this old mosque can be made out a mural painting of the ride to Heaven, in which the Turks have covered the face of Christ with plaster, in keeping with the Koran's rule about picturing the animate.

Another interesting mosque here is that of the dervish Effendi, likewise built by Constantine, with a semi-circular roof, twenty-five metres across, and noted for its mosaics. This mosque

of the mosques here, as elsewhere in Moslem lands, have the cemetery at one side, a woe-begone weed-grown place, in which the dogs dig their homes, and rear their cunning litters, actually turning up human bones, time and again, in the process, for the Mohammedan gives but little thought to the dead. There are in the cemeteries tombs of many sorts, but the usual form of monument is a shaft of white marble, or oftener of wood, that is white-washed, for the women—while it is surmounted by a turban, to indicate the grave of a man, a queer brown fez of adobe replacing this should he chance to have been a dervish. At one of the Adrianople mosque-cemeteries, however, the stones are painted in gay colors, producing a most ludicrous effect.

Occasionally in planning the mosque, as in the case of the Dschamia Sultan Murad, the architect must include the so-called



A BULGARIAN CHURCH.

underwent renovation in 1881, and is now in good state of preservation.

The Mosque Eski Dschami is interesting as the first Christian church of old Thessalonia (to whose congregations St. Paul addressed his epistle) to be changed into a Mussulman house of worship. The façade of this building stands between two neighboring houses, and occupies the site of the Temple of the Thermaican Venus.

Salonica, too, boasts her Mosque Kassinije, built in the fifth century as the Church of St. Demetrius, the patron saint of the city, over his grave. The building was burned in the year 306, but was rebuilt, and on the Turkish conquest of the city it was turned over to the Greek congregation, who built in it the tomb of Lucas Spandom (died 1481), which still survives. Two years after his demise the place was changed into a mosque, with a pentagonal basilica that is one of the sights of the city. There are

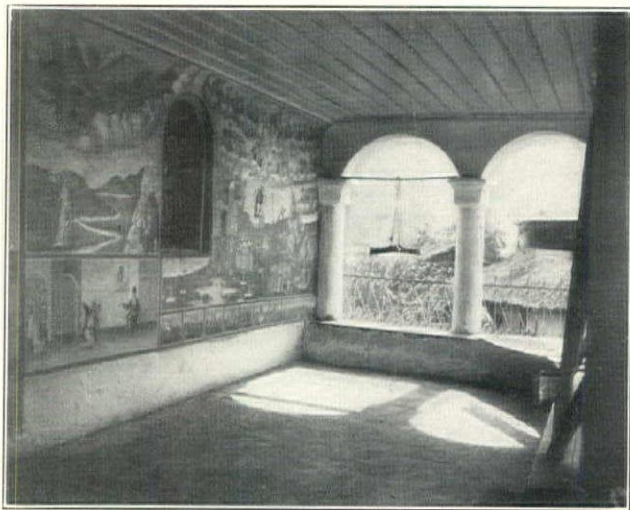
four other mosques and a dervish convent at Salonica that invite attention.

Away to the north, at Uscub, there is a single, really great mosque, in addition to the many small ones. At Monistir, in the reform belt of Macedonia, likewise, most of the numerous mosques are small, and much alike. Near this latter city there are two old monasteries, that of Bukova, built at an elevation of 904 metres above the sea, and the other, of Chrestofor, noted for the iron springs close by, which are interesting to the builder for their preservation of the ancient Oriental type of construction. These, however, are Christian edifices.

Here and there, along the railways cutting Macedonia, on beetling crags, a minaret is seen, marking some small mosque built along the great trade routes. While picturesque, these buildings are set on the one stereotyped plan.

At Sofia, capital of Bulgaria, in which principality, still nominally part and parcel of the Ottoman domains, but *de facto* independent, the Mohammedan is almost extinct, there is an old mosque of brick—the tiny, four-inch long by an inch thick brick—that is crumbling slowly, through disuse, but is good for generations to come. Philippopolis, capital of Eastern Rumelia, still has many mosques—out of all proportion to its Turkish population—though only two of them are worthy a visit.

FELIX J. KOCH.



DECORATIONS IN A CHRISTIAN CHURCH.

EXTERIOR WALLS.¹

THERE was a maxim much quoted by a past generation of builders, that a good building should be "sound tie, top and bottom," that is to say, that it should have a sound foundation, a watertight roof, and its walls properly strengthened by the tie of the floor and otherwise. It is also a good commencement for sanitation; for instability of the framework of a building tends in time to set at naught the careful construction of sanitary fittings, and to admit damp into the buildings.

I do not propose to discuss the question of the site and the nature of the ground upon which a building should be erected. In Great Britain, and especially in towns, choice of site is restricted. Other considerations than that of suitability from constructional and sanitary points of view are paramount.

We must be prepared to build sanitarily upon clay, gravel, sand, or chalk; anywhere between the top of the hill and the bottom of the adjoining valley; on dry ground; on wet ground; and at times on *bad* or polluted ground. In each case we must adapt our method of construction to suit the particular circumstances; but in all cases to secure a sound foundation and the exclusion of ground air from the building. Under the usual by-laws a layer of concrete 6 inches thick (in some cases 4 inches) is required for the latter purpose, but in many cases, I venture to think, it is an inadequate protection. Water will run or rise from damp ground through cement concrete as through a sieve. It is well, therefore, to add a rendering of cement on the top of the concrete; better still asphalt, which alone can be relied upon to exclude water.

The second safeguard or, so to speak, "line of defence" against ground air is the open space beneath the ground floor, provided it is well ventilated. The sanitary value of an air-flushed space beneath the ground story is scarcely sufficiently recognized. In hospital buildings it is commonplace; why not in all buildings? It is not too much to say that the free passage of air beneath the building is of more value than a bed of concrete over the site. Ventilation of this space is effected by air-bricks in the outer walls, properly distributed to insure that no part is left stagnant. Generally too few are provided, and these are often closed up in time by successive coats of paint or buried by the raising of garden beds next the building.

Moisture will also travel up and through the walls to a surprising extent; hence the necessity of an effective damp-course. The commonest and cheapest form is that formed with slate set in cement. This, if the two courses are laid to "break joint," is effective enough, provided there is not the slightest settlement in the walls; otherwise a break occurs, forming a fissure which dampness can penetrate. An excellent damp-course is also formed with glazed perforated slabs, and these serve also as means of ventilation under the floor. Sheet-lead between two thicknesses of tarred-felt should be effective, but care must be taken that the joints are very carefully lapped, and that the brickwork both above and below is even, so as to prevent perforation by excrescences on the bricks. Almost the only really satisfactory damp-course is good asphalt, about half an inch thick, not more.

Assuming that the lowest floor is as little as 12 inches above the level of the ground outside, a damp-course placed over the whole thickness of the walls, etc., below the floor sleepers and a few inches above the ground is quite effective. But when, as is often the case, the lowest floor is below the level of the ground, obviously the simple damp-course is ineffective by itself. It is possible, of course, to keep the wall dry by turning the damp-course up the wall on the face to a few inches above the ground, but great care is required to insure a proper junction at the angle of the vertical and horizontal layers.

Another method is the construction of a "dry area," which is usually formed by carrying a thin (half-brick) wall from the footings up to the ground level. In order to withstand the pressure of the earth outside, this wall must be provided with means of support from the main wall; either small bent iron ties or occasional brick ends bedded against the wall, and always with a small piece of slate placed between the brick and the wall. Obviously, without the slate the porous brick end would convey dampness to the wall. It is a clumsy method, but quite effective if carefully done.

Various forms of iron ties are used, and all are designed to prevent water traveling above the surface towards the main wall. A very effective vitrified brick is also made for the purpose, and

is built into both walls. It will bear more pressure than the iron ties, and is, of course, not liable to corrode away. The vitrification of the materials renders it impermeable by water. Neither the vertical damp-course nor dry area can be considered good sanitary construction. A wide open area is the only satisfactory solution, and this should be carried down at least a foot below the floor level. Thus the whole surface of the walls of the rooms is exposed to the air. The part played by the porosity of walls in the ventilation of buildings is apt to be overlooked. The best sanitary construction is to avoid basements or semi-basements altogether for living-rooms.

So far we have dealt with dampness arising from the ground. Next in order is that arising from the rain beating on the surface of the walls. Damp walls are obviously insanitary, and here we are met by a difficulty. If a wall is constructed so non-porous as to exclude water, it may also exclude the passage of air. What is required is a construction which, as far as possible, shall attain to the ideal supposed to be the special property of certain much-advertised cloth materials for coats, which claim to be "rain" but not "air" proof. As a rule, and except in exposed positions, good brickwork is very satisfactory in this respect, and the ordinary London stock brickwork especially so. The vertical surface of the bricks has a very thin skin, which acts as a slight check upon the entry of water, and the rain therefore runs more readily down the surface to the ground. The weak spots are the mortar joints and any horizontal surfaces. At the joints it is impossible to avoid small ledges being left either on the brick or mortar, and these at once collect the water and allow it time to penetrate the brickwork. The "cut and struck" weather joint counteracts this to some extent. In making this joint with the point of the trowel, the pressure used consolidates the surface of the mortar, thereby closing up the larger pores. The outward slope throws the wet forward from the face of the wall, and the sharp edge assists this action. Another safeguard against damp in the wall is solidity of construction. A solidly built wall may hold water in the innumerable pores and small interstices of the bricks; and this may go right through the wall, but generally it travels so slowly as to be absorbed by evaporation before it has gone far. Voids in walls, formed by lack of sufficient mortar in the joints, collect and convey water readily to the internal face.

In very exposed positions, and especially with a west and south-west aspect, brick walls 14 inches thick, or even more, are not rain-proof, and it then becomes necessary to protect them by special means. One of the most ordinary methods is that of building what are called "hollow walls." The outer wall forms in effect a "dry area." Inasmuch as the main wall cannot be reduced in thickness the method is not cheap, but it is certainly effective. Another and more picturesque method is to tile the external face of the wall. The tiles would be secured by nails and bedded in cement or plaster, or merely hung on fillets nailed to the wall. I have also found that slates bedded in mortar and with a 3-inch lap are absolutely effective. A rendering of cement or even painting with tar is of use.

With respect to materials of construction, obviously anything likely to nurture, or, under given circumstances, generate noxious gases or growths, must be considered as insanitary for use. I have heard that ordinary road drift makes very strong mortar, and this is no doubt due to its main constituent, washed, *i.e.* sharp, sand. But in general it also contains particles of manure and decayed vegetable matter, which cannot but be injurious and a source of pollution to the air passing through a wall. Ordinary pit or other unwashed sand has been objected to on the ground that it contains various particles of organic matter, but with fairly clean sand the danger is a negligible quantity. Mortar formed with finely ground coke-breeze is, of course, entirely free from objection and it is very strong.

ADRIANOPLE.

HAVING recently had occasion to visit Adrianople, it has occurred to me, says a correspondent of the *Glasgow Herald*, that some account of this little-visited city may be of interest just now, the attention of the public having been attracted to it by reason of the recent disaster. Many ancient towns in Turkey, such as Ephesus and Philippi, are now no longer inhabited sites. Where Philippi once flourished there is now a stony desert, scattered with ancient potsherds and fragments of brick, marble mouldings and pillars, so completely out of the way of ships and railways that scarcely ever does the tourist set foot upon it. Ephesus, again, on the other side of the Ægean, is oftener visited, but cannot boast of a single inhabitant.

¹Extract from a paper by Mr. Alfred Saxon Snell, F.R.I.B.A., read at the sessional meeting of the Royal Sanitary Institute at Cambridge, and published in the *Journal*.

The brigand, by the way, is not unknown in Ephesus, but he cannot be regarded as an inhabitant. The relative level of sea and land having changed since the days of the worship of Diana, the town is now stranded and difficult of access. A group of a few mud houses a mile or so distant, which goes by the name of Ajasuluk, is just sufficient to impress upon the mind of the visitor the startling contrast between the modern squalor and the wonderfully-preserved streets and public buildings with which St. Paul was familiar, and which for about a score of centuries have been hidden and preserved by alluvial deposits. In these deposits the spade of the archæologist has been so busy in recent years that the uncovered ruins of Ephesus now almost rival in interest those of Pompeii.

But Adrianople. Though steadily on the down grade, Adrianople has not fallen into complete decay. At this moment the town must present a sorry spectacle, as apparently about one-fourth of it was reduced to ashes during the conflagration. A glance at the map discloses its position in that pathetically narrow strip of country which is squeezed close upon the shore line by budding Bulgaria. It is this attenuated stretch of European Turkish territory, almost unique in Europe in this respect, which does not invite the advent of the tourist, and he seldom goes. The man who "does" the Near East runs round by Egypt, Palestine and Greece, or even touches at Constantinople, but he ignores Adrianople. He may pass near it (often it is in the dead of night) in the Orient express on his way to or from Constantinople.

Adrianople, called Edirne by the Turks, and very anciently Uskudama, is the ancient capital of European Turkey. Hadrian embellished it, and in its name is enshrined that of the mighty emperor. A second Hadrian would now find much work to do. The streets are narrow, twisted and badly paved. The houses, usually of no great height, are chiefly built of mud bricks inserted in timber framework, but some buildings are constructed entirely of wood. Quite recently a large part of the worst quarter was in course of demolition preparatory to its being reconstructed. Whether the opportunity of putting the place into better condition will be seized after the recent fire is doubtful. Adrianople's day appears to be done. Once, and not so long ago, a flourishing place with big markets and a population of 90,000, it has lost sources of revenue since Turkey was deprived of territory in the vicinity of the town. Indeed, the Bulgarian frontier at its nearest point is now only twenty-five miles distant.

Nowhere else in Turkey have I seen such interesting street scenes as in Adrianople. The provincial Bulgarian dress is here seen in abundance, and also an array of purely Eastern costumes. On certain week-days the open-air bazaars are crowded to suffocation with hordes of gayly-arrayed peasants. As elsewhere in Turkey, even during the most important fêtes the absence of drunkenness is noticeable. Disturbances and unrest seem, indeed, chiefly to arise from religious and political causes. The wine of Turkey is not a product one hears much about: it is of inferior quality; but that grown near Adrianople is said to be the best. Better methods of cultivation and preparation are sadly required. The wine grapes in the Adrianople bazaar cost one-fourth of the price of similar fruit in the Rhine district. Among other articles produced in the neighborhood are cocoons, spun silk and perfumes distilled from roses. There are several flour mills and a large trade is done in raw hides.

The Turks consider that the Adrianople mosque of Sultan Selim II. is the finest in the Empire. It was built about 1550 by Sinan, the greatest architect of the Osmanlis, and he himself considered that this mosque was his masterpiece. It is certainly a noble structure, and stands in a commanding situation. Its vast interior, almost destitute of ornament, constitutes a dome nearly equal in diameter to that of the Pantheon. The arrangement of the portico is most impressive. Here Sinan has utilized several huge ancient pillars of green marble.

ALFRED WATERHOUSE, R.A.

BRIEF as is the following extract from the *Manchester Guardian*, it seems to us to give a more understanding and sympathetic view of Mr. Waterhouse and his works than any of the more elaborate notices we have seen in the architectural periodicals:

"Alfred Waterhouse was born in Liverpool on July 19, 1830. He came of Quaker stock, and was educated at Grove House School, Tottenham, and studied architecture in Manchester under Richard Lane. His first commission, we believe, was for a pair of small houses in Liverpool. However, he rapidly obtained more important work, and it will be by the large public

buildings he erected that he will be remembered. One of his earliest important undertakings was the Assize Courts in this city, the commission for which he won in competition in 1862. This was followed by the Manchester Town Hall, the most successful of all his designs. His style then was a free rendering of old mediæval detail. It cannot be said that he ever thoroughly caught the spirit of the old work, as other men have done, but his buildings always have a distinct character of their own. The detail was old, but the setting was always modern. This, to a certain extent, is to his credit. His forte was planning. It is to this great gift, which he undoubtedly possessed, that his success was mainly due. It was also partly owing to his delightful and charming personality. Few men were so personally popular, and many who disliked his work were the first to admit his rare charm of manner. The planning of the Manchester Town Hall was in itself sufficient to make a man's reputation. The site, an extremely awkward triangular one, presented difficulties at every point, and these were not only overcome, but overcome in such a manner that out of the very irregularities and difficulties of the ground grew the most successful arrangements. Few men living could have managed as well, and it is doubtful if any could have managed better.

"These two buildings are in stone; in his later work he used this material but seldom, and designed chiefly, to the regret of many, in terra-cotta. This is not the place to discuss the much-debated question as to whether terra-cotta is suitable for buildings of a monumental character. It is possible that posterity will regard it as an unfortunate craze of the nineteenth-century architect; it is equally possible that a hundred years hence no other material will be procurable. This material he used for the large and imposing Natural History Museum at South Kensington, which occupies so commanding a site. Light blue or grey and bluff were the colors used, and the design was a free rendering of another style, the Romanesque. It is a style well suited to a building of this character, and it is treated in a way which, although open to criticism, has considerable interest. As far as we can remember, he never used these colors again externally, although they are to be found, side by side, in the entrance-hall of University College, Liverpool, another large work of his. Most of his terra-cotta buildings are carried out in a dull red 'terra-cotta' color, mixed with bricks of similar hue, which doubtless would appear less funereal if light-colored mortar instead of the black, which he nearly always affected, had been used. The most noticeable of these buildings is the series he erected in nearly all the principal towns in England for the Prudential Assurance Company. By no means the same design is used throughout, and yet they all have a certain similarity which stamps them, and a Prudential Assurance building is difficult to mistake. It is impossible and unnecessary to attempt to give anything like a complete list of his works. There is hardly any kind of building of which an example by him could not be mentioned. In addition to those already referred to, he built the Owens College, luckily in stone, Lime Street Hotel, Liverpool, in the same material, and the Yorkshire College, Leeds. In London, among others, he designed the New University Club in St. James's street, an early work with huge plate-glass windows; the National Liberal Club, Northumberland avenue, when he was blamed by some, probably without reason, for placing the staircase in the most important angle of the building; St. Paul's Schools, Hammersmith; and the Central Institution of the City and Guilds' of London Institute in Exhibition Road. Throughout the country he erected numerous hospitals, banks, hotels, colleges, schools and other important public and private buildings. He also built churches, but these are not among his most successful efforts. Neither was his genius best adapted for private houses. His most important example, "Eaton Hall," Chester, for the Duke of Westminster, can hardly be regarded as a success. His own house, "Vattendon Court," Berks, where he owned about 700 acres, is perhaps the best.

"He was essentially a man of business, a man of large ideas, and able to master big problems; he had great powers of organization, and was an admirable member of committees and an indefatigable worker. He was elected an A.R.A. in January, 1878, and a R.A. in June, 1885. He was for three successive years (1888-1891) president of the Royal Institute of British Architects. He received the gold medal of that society in 1878, and he was also 'Correspondent de l'Institut de France.' In 1895 he received the LL.D. degree from Victoria University. He

painted both in oil and water colors, but did this avowedly as a recreation. He has left his mark on the architecture of his country, and yet he has few followers in his own profession. His work appealed more to the uninstructed public than to architects. This is as it may be, but there can be no doubt that it was always strong, individual, and unmistakable, and, above all things, essentially typical of the age in which he lived and the people for whom he built."

THE DECENTRALIZATION OF ART.

TILL towards the end of the nineteenth century, European art was centered almost entirely in the principal European cities. Artists were fascinated by the attractions offered by the great cities in modern times and generally tended to the metropolis. But towards the close of that century a reaction set in. This was of a twofold nature. On the one hand, the artists themselves became tired of the enervating influences of populous centres, and yearned to return to the arms of nature, or at least to find a home in some more peaceful spot. On the other hand, however, the "province" began to assert itself as against the metropolis, and demanded that due regard should be given to its characteristics in artistic life and work. Thus commenced the great process of the decentralization of European art, which is still going on, and which has produced widely altered conditions for the development of art in the twentieth century. There is only one country not taking part in this process and that is France. For art, it is still absolutely true that Paris is France. The other large French cities, Lyons, Marseilles, Bordeaux, have no independent art life and have no artistic influence whatever. The artistic hegemony of London, on the contrary, is broken by the Scotch school, which has created an independent art centre with its home more particularly in Glasgow. The extensive industrial art movement, too, in England has led to the result that cities like Birmingham, which formerly had no share in the artistic life of Great Britain, can now claim to be centres of independent schools of art, and can point to really valuable productions. In Spain, Seville, the home of Velasquez and Murillo, maintains its own position alongside Madrid, and one of the most powerful and original of Spanish artists, Sorolla y Bastida, carries on his work in the industrial centre of Barcelona. Rome's place as the metropolis of art in Italy is being so much the more successfully contested by Venice, as it gives evidence of a more enterprising spirit than the Eternal City, a fact which was clearly proved by the great exhibition last year in the lagoon city. Vienna has found a rival in Prague, where a group of talented young Czech and German artists have congregated.

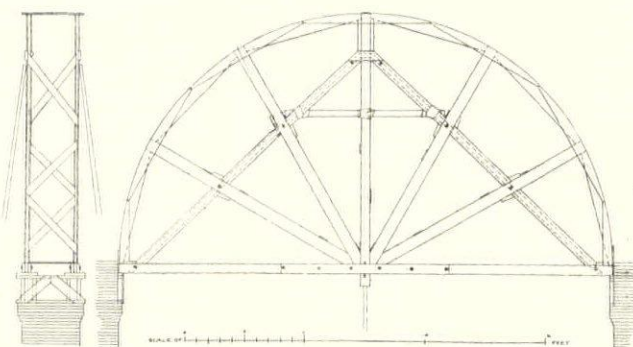
But the process of artistic decentralization is more remarkable and more striking in Germany than in any other country. Thanks to its multiplicity of small States, Germany has never known a single tyrannical art centre like Paris. Munich, Berlin, Dusseldorf, Dresden are all more or less old artistic centres. To these, however, have been added during the last decade quite a number of other places, where artistic activity prevails. The schools of Stuttgart and Karlsruhe enjoy a high repute and have produced artists of considerable note. Darmstadt has been raised by the Grand Duke of Hesse to the rank of a metropolis of art. In Hamburg a special Hamburg school has been developed. Great attention has been paid to the evolution of industrial art in Magdeburg and Crefeld, and even Posen has begun to show signs of becoming an active art centre for the Province of Posen, which, as regards art, has so long lain fallow. In addition there are those especially interesting art groups that have settled in the country itself, such as that of Worpssweder in the neighborhood of Bremen, and that of Dechau in Upper Bavaria.

This decentralization of European art is a very salutary process of great importance for the growth of artistic culture. It bids fair to remedy the danger of the growth of an artist proletariat in the great cities and to offer artists improved conditions by providing them with opportunities for profitable work in places where hitherto such were not available. Further it raises the whole level of artistic culture by distributing art with more uniformity over the various countries, and thus arousing interest and providing enjoyment in many districts, which formerly lay cut off from participation in art. Finally it will have the effect of bringing new vigor into artistic productions, since artists will be induced to pay regard to a greater variety of landscapes, national characteristics, and social customs, for every artist naturally devotes his attention to that with which he is brought immediately and permanently in contact. Hence, owing to this tendency in artistic development, European art enters upon the new century

under very favorable auspices, and if the auguries may be relied upon, the network of artistic centres in the various countries of Europe will be considerably denser at the close of the century than at its commencement.—*"The Cosmopolitan," in the Boston Transcript.*

LARGE CENTRES.

THE design of large centres for arches and domes is of some importance in construction, and we illustrate an original design for a large centre by Professor Beresford Pite, F.R.I.B.A., which was used for the construction of the arches at the crossing of the nave and the transept at Christ Church, Brixton. The span of this is about 41 ft. The details of the framing will be gathered from the illustration.



In the case of large centres the load is often transmitted to the ground by vertical supports, but in the present case this was not done, and the advantage in giving a clear space for traffic underneath is obvious. Sometimes, because of this desire for a clear way underneath the supports are inclined and are then apt to shrink and become loose-riding, on the dogs, and so throw themselves out of bearing. There is, however, another very important advantage in doing without the vertical supports in the case of arches, because if the weight is not put upon the footings during erection, when the centering is struck the sudden throwing of the weight upon the piers may cause the latter to settle unequally.

Of course during the construction of the arch the stresses in a centre are continually altering in direction and amount, and for this reason the centre has to be well braced. The method of bracing adopted in this particular case is notable.

It is usual to construct centres in position piece by piece, having previously fitted and marked them, rather than to build them complete on the ground and sling them into position with a crane, which would be liable to distort them.

Projections below the springing should be allowed for in designing centres, such as caps or neck mouldings, as these may prevent the lowering of the centre. In this case the centre is not diminished sufficiently to pass over the projections, but enough play is given.

The whole weight of any arch stone is not taken by centering until it is in such a position that a vertical line drawn through the centre of gravity of the stone passes on the outside of its bed. The load gradually increases from the springing to the crown during the construction of the arch, and in a semi-circular arch when about half way up between the springing and crown the load will have a tendency to force in the haunches and spring the crown up. For this reason the centre needs to be made stronger in the middle than on the haunches, as a greater weight will have to be carried by that part, while the stresses from the haunches where not supported from below, has to be taken from the middle of the span by framing the feet of the haunch braces into the foot of the king-post, which will counteract the tendency of the latter to rise. The stress at the crown, which comes into play later, is generally taken by braces from the head of the king-post to the ends of the tie-piece, directing the stress to the supports at the springing, as shown by the accompanying illustration.—*The Builders' Journal.*

ILLUSTRATIONS.

THE LANAHAN BUILDING, BALTIMORE, MD. MESSRS. SIMONSON & PIETSCH, ARCHITECTS, BALTIMORE, MD.

The warehouse is what is called a heavy warehouse, and is constructed of steel columns, girders and beams, concrete floors;

the floors of the public lobby and vestibule of the first floor are marble, the floors of the offices hard wood, but all the other floors are granolithic. All window-frames are of metal, glazed with clear polished wire plate-glass. The first story is faced with Maryland granite, and the other brick facing is of vitrified paving-brick, while all trimmings and cornices are of Indiana limestone. The stairways are of steel frame with cast-iron risers, fireproof with concrete, having cement treads. The steel-work is designed to withstand a superimposed load of 350 pounds per sq. ft. The building is equipped with electric elevators, electric and gas lighting, steam heating and sanitary plumbing. It has a frontage of 85 ft. and is 102 ft. deep. The offices on the first floor are finished in marble, mahogany and oak, but the balance of the entire structure is extremely plain. The cost of the building complete is \$150,000.

THE GUGGENHEIM BUILDING: COLORADO SCHOOL OF MINES, GOLDEN, COLO. MR. JAMES MURDOCH, ARCHITECT, DENVER, COLO.

This building is now being erected at the sole expense of Mr. Simon Guggenheim, one of the wealthy brothers so well known in connection with the American Smelting and Refining Co. The first floor is two feet below grade and is occupied by laboratory, work-rooms, lecture-room and museum; the second by library and offices, and the third by a large auditorium, open to roof, over library, and lecture-rooms and offices. The walls up to the first floor are of Fort Collins stone, and above that of golden grey pressed brick with lava-stone trimmings. The cost approximates \$70,000.

HOUSE OF GUSTAV SCHIRMER, ESQ., PRINCETON, N. J. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

HOUSE OF ROBERT CASSATT, ESQ., ROSEMONT, PA. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

HOUSE OF JOHN E. ALEXANDRE, ESQ., LENOX, MASS. MR. GUY LOWELL, ARCHITECT, BOSTON, MASS.

DETAIL OF THE SAME.

GARDEN FRONT OF THE SAME.

MAIN ENTRANCE: CAMDEN FREE PUBLIC LIBRARY, CAMDEN, N. J. MESSRS. HALE & MORSE, ARCHITECTS, PHILADELPHIA, PA.

Additional Illustrations in the International Edition.

PORTE COCHERE: HOUSE OF JOHN E. ALEXANDRE, ESQ., LENOX, MASS. MR. GUY LOWELL, ARCHITECT, BOSTON, MASS.

NOTES AND CLIPPINGS.

THE READING-ROOM, BRITISH MUSEUM.—Proposals are already being made for celebrating the coming jubilee of the opening, in May, 1857, of the general reading-room, of which, it appears, the erection was originally advocated by Professor Hosking—see the *Builder* of June 22, 1850, with an illustration, and the pamphlet, "Observations on the Recent Addition of a Reading-Room at the British Museum," fo: 1858. The circular apartment, 140 ft. in diameter, and roofed with a dome rising to a height of 106 ft., was built in the big quadrangle by Sydney Smirke, R.A., 1855-7. It replaced the former two reading-rooms in the block on the north side of the quadrangle into which the readers were admitted from Montague-place, and a revival of that means of public access would be a great convenience. Amongst the various projects for marking the anniversary is the fixing of busts or statues of the world's greatest writers upon the consoles around the wall at the springing of the iron ribs. The number must necessarily be limited to twenty, and what hope is there of agreement upon the selected names? A well-known reader suggests the separation of the seats with partitions, but that would reduce the present scanty space on the floor of the room; another advocates the compilation of a catalogue, with full references, of printed books which are not in the national collection, and yet are known to be in existence elsewhere, either at home or abroad. We scarcely expect that the authorities would enter upon so vast an undertaking, or comply with similar pet projects relating to the books and the catalogues. Meanwhile there are more urgent and practicable needs to be considered, on behalf of the public and the executive staff alike. Measures should be taken to provide an improved system of ventilation. During the past fifty years or so the numbers of the readers have increased from 70,000 to 226,325 per annum, sanitary science has advanced in the meantime, and "museum headache" is a long-standing grievance. Moreover, the in-

terior of the dome ought to be thoroughly cleansed and renovated; a scheme for its decoration was prepared, we believe, by Alfred Stevens. The interior and plan are illustrated in the *Builder* of March 24, 1855. Baker & Fielder's contract amounted to about £100,000. The rotunda of the Pantheon at Rome measures 142 ft. 6 in. across the floor, and rises to 142 ft. in the clear—*The Builder*.

CHEAPEST ARTIFICIAL ILLUMINANT.—This is claimed to be the Kitson light, and the following extract from the second report of the British Royal Commission on Coal Supplies recently published is tendered in support of the contention: "With regard to the manufacture of gas from oil processes, the Kitson process is the cheapest illuminating power known; whereas with coal gas and the incandescent mantel with high-pressure lighting you get 1,000 candle-power for about 3½ cents, with the Kitson you get the same power for 2 cents now. The Kitson system is very convenient for street lighting and for docks. It is cheaper than electricity, and it is even cheaper than coal gas. Taking into account the cost of the oil, it is considerably cheaper, and it does not mean the breaking up of roads—that is to say, each installation is self-contained."

AN ANCIENT HINDOO TELEPHONE.—A telephone 2,000 years old has been discovered in Panj, India, by an English officer. It connects two Hindoo temples at a distance of 500 feet. This strange discovery called forth statements from the Egyptologists, who do not want to be behind the English officer, that they have found unmistakable traces of wire connections between several of the Egyptian temples belonging to the period of the older dynasties, although they are unable to say whether they were used for telephone or telegraphic purposes. It is to be remembered, however, that some of the ancient temples of Egypt were provided with lightning rods, and it is quite possible that for once the Egyptologists may have made a mistake.—*Boston Transcript*.

AMERICAN TECHNICAL STUDENTS.—The number of students in American engineering colleges in 1901-02, including those taking courses in architecture, naval architecture, and pure chemistry, was 14,913. By the year 1902-03 the number of undergraduate students of engineering alone was 18,859, of whom there were in mechanical engineering 6,800, civil engineering 5,278, electrical engineering 3,652, mining engineering 2,244, chemical engineering, 725, textile engineering, 133, sanitary engineering 27. The students of architecture only enumerated 558—a very small number compared with the totals cited for engineering subjects. At the last United States census in 1900 there were in the whole country 10,604 architects to 6,034 surveyors, 20,153 civil engineers, and 14,440 mechanical and electrical engineers.—*Exchange*.

THE TIBERIAN GALLEYS OF LAKE NEMI.—Once more the project for raising the galleys or house-boats which belonged to the Emperor Tiberius and are lying at the bottom of Lake Nemi has been revived. The subject should possess an interest for architects, for Leon Baptista Alberti was connected with the first attempt to bring the galleys to light, which occurred in 1450. He acted as consulting engineer at the desire of Cardinal Prospero Colonna. Fishermen had reported that two great galleys were visible to divers. The machinery for the purpose had to be improvised, and it speaks well for Alberti's advice when we learn that the prow of one of the vessels was raised. But there was not sufficient mechanical power to do more and the attempt was abandoned. In 1535 another architect, Francesco de Marchi, made further experiments. The preparations were more elaborate than on the previous occasion, but there was hardly as much success. It took a long time before there was a third experiment. In 1827 Fusconi constructed a diving-bell. But the galleys were so embedded in mud he came to the conclusion they were wrecks, and it was not worth expending time and money on their rescue. A company called the Società Nemorense, with a capital of 500,000 lire, has been formed with the object of making one more effort. It is believed that one vessel measures 64 metres by 20 metres, while the other is 71 metres by 24 metres. It is now supposed they were constructed in the time of Caligula, and may have served some of the purposes of a marine temple. From objects already found, bronze was largely used in the construction, and the metalwork at least would be valuable.—*The Architect*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, OCTOBER 21, 1905.

No. 1556.

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WHEN noted, respectable and intentionally honest insurance officials blandly acknowledge incomprehensible carelessness and indifference in the handling of funds that really belong to the helpless, it seems rather unreasonable to hold mere political adventurers to a stricter accountability as to their methods of handling funds that belong to the all-powerful public. Still, now and then it has to be done, and the investigation just begun in Philadelphia before a committing magistrate seems to promise to uncover things of some interest to architects. The object of the investigation is to get at the party "boss," Durham, but the parties immediately concerned in the inquiry into the manner of building the Smallpox Hospital, one of the buildings of the new Municipal Hospital group, are the ex-Director of Public Safety English, Philip H. Johnson, architect of the building and a connection by marriage of Mr. Durham's, and the contractors, Henderson & Co. Thus early in the enquiry there is disclosed an ex-mayor of the city who, while in office, obligingly signed any contracts his subordinates laid before him without examining them or comparing them with the original bids. Evidently there is no Iberian dilatoriness in ex-Mayor Ashbridge's makeup, for one of these contracts seems to bear date several weeks before it was actually authorized by vote of Councils, and to have the further peculiarity of being made for a larger amount by several thousand dollars than the contractors actually named in their bid. Started in this way, and watched over by a building-inspector well-fitted for the task by his life-long training as a retail flour-and-feed salesman, it is not surprising to learn that the contractors are alleged

to have built the hospital with consistent disregard of what the specifications required. It is believed that the conspiracy alleged resulted in enabling the contractors to secure and divide—with someone—probably forty thousand dollars more than their rightful builders' profits.

MANY can readily remember the newspaper turmoil made over the attempts to cause the removal of the portico of the Pabst Hotel on Forty-second Street, New York, a contest that ended only with the tearing down of the hotel itself to give place to the new *Times* Building. A similar issue, raised between an abutting owner and the owners of the New Amsterdam Theatre, a few doors away from the Pabst site, has just resulted in a decision handed down by the Appellate Court that the so-called "portico" of the theatre is illegally erected and must be removed. This "portico" is in reality nothing more than a frontispiece, decorated with much sculpture and rising through three stories' height, supported by two narrow piers that project some four feet only beyond the building-line. The theatre-owners' contention is that this frontispiece is legally erected, since, at some stage, they procured the passage by the Board of Aldermen of an ordinance granting them the privilege of encroaching on the rights of the public and abutting owners. This ordinance is now declared by the Appellate Court to be unconstitutional and so null and void. The New Amsterdam Theatre case is interesting because the encroachment is paralleled by that of the Knickerbocker Trust Company's fine building at Fifth Avenue and Thirty-fourth Street, and yet one would have thought the architects of the latter building would have avoided this particular blunder, since it is not many years ago that, through a similar disregard of the building-line and the rights of the public and abutting owners, one of their clients, the Algonquin Club, of Boston, was put to much cost and inconvenience, being at length compelled by law to cut back and rebuild those portions of the façade that projected beyond the building-line. Some people, architects as well as others, who are scrupulous in regarding the sanctity of private property as expressed in the party-line, are quite willing to encroach on the rights of the public, feeling pretty sure that the public doesn't really know what its own rights are and that the official guardians of them are seducible.

EVERY few days a largish section of the New York Fire Department hastily gathers about the building in which we have our offices—the new *Times* Building—and when arrived feel obliged to go through the form of seeking for a fire that they know very well does not exist. Oblivious of the fact that telephones and electric-lights in the building perform their duty duly, the eccentricity of the fire-alarm is gravely accounted for by the statement that the building is "grounded." These false alarms seem to us corroborative proof of the trustworthiness of the report just made to the New York Board of Fire Underwriters by an expert employed by

the Board, under an authorization to expend ten thousand dollars in thoroughly examining and reporting upon the existing fire-alarm system of the City of New York. Mr. K. H. Miller, the expert employed, reports that the present system is "faulty in original design and construction" and has now become so deteriorated and so repaired, altered and patched about that it "cannot be transformed into permanent proper working order." Mr. Miller recommends that the present system be kept, in as good working order as possible, only until a new and thoroughly up-to-date system shall have been established in complete working order and then permanently abandoned. The cost, which he gives roughly as something less than two million dollars, is anything but prohibitive, being hardly more than the cost of an ordinarily large "fire" and far less than the cost of a "conflagration" that may at any time acquire momentum through the delay in summoning the apparatus caused by the defective working of a decrepit and unreliable system. Of course the Board spent its money mainly to save its own surplus, reserve funds and capital, but it has none the less rendered a very real service to the public.

THE country at large, through the agency of the Metropolitan press, has just been treated to another exhibition of the wonderful pettiness of human nature. The trustees of the Metropolitan Museum of Art, instead of investigating and manfully applying the needed discipline in the disgraceful squabble between Mr. F. E. Elwell and Mr. G. H. Story, curators of different departments in the Museum, to which we referred at the time of its occurrence, have taken invertebrate action. They have announced that they had for some time been planning to abolish Mr. Elwell's department and office, and they would take that step now, but it must be understood that their act is so taken as "to involve no judgment on their part as to the issues between these two gentlemen." We did not suppose it possible for any one to behave worse than Messrs. Elwell and Story, but it appears by the record that the trustees must be awarded the palm. The two combatants proved that they had backbone at least.

ONE of the unpleasant consequences of the strenuous times in which we live, times which compel architects and builders to do their work at a speed the world, probably, has never seen before, is that the pleasant and often intimate friendly relation between the architect and his draughtsmen is now almost absolutely a thing of the past. Formerly, a draughtsman, once he had proved himself, felt that he was a fixture in his employer's office just so long as his own inclinations were satisfied. Nowadays, however, most draughtsmen know that they are not engaged by the year or even by the month, but almost always and merely "by the job;" and when the job is finished and they are once more thrust out into the stream of their fellows ever seeking another job, they hardly perceive with how real an inhumanity they are being treated, an inhumanity their recent employers in many cases did not themselves experience. The consequence is that the draughtsman of to-day is, and must be, a permanent member of the country's floating population,

to the detriment of his own happiness and the injury of his moral and business well-being. It is unfair and unjust; but so far as we can see the situation has but a single cure, and that is so radical a one that we hesitate to express our views. We are reminded of the happier state of things that used to exist by noting that the late Alfred Waterhouse made substantial bequests—from one hundred to one thousand pounds—to a score of his draughtsmen—"present and former pupils" they are styled—"in grateful recognition of their efficient and willing services." Evidently, life in England is, even to-day, less strenuous than it is here.

THE Dean of Westminster, who recently gave occasion for merited criticism by ordering the displacement and curtailing of the perhaps too bulky and overpowering monument to one of England's naval heroes of the last century, in order to make room for the monument to the late Marquis of Salisbury, has found it comparatively easy to comply with what seemed to be the popular desire that Sir Henry Irving should find sepulture in the Abbey. As it was the great actor's wish that his mortal frame should be cremated, it is apparent that no large amount of space is needed for the urn that holds his ashes, and that none of those sanitary precautions will have to be observed which an intramural interment calls for.

QUOTING the words of the Supreme Court of Illinois to the effect that an ordinance that public work "shall only be done by certain persons or classes of persons, members of certain societies, necessarily creates a monopoly in their favor" and hence is illegal and void, the Supreme Court of Michigan has recently given judgment in favor of a contractor who dared to stand out against that most autocratic of governing bodies, a Board of Education. It appears that, after one Lewis had put in a bid for the steel frame of a school-house in Detroit, the Board of Education voted that none but union labor should be employed in building the school-house. Lewis declined to sign the contract if it contained such provision and the Board refused to make a contract with that stipulation omitted. Thereupon Lewis successfully sued out a writ of mandamus requiring the Board to enter into a contract with him irrespective of the kind of labor to be employed. The Board appealed to the higher court, which, however, affirmed the decision of the lower court, quoting the words of the Illinois decision as given, in part, above.

ONE would think it might cause the authorities of the *École des Beaux-Arts* to "view with alarm"—as the politicians phrase it—what the future has in store for them, to know that at the last examinations twenty-two female students were admitted to the school, and that this means that a little over twenty per cent. of those admitted belonged to the gentler sex. Probably most of these young women entered the ateliers of painting or sculpture; but doubtless here and there one is now fitting herself to take part by and by in all the public and private scrambles for "a job" that her courage and strength will allow her to enter into.

SOME ITALIAN LOGGIAS.—I.

ITALY is pre-eminently the country of the loggia and portico. Rome, city of arches and vaults, possessed porticos, amplifications, that is, of loggias, whose names are sacred to posterity. The porticos of Octavia, of Philip, the porticos of Pompey, of the Argonauts, the Porticus Maximæ are triumphal monuments whose remains awaken the deepest feelings of respect and veneration. Whether near famous temples, or beside profane edifices, they received such a wealth of ornaments, statues and paintings that these accessories were sometimes worth as much as, or more than, the architecture itself. At Rome the porticos were places of convenience and pomp, and those which are found outside of the sacred territory, the porticos of Pompey, built, according to Vitruvius, for the sake of protecting spectators in the case of a shower, are erected in the midst of fields, accompanied with fountains and natural beauties, composing with them incomparable pictures. Then it must be added that the porticos possessed—besides columns—niches, passages and halls whose decoration often was of the highest merit. In one of these halls, the Curia Pompeii, Julius Cæsar met his death.

Rome was pervaded by porticos; porticos were here a necessary element of the temple, and, the portico which has an existence as in architectonic ensemble excepted, the portico sane and fine in itself forms the habitual theme in all pictures of Roman life; hence, to import porticos into the Eternal City would be like importing rags into Athens.

We encounter porticos near theatres, near amphitheatres, near the forums, places of public and private business, and we meet them seemingly isolated or united by means of passages in such a way as to compose a network of porticos, as in the Cistiberine region, creations of the three Augusti, Gratian, Valentinianus and Theodosius.

Nothing comparable with these occurred later, and the Latin works were replaced during the Mediæval and Renaissance times that followed by loggias, reductions of a great theme of art which give to streets and squares a pomp which the world, after Rome, renounced. The purpose, nevertheless, continued, and loggias were almost always built for the convenience of men of business, as antichambers between a public bureau and the street, places for discussing or preparing affairs. This, however, does not mean that their purpose was not sometimes different, and the Loggia della Signoria at Florence was erected by will of the Florentine ædiles, who constructed the seigniorial place for public ceremonies and for the sake of bringing themselves into direct communication with the people. Later, the loggia was changed into a public rostrum as at Florence (Loggia dei Bigallo) and at Siena, and very often into a corn market, as at Florence and elsewhere.

The city of Dante, Machiavelli and Michael Angelo must be often mentioned by the writer, for no Italian city exists which is more decorated with loggias than Florence. I am thinking also of those which have been destroyed alike in past and recent time, whether built of stone or wood, as the Loggia of the Pisans on the Piazza della Signoria, and the loggia which, in 1528, was built by Vasari for the sale of fish upon the old market-place, the Mercato Vecchio, the ancient centre of the city of Dante. This loggia was torn down at the time of the great rebuilding of this portion of the centre of Florence. It was a model of architecture which might have been saved, but the Florentine fathers endured and disregarded the criticisms and remonstrance of architects on more important points than this, and it is useless now to renew the attack.

Now let us turn our attention to the oldest loggias, and here Siena takes rank before Florence. Siena—the "red city," as Bourget calls it in his "*Sensations d'Italie*," because of the large use made of brick in the Sienese buildings, offers a large number of loggias, accessories of its mediæval fountains, wherein brick plays the leading rôle. And then look at the red in the loggia of the fountain at Oviglio, a picturesque fragment from the early years of the 14th century, whose simplicity commends it as a model to the copyists of to-day. And Siena possesses many fountains (Fontebranda, Val di Montone, Pescaia, Follonica, Vetrice) whose good taste has a resemblance with the little-known fountains at San Gimignano and Poggibonsi.

The elegance of the fountain at Oviglio, a Gothic fragment, is comparable to the almost pudic beauty of a Greek vase. It prepares one for the luminous art which lives in the most celebrated of the loggias, whose beauty is a source of Italian pride, the Loggia della Signoria or "dei Lanzi" at Florence, said to be by Orcagna, or, worse still, by Orgagna. Its real name should be the Loggia della Signoria, and it ought not to be called after Orcagna because, although he was the most celebrated Florentine artist of

the 13th century after Giotto, he did not erect the loggia. And it ought not be called "dei Lanzi," since the mere fact of its being found near the barracks of the Lanzichenecchi has no bearing upon its real origin, expressed by the name which I have given and which ought to be preferred. The loggia was built by the



CORNICE OF THE LOGGIA DELLA SIGNORIA, FLORENCE.

Florentine Seignior, in order that they might have, as I have said, a place for public ceremonies and one where they might come into direct contact with the people.

The Loggia della Signoria unites beauty, sobriety and elegance in perfect harmony and its voice could not be more Florentine; just as the Parthenon represents Grecian art, so the Loggia della Signoria represents Florentine art and glorifies it. It has ex-



PORTICO DEGLI UFFIZI, FLORENCE.

quisite proportions, modesty of projection in its superb piers, and it appears that this exists for the sake of giving a greater surface and offering a greater convenience to the seigniors between the arches which so joyously invite them to enter. One easily comprehends that so much magnificence might have been assigned

to such a master as Orcagna, and posterity has willed that his statue should stand in a niche in the portico of the Uffizi, in the act of admiring this chef d'œuvre, which does not belong to our Orcagna at all, but whose authors are Benci di Cione and Simone Talenti, who built the Loggia della Signoria between 1376 and 1387. Nevertheless, there exists an opportunity which allows the possibility of not absolutely excluding Orcagna from any share in the work, and I note that the first decree relating to its construction dates from 1356—a year in which the glorious master was still living, while the absolute beginning of the work dates from 1376, eight years after his death. For my part, I do not have much faith in the claim which assigns to Orcagna the credit for the loggia which commonly bears his name, and I believe that the question is actually obscured by a species of transubstantiation, and that Orcagna is, rather, the author of the Loggia di Bigallo.

History is silent on the subject of this little loggia, which rises vis-à-vis to the Campanile of Sta. Maria del Fiore. Far from having the solemnity which makes fair the Loggia della Signoria, not far away from which the Bigallo is found, it recalls the *puissance* of the Tabernacle of Or San Michele, the treasure of Italy and Orcagna's highest claim to honor. A mere glance is enough to convince one that the two monuments embody corresponding lines, motives and colors. But alas! the Loggia of the Bigallo is not finished; if it were complete the identity which I have just pointed out would be still more striking. The same motive of statues, placed in the same manner, isolated, without niche or canopy, exists in the Tabernacle, and serious arguments repelling the idea that Orcagna might have been the author of the Loggia di Bigallo are still to be found, so I insist on my own thesis. The loggia is



LOGGIA DI STA. MARIA DELLA MISERICORDIA, THE SO-CALLED BIGALLO, FLORENCE.

not of value in itself only; it has worth because of the majesty of its upper stories, with the quattrocento paintings of Pietro Chellini (1444) on the side towards the Baptistery, and a sober roof of wood, which casts a poetic shade over the many-colored windows. At present, the building is in excellent condition, having been restored and strengthened about twenty years ago, and even more recently.

The search for novelty now leads us to the Palace of the Woolworkers, still in Florence, whose re-inauguration after important restorations has taken place within the last few months. The restored loggia has somewhat the same fame as the Loggia di Bigallo, and leads us to remark that the Woolworkers' Palace has been for some little time the majestic residence of the Dante Society of Italy.

Quite near these Florentine loggias, on the Via dei Calzaioli, rises one whose grandiose aspect tells us that we are before one of the most remarkable monuments of Florence, Or San Michele. Formerly it was a loggia and remained such until additions embellished the ancient edifice. In fact, Or San Michele, or S.

Michele in Orto, was begun as a loggia about 1337 on the site of a more ancient portico, erected for the grain trade in 1280 by Arnolfo di Cambio, according to Vasari; but to-day the loggia no longer exists, for the arcades have been closed by means of a bewildering decoration of the 14th century.

Now, you who retain a remembrance of Or San Michele, will you have the kindness to cast your eye on the Loggia dei Mercanti at Siena? On the pilasters of Or San Michele and on the Siense loggia are carved tabernacles inhabited by statues, but there is an enormous difference apparent here between Florence and Siena. At Or San Michele the corporations of Florentine Arts show their power with tabernacles wherein from Donatello to Verrocchio, from Ghiberti to Nanni di Banco, from Baccio da Montelupo to John of Bologna architecture, ornament and sculpture all hymn eternal beauty; at the Loggia dei Mercanti what one sees can hardly make good such lofty aspirations. Yet noteworthy artists carved the statues in the Siense loggia; Antonio Federighi did the "St. Victor" and the "St. Ansano," while Lorenzo Vecchietta did the "St. Paul" in 1458 and the "St. Peter" in 1460; and of the statues in the smaller niches there is one that seems inspired by the "St. George" of Donatello, one of the jewels of Or San Michele, that some years ago was transferred to the Museo Nazionale at Florence, where it is most unhappily placed.

The Loggia dei Mercanti, at present the Union Club, is a remarkable monument, and Burckhardt, who forgot to mention it in his "*Cicerone*," is to blame. Its architecture is noble, and two styles are superposed in its façade. The interior was to have been decorated with paintings by Pastorino Pastorini, a rather bizarre painter and glass-worker of the 16th century. In fact, in 1552, he did decorate a portion of the loggia and then allowed himself to be put in prison, having been paid in full for the work, yet having earned only part. It was at this time (1552-63) that Lorenzo Christoforo, called "Il Rustico," replaced him.

Siena "the red" does not show a loggia as red as does Bologna "the scarlet," where the Loggia or Forum of the Merchants exhibits a tone of brickwork even stronger than formerly, thanks to some recent restorations. Florentine delicacy does not prevail here, for the Bolognese windows, with their framing of small, square panels, are singularly stiff and offensive, and the use of white marble with the brickwork does not produce a harmonious result; yet the reality is more attractive than the photograph, for the red and weather-stained white are really commingled with color and gilding. The Bolognese loggia makes an impression with the parti-colored coats-of-arms in its cornice, forming the most artistic side of the structure, which yesterday was assigned to Andrea Manfredi, but which to-day is restored to its real author, Lorenzo di Domenico da Bagnomartino (1382-84).

There should also be noted at Siena the Loggia-oratory of the Tower on the great piazza, a structure that belongs to two different epochs, the elder part to the Middle Ages, the newer to the Renaissance. Here the details, ornaments and statues are exquisite. I should like to have shown the Loggia dei Mercanti at Ancona, a monument in Venetian Gothic, whose walls are now being strengthened, a step which allows one to hope that it will last longer than many another monument at Ancona, for, thanks to the scantiness of his budget, the Inspector of Monuments cannot do much to protect the structures he is supposed to care for. This loggia, which I am unable to illustrate, was designed in the 15th century by an artist, a plagiarist, Giorgio Orsini da Sebenico who, the author likewise of two monumental gateways at Ancona, showed in them as in the loggia that the source of his inspiration was the "Porta della Carta" of the Ducal Palace at Venice.

Nor do I wish to speak here of the Carrarese loggia at Padua, built, in 1343, it seems, after the design of Domenico da Firenze in the Tuscan style. I will also mention a noble loggia at Milan recently restored—1904—the Loggia degli Osii. This loggia, near the Cathedral piazza, was built and assigned to the needs of the grain and wine trades in the time of Scoto da San Gimignano, a magistrate of the city in 1314. With the mention of this structure I bid farewell to the Middle Ages.

ALFREDO MELANI.

(To be continued.)

DECAY OF STONWORK AND ITS PREVENTION.

THE subject of the decay and stonework is one which is always before us, and is a question which so far has not been practically solved. By familiarity it appears to be considered a necessary evil. But the ravages of time go on insidiously, until at last one is brought face to face with the dangers of further delay.

This has been the case with the Bell Harry Tower of Canterbury Cathedral. The Coal Smoke Abatement Society has done great service in calling attention to the fact that one of the causes of the decay of stone, namely, the imperfect combustion of coal, is preventable. That the influence of this is of greater importance than that of the natural agencies—rain, wind and frost—is proved by the fact that our town buildings decay much more rapidly than our rural buildings. The Secretary of the Society for the Protection of Ancient Buildings has called attention to the fact that the fine tower of West Ham Church is suffering solely from the surface decay of its stone, and that the beautiful work of old Croydon Palace is fast disappearing from the same cause; while the elaborate carving on the magnificent porch doorway of Malmesbury Abbey is rapidly decaying. He suggests as a remedy that lime should be applied to the stone, as was done some few years ago at Exeter Guildhall. By this means decay is arrested until the protecting coat of lime is eaten through. The objection raised is that buildings would be disfigured by this process of limewashing; and the criticism, certainly, is not to be lightly dismissed. At Exeter, the lime was toned, and now, to quote the Secretary of the Society for the Protection of Ancient Buildings, "The only difference in appearance is, that when we took it in hand it was black with soot, except the portions where the surface of the stone had recently fallen off, and now it is stone color." A technical point worth mentioning is that the lime was slaked with boiling water, which results in its penetrating the stone farther than lime slaked with cold water, and it adheres firmly without the addition of Russian tallow or like substance. One gentleman, who is well-known in the scientific world, Professor Church, claims that a lime-wash is objectionable, because, although it undoubtedly acts for a time as a preventive of further attack by sulphuric acid (provided it keeps its place on the decayed and crumbling walls) it must give rise to more sulphate of lime the very substance, the formation, presence and migration of which have been the chief causes of the mischief. If such an opaque coating as milk-of-lime be admissible at all, then Professor Church suggests one into which precipitated carbonate of baryta (an amorphous, white powder, which is obtained by double decomposition of adding solution of carbonate of soda to a solution of chloride of baryta) enters as the chief ingredient. This substance is as effective as lime in barring out the corrosive sulphuric acid, while it can add no injurious soluble salt to the decaying or decayed stone.

Another prominent authority on this same subject, Mr. W. R. Purchase, says that although the necessity of choosing a good building stone for durability is well known, but too little attention is, as a rule, given to the selection of the stone, in order to obtain, as nearly as possible, a perfect structure. Yet, however careful the selection may be, it should be understood that there is no kind of stone, whether the hardest and most intractable of the syenites—a rock which consists of orthoclase, an impure species of felspar; pure felspar and hornblende only, or granites, or the softest limestone or sandstone, that is not perishable in a greater or lesser degree in the course of time. The physical forces and agencies within and without which produce this effect are apparently invisible, although always present, each acting in its own way with the same result—that the stones begin to disintegrate and gradually fall away into dust. Hence scientists tell us of the divine, immutable laws that govern the universe—that nothing exists in Nature but what is likely to change its condition and manner of being, and that all bodies possess the materials of which they are composed only for a limited time, during which some powerful agent effects their decomposition, and sets the elementary particles at liberty, again to form other equally perfect combinations. To discover the causes of decay in stone, and the means of avoiding the evil in future, is an investigation of some difficulty, because of the great number of stones, varied in composition and character, that are used for building purposes in this country. Some advantage may, however, be derived from the attempt by eliciting intelligent discussion, suggesting inquiries, making researches amidst old buildings, directing experiments, and arranging sound practical experiments. By this means certain conclusions may be inferred, so that defects may be remedied in existing works and improvements suggested for the future. It should not be forgotten that a bad selection of stone cannot be rectified when once used in a building, and is a lasting testimony to want of care and, maybe, experience; while a good selection remains a lasting record for posterity. Chemical tests and analyses, to determine the *quality* of a building stone for *durability*, are admitted by practical men to be somewhat unreliable. The processes which are reliable in the laboratory are generally of little value when brought into use by the ordinary worker; for chemical analysis will only give the constituents, and microscopical analysis the phy-

sical construction of a stone; and neither has as yet been proved to have any direct relation to the weathering qualities of that stone. And although stones have been subjected to severe tests in the laboratory—such as being dissolved in various acids, saturated with salts, ground into semi-transparent discs, disintegrated, pulverized, baked, boiled and treated in various other fashions—yet none of these processes have as yet furnished sufficient data by which a correct judgment or estimate can be formed as to the weathering properties of any stone. In the foregoing remarks there is no wish to depreciate or disparage the true value of tests by chemical analysis, but rather the contrary. These, however, should be confined to ascertaining the component parts of the stone, its cementing material, the absorption of water, which gives a very fair indication of the power of a stone to resist rain and frost, the microscopic test, which is useful in determining the homogeneity of its structure, and others. In fact, there is no detail in connection with stone that one should not be familiar with.

Without going into the scientific aspect of the causes of decay in building stones, it may be briefly stated, that the weathering power of a stone is dependent upon its physical structure, its composition, and the nature of the atmosphere in which it is placed. The most destructive agent that the stone has to contend against is rain, or a moist atmosphere, and also, in some degree, wind, frost and smoke. The air of populous and smoky towns is charged with various deleterious acids; these acids are dissolved by the rain which penetrates the stone in a greater or lesser degree according to its physical structure, and combines with the constituents of the stone, causing it to ultimately crumble away, so that any contrivance that will check the admission of water will be most likely to succeed in arresting decay. The wind, in some instances, acts destructively, as when it drives the rain into the pores of the stone, and again when it carries away loose particles which have been dislodged by other means; but on the whole the effect of the action of the wind is to enhance the durability of the stone by drying out the moisture, and thus assisting its lasting powers. The points which should be emphasized are: First, selection. Take every precaution to ensure getting the stone from a sound and compact bed, and one that is easily wrought and convertible. All stones are more or less porous, and those which readily absorb moisture should not be used for the external exposed portions of buildings, as when frosts occur the freezing of the water on the wet surface continually peels off the latter, and eventually destroys the ornamental work upon it. This, however, is not a universal rule, as, although a stone may be very porous and absorbent, it may also be extremely durable, its durability depending upon the cementing substance which holds the grains together being strong enough to resist the physical forces acting upon the stone, such as rain, frost and wind. Examples of these are found in the durability of the shelly oolites, a variety of limestone, composed of grains like the roe of a fish. These stones present a remarkably open and porous nature, and resist disintegration much better than might be expected from their appearance. This is due to the interstices being filled with a compact highly crystalline cement. Stones which exhibit distinct beds of stratification should, as a rule, be avoided, as in frosty weather they have a tendency to split along the lines of cleavage. In selecting a good sandstone the grains should be compact and homogeneous, and on crushing a bit of the stone the grains should be lustrous, as those with a dull lustre are generally found in a stone that weathers indifferently. In limestones, a stone of an open, powdery and slightly cemented texture will, if exposed to the weather, decompose in a comparatively short time, whether fixed on its bed or in any other direction. It is with the limestones, as with most other stones, that the goodness or power to resist decomposition depends chiefly upon the quantity and quality of the cementing substance by which the particles adhere to each other, and that stone which is closest in texture and contains the largest quantity of crystalline cement in the interstices between the grains will certainly be the least affected by external influences. The next most important point is that of properly seasoning the block or slab before setting. This, it appears, was considered a matter of much importance by the old masons, the process of seasoning often extending over many months. The third important point in the matter of preventing decay is that the stone should always be laid on its natural bed.

It has been stated that when once decay has thoroughly set in, in a building stone, it is almost impossible to effectually stop its progress. It is, therefore, important to afford a protection to it before decay has commenced. One good, and at the same time, simple treatment is the use of baryta, especially when the cause of the decay or partial decay has been proved to be sulphuric acid. The easiest way of applying baryta is in the form of baryta water.

This is a solution in distilled water of barium hydrate, also known as barium hydroxide. Supposing that one has at hand a solution of this compound, saturated at the summer temperature, then the following directions for applying it to the decaying or decayed stonework should be followed: Remove dust and loose particles of stone from the surface to be treated, by means of a jet of air, which may be conveniently produced by a suitably-fitted foot-blower; there are cases where the stone may be safely cleansed by means of a dry brush. Then the baryta water should be applied in the form of a spray, to the tender surfaces of the decayed stone, the use of a brush at this stage being generally inadmissible. The spraying should be repeated at intervals of two or three days, until the treated stonework has become hard enough to bear the application of a paint brush, freely charged with baryta-water; in some cases a garden syringe having a fine rose-jet is a convenient instrument to employ. For all external stonework and in all interiors not artificially warmed, the baryta treatment must be carried out in the summer. The baryta solution, which penetrates to considerable depth in the case of porous stones, seldom hardens the surface appreciably until it has been applied several times. On an average one gallon of baryta-water will serve for a single treatment of twenty superficial yards. Here it may be mentioned that disfiguring incrustations, such as those formed by the drip from corroded Portland stone, ought to be removed previous to the application of the baryta treatment. The chemical changes brought about by this process are chiefly these: The soluble sulphate of lime, or gypsum, in the decayed stone is converted, in part or wholly, into soluble sulphate of baryta, with the simultaneous production of hydrate of lime. The latter will be changed gradually into the carbonate of lime and will then have re-assumed its natural and original state. It is to this change that the hardening and consolidation of the decayed stone are mainly due, but it may be weeks, and, in some cases, months, before this process is complete.—*The Stone Trades Journal*.

JEAN GOUJON.

IN the last number of *L'Art M.* Henry Jouin, the secretary of the École des Beaux-Arts, has completed his series of chapters on Jean Goujon, the sculptor. Among all the French artists there is not a man whose life is worthier than Goujon's of the attention of the biographer, and especially of one who follows modern systems of inquiry. It should be remembered that his career is full of mystery. Hitherto he has been known by his works and by the legend that as he was a Calvinist he was shot as he stood working on a scaffold on the day of the massacre of St. Bartholomew, Aug. 24, 1572. At one time it was supposed he was engaged on the Louvre when slain, while others maintained he was carving some of the figures at the beautiful Fountain of the Nymphs, which is now called the "Fontaine des Innocents," near the Halles in Paris. But as the fountain was known to have been completed some years earlier, it was taken for granted that he must have been employed on the decoration of the court of the Louvre. Like other artists of the Renaissance period, Goujon is presumed to have been an architect as well as a sculptor, and the Hôtel de Carnavelet, which is now the principal municipal museum, is said to have been erected from his designs. There is no doubt he adorned the building with beautiful reliefs and other figures. But it is uncertain whether he can be regarded as the architect. He was undoubtedly the greatest of the French architectural sculptors.

If the events of his everyday life are unknown, it is possible to understand the characteristics of Goujon's works, or at least as many as suffice to give him renown. He produced the sculpture of the Château d'Ecouen, for the Constable Montmorenci; the sculpture of the Château d'Anet, for which he received the commission from Diana of Poitiers or from Henri II.; the "Fontaine des Innocents," a large part of the exterior sculpture of the Louvre, besides works like the caryatids and the "Diana," which are preserved within the building; the figures of the Porte St. Antoine, which are now in Angoulême. It is not necessary to mention the other works which are ascribed to him. Those which are known as authentic must all be regarded as masterpieces, and France after more than three centuries continues to value them as priceless examples of art.

It is strange that investigation cannot solve the mystery of his training. There is a tradition in Rouen that his first master was a Norman sculptor called Quesnel. His style, however, does not recall any Mediæval influence; it came nearer to Greek work than any contemporary sculpture. He could not have seen many of the great examples of Classic art, and we must therefore conclude

that his ideas were derived from a study of Italian examples. The difficulty is not, however, removed, for there is no evidence that he studied in Italy. It would not be impossible for a sculptor of his dexterity to work his way there. Francis I. brought many Italian artists to Fontainebleau. There was likely to be a freemasonry which bound Frenchmen and Italians, and it would not, we think, be difficult for a young man who showed his love for Italian work to obtain introductions by which he would gain admission to foreign studios. For a long time the "Diana" was considered to be a work by Benvenuto Cellini, and it reveals the general resemblance in many of Goujon's works to those of the truculent Italian's. It will bear comparison with the latter's "Nymph" at Fontainebleau. A Greek sculptor would not have treated one of the legs of the goddess in the awkward manner adopted by Goujon, for the left leg is turned back to an extent which a model's sinews would not allow, but otherwise the figure is of immense value.

It was fortunate for Jean Goujon that Pierre Lescot, the great architect, was able to discern his genius. He employed him on the Louvre. The prices he received for his sculpture would now seem very low and far beneath the proper value, but there may have been considerations of which we have no knowledge. For each of the caryatids, which are about 13 feet high, he received for carving 580 francs. For the model he was paid 331 francs, and it had to serve by a change of drapery for the series of four. Evidently Goujon was able to realize that a caryatid, and especially one in the form of a woman, was out of place when supporting a weight. He has elaborated the drapery to a remarkable extent, and the vertical folds appear as so many props. The arms are cut off from a little below the shoulder. The impression conveyed is that the sculptor presented conventional figures, and not portraits of Greek women like those in the Erechtheum. In the sixteenth century the Italian sculptors produced no figures equally satisfactory for the purpose.

It is now impossible to say how much of the sculpture of the Louvre was executed by Jean Goujon's own hands. He could no more carve all the ornament and figures than Phidias could have produced the whole of the Panathenaic frieze and the metopes and pediments of the Parthenon. Certain figures, especially those flanking the *ceils-de-bœuf*, by their peculiar drapery, must be his work. But in other parts journeymen sculptors were likely to have been employed.

Jean Goujon had to leave Paris before the decoration of the Louvre was completed. There are various entries of payments to him, the last being on Sept. 6, 1562. The amount was 716 livres. The massacre of St. Bartholomew did not take place until ten years afterwards. If Goujon was one of the victims, where was he during the interim? It must be remembered that in 1562 the Huguenots were made to suffer, and it is remarkable that there is mention in that year of a Jean Goujon who suffered for his faith. He perished in the flames while exclaiming "Lord, have mercy on me!" The martyr was, however, a worker in wool. It cannot be ascertained whether the victim was a relation of the sculptor, but his fate was likely to compel Jean Goujon to reflect on his position. He fled from France and died in Italy. The discovery of this fact is due to M. Tommaso Sandonni, of Modena. In that city the Inquisition held inquiries relating to the Protestant refugees in Italy. One of the inculpated was Laurent Penis, of Fontainebleau, an engraver on wood and copper. He was employed in various cities of Italy. Among those for whom he worked was a firm of publishers of engravings in Modena. Owing to some dispute between them Penis was denounced as a heretic. He was first examined in 1568; he had to tell the story of his life. He stated that he had lived in Bologna for nine or ten months, and among other places he lodged in a house with "Maestro Gio Goggion, Francese, intagliatore de releve," *i.e.* with the master Jean Goggion, a Frenchman, a sculptor in relief. In another examination he referred to Goujon as being then deceased. There seems to be no doubt from the statement that Jean Goujon's term of exile and his earthly life came to an end between 1564 and 1568, but of him it can be truly said, "Dead he is not, but departed—for the artist never dies."

M. Sandonni's discovery dispels a legend that was long accepted, but it cannot be claimed that much is gained. The slow death of the exile would perhaps be less desirable to Goujon than receiving his quietus from *un coup de carabine*. The French king and his satellites were as much murderers in one case as in the other. France lost a great artist, and it could not be said that Jean Goujon was guilty of any worse act than adherence to the doctrines he believed. M. Jouin has done useful service by re-

newing the interest in the sculptor's history. He conveys a lesson in toleration which Frenchmen would do well to take to heart.—*The Architect.*

COMMUNICATIONS.

DEFECTIVE AMERICAN BRICKLAYING.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs:—I hope that you will kindly give me space in your valuable paper, as a practical bricklayer, to draw attention to the flaws in American brick construction versus brick construction in England, where buildings stand for hundreds of years as monuments to their architects and builders. All builders in America whom I have worked for believe in driving their men so that the bricklaying is slip-shod work. There is no bond to it. They seem to depend on the cement and mortar holding it together; and there are not more than two buildings in every eight erected in this city where the corners are carried plumb, for the men are not given time to do their work properly.

The bonds in England are entirely different from those in America. In regular English bond you start with a header and a 2-inch bat and run three courses of stretchers and one header course, and on an 18-inch wall the header on the outside must be on a level with the header on the inside to afford a proper bond; whereas in the United States they start off with a three-quarter bat on the heading course and run five stretchers between. They do not bond a 16-inch wall properly, because they put the inside header two courses below the outside header; then, when they do not rack up properly, they tooth or block, which is not proper brickwork. Last summer I worked on a convent for the Sisters in Brooklyn, where there was a young fellow acting as inspector. He came from the architect's office, but he admitted that he didn't know how the bullnose arches should be put in properly. He allowed them to go in without mitreing the bullnose.

How many foremen bricklayers here know how to lay out garden-wall bond, broken, Flemish, old English—the strongest of all bonds—English cross, English diamond, and how to start footings without getting straight joints? All they seem to want is to pile brickwork together as fast as possible.

Then take the iron construction. In England they plumb every column before any brickwork goes on to it. If it is not plumb they put asbestos underneath it. Here they bolt or rivet all iron together, and if it is not plumb they rack it plumb with powerful levers, which weakens the whole construction, and even then it is not plumb. I have worked on columns 3 inches out of plumb. The idea of laying brick in the month of July without wetting them before laying them is absurd. I have had to lay brick here in cement on scores of jobs without ever wetting them in the hot summer months.

Hoping that you will kindly note these in your valuable paper, I remain

Yours truly,

WILLIAM ADAIR.

SHORING AND UNDERPINNING.

October 11, 1905.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Sirs:—Please answer the following through the columns of your reliable journal: A is owner of property with division wall on lot line; B is A's tenant and his lease reads: "B shall do all repairs and improvements." C is owner of adjoining property and will erect a large building with basement 7 feet deeper than that in A's building. Who should do the shoring and underpinning of A's wall and who should pay for same? What is the customary usage in New York and in Boston?

Respectfully,

N. W.

[We cannot conceive that B, the tenant, has any concern in the matter. By his lease, to be sure, he is called on to repair damages, but until damages have occurred he has nothing to do. If his landlord consents to the creation of damages caused by this particular form of operation, thinking he can compel his tenant to make them good, we believe he would find himself seriously mistaken. Fortunately it is, for the moment, hardly more A's concern than B's. The owner of the adjacent property, C, the man who intends to dig a deep cellar, is the one who, for the moment, must be at the full expense of protecting the property of his neighbor A and the life of the tenant C, unless he can first come to some joint agreement with A as to sharing the cost of shoring and underpinning. Even if he were to keep his own excavation and foundation work absolutely within the line of his own lot, he would have no right to deprive his neighbor's building of its lateral support. But the theory is that each owner of adjacent lots is entitled to the fullest use and enjoyment of his own property, and A could not say to C: "You shall not dig lower than my foundations, since you will expose my property to risk." All he can say is: "You must exercise all proper care and diligence that your operations may not inflict injury on me." As in the case of party-wall operations above ground, matters of underpinning are usually arranged between owners by special previous agreement, the theory being that ultimately both owners will

profit equally by the outlay that momentarily is undertaken solely for the benefit of one of them. In this case, C will probably secure from A an undertaking that, if at any time the excavation of A's lot shall be carried down to the same grade as C's, he shall then pay half the cost of the underpinning C is about to embark on and so be able to use the party-wall for his own heavier building. A case in point is to be seen just now in the great excavation for the Grand Central Station, in this city, where, completely isolated on three sides, there is standing a single dwelling-house, the owners of which have been unwilling to come to terms with the railroad company, and consequently the latter, having no right to deprive the house of its lateral support, have been put to considerable cost to shore it so that it would not fall into the surrounding excavation, some fifteen feet below.—EDS. AM. ARCHITECT.]

ROMAN NOTATION.

KANSAS CITY, Mo., Oct. 13, 1905.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs:—I beg to submit that in the editorial paragraph of your issue of October 7th you have gone astray regarding Roman Numerals. The Roman System of Numerals is constructed according to a very definite system of rules, by which it is not proper to write MDCCCLV for 1905. According to this system, there is but one proper way of writing any given number. In this case 1905 should be written MCMV. You would hardly write VIII for nine or XVIII for nineteen and, unless you are prepared to do so, you will have to abandon MDCCCC for nineteen hundred. This matter was threshed out here some four years ago in connection with the erection of a prominent public building. At that time the writer gave the press a complete digest of the Roman System. The architect, however, was not satisfied and finally referred the matter to the authorities of the British Museum, who upheld the writer in every particular.

Yours truly,

BIXBY WILLIS.

[As the paragraph referred to expressed the opinion that the shorter form—the one our correspondent upholds—was the "more scholarly," we feel we can hardly be convicted of having "gone astray." The matter is one upon which authorities and scholars hold divergent opinions, and amongst those who admit, while they do not indorse, the use of the longer form is, we believe, the Institut de France, or rather its Académie des Inscriptions et Belles Lettres.—EDS. AM. ARCHITECT.]

ILLUSTRATIONS.

HOUSE OF GUSTAV BAUMAN, ESQ., BELLE HAVEN, GREENWICH, CONN.

MESSRS. WOODMAN & HARRIS, ARCHITECTS, PHILADELPHIA, PA.

HOUSE OF EMIL BOAS, ESQ., GREENWICH, CONN. MESSRS. KIRBY, PETIT & GREEN, ARCHITECTS, NEW YORK, N. Y.

ITALIAN LOGGIAS: THE LOGGETTA AT THE FOOT OF THE CAMPANILE OF ST. MARK, VENICE.—THE LOGGIA DELLA SIGNORIA, FLORENCE, ITALY.

See article elsewhere in this issue.

ITALIAN LOGGIAS: FORO DEI MERCANTI, BOLOGNA.—LOGGIA DEI MERCANTI, SIENA.

See article elsewhere in this issue.

HAMILTON COURT, 39TH AND CHESTNUT STREETS, PHILADELPHIA, PA. MESSRS. MILLIGAN & WEBER, ARCHITECTS, PHILADELPHIA, PA.

THE LOGGIAS: HAMILTON COURT, PHILADELPHIA, PA.

BROADWAY FRONT: NATIONAL PARK BANK, NEW YORK, N. Y. MR. DONN BARBER, ARCHITECT, NEW YORK, N. Y.

INTERIOR OF THE NATIONAL PARK BANK, NEW YORK, N. Y.

Additional Illustrations in the International Edition.

NORTH AND SOUTH WALES BANK, LIVERPOOL, ENG. MR. J. F. DOYLE, ARCHITECT.—STUDY FOR HOSE-TOWER, MANCHESTER, ENG.

MESSRS. WOODHOUSE, WILLOUGHBY AND LANGHAM,

ASSOCIATED ARCHITECTS.

The first of these subjects is copied from *The Stone Trades Journal*, the other from *Building News*.

THE WESTERN THEOLOGICAL COLLEGE, BRISTOL, ENG. MR. H. DARE, BRYAN, ARCHITECT.

This plate, which is copied from *The Builder*, shows a remarkable attempt, and a rather successful one, too, to disguise and misinterpret a sensible and ingenious plan.

DWELLING-HOUSES ON THE FRANZ-JOSEF STREET, MUNICH, BAVARIA. HERR MARTIN DÜLFER, ARCHITECT.

This plate, which is copied from *Blätter für Architektur*, offers suggestions as to the treatment of wall-surfaces rendered with stucco or finished in concrete.

DESIGN FOR A VOTIVE CHURCH IN BRITANNY.

We regret that we cannot ascribe this amusing flight of fancy, which is copied from *l'Architecture*, to its author, as we have carelessly mislaid the original plate.

COMPETITIVE DESIGN FOR UNIVERSITY COLLEGE SCHOOL, FROGNAL HAMPSTEAD, ENG. MR. PAUL WATERHOUSE, ARCHITECT.

This plate, which also is copied from *The Builder*, clearly shows that not a little of Mr. Alfred Waterhouse's prowess as a deviser

of ingenious and economical plans has descended to his son and successor.

OFFICES ON THE COURTYARD OF THE ROYAL LAW COURTS, BERLIN, PRUSSIA. HERREN P. THOEMER AND O. SCHMALZ, ARCHITECTS.

This perfect nightmare of a building offers more lessons in eccentric design than any that we have seen of late. Apart from the riotous confusion of the authors' efforts in fenestration, the playful way in which the walling of the flanking towerlets is punched in here and there, as if it were still in the plastic state, shows that there are no limits that can confine the fancy of a German designer once he makes up his mind to break with the precise formalism of engineering conceptions that are more suited to his ordinary ways and habits.

CARVED WOODWORK FORMERLY IN WINCHESTER COLLEGE, ENGLAND.

These subjects are copied from the *Architectural Review* (London).

TWO VIEWS IN THE STAIRCASE HALL: ROYAL LAW COURTS, BERLIN, PRUSSIA.

These subjects are copied from *Zeitschrift für Bauwesen*.

NOTES AND CLIPPINGS.

DEW-PONDS.—A "clipping" was published in this column some weeks ago which merely made mention of the fact that there were such things as dew-ponds in existence and use, but gave no precise information as to just what they were or how they were produced. We are pleased, therefore, to be able to convey from the columns of the *Inland Architect* the following interesting and doubtless authoritative facts relating to a very ingenious method of producing in unexpected places an adequate water supply:

"There is, to this day, at least one gang in England of men whose business it is to construct 'dew-ponds' for farmers who need a more ample and certain supply of water than they have previously possessed.

"To form a dew-pond, a considerable area, much larger than the surface which it is expected to cover with water, is excavated, so as to form a shallow basin, which is then filled with straw. On top of the straw is spread a layer of clay, which is well worked and 'puddled' so as to render it as impervious as possible, and is carried well out over the edge of the basin, so that air cannot circulate under it; and the operation is finished by covering the clay with stones. Water soon begins to collect under the straw, in the middle of the depression, and accumulates until a comparatively ample supply, of the purest quality, is always available at the opening provided for reaching it. This curious phenomenon is said to be due to the operation, on a large scale, of the laws governing the formation of dew. At night, when the sky is cloudless, there is, as we are taught, rapid 'radiation' from the surface of the ground, which cools it so much that the water dissolved in the air in contact with it is deposited, in the form of dewdrops, on all suitable objects. In the dew-ponds, radiation takes place from the surface of the clay covering, assisted, probably, by the unevenness of the stones strewn over the top; and, as the clay is a comparatively good conductor, the lower surface of the stratum is cooled to a temperature below that of the air in contact with it. The moisture present in the air is, therefore, to a certain extent, condensed into drops of water, which fall through the straw to the bottom of the basin. They are prevented from evaporating when the sun rises by the layer of clay over them, and the following night finds the air under the clay more moist than before. In this way the condensed water, or dew, gradually accumulates, until a permanent reserve is formed."

ART AND ITS PUBLIC.—It seems to the "Cosmopolitan" that the recent death of Mr. Alfred Waterhouse called forth a good deal less comment than the man's work entitled it to. He was the architect of the Manchester Town-hall and Assize Courts, of several groups of college buildings at Oxford and Cambridge, and of the Prudential offices and the National Liberal Club in London, to say nothing of his house for the Duke of Westminster near Chester. And yet those notable structures, admired unreservedly in their day, belong to a bygone style that has been superseded by a better one—indeed, by several better ones. The "Cosmopolitan" is therefore a trifle puzzled; ought we, or ought we not, to praise a man for doing things well, but less well than they might have been done? Had Waterhouse died while his work was still in vogue, he would have been lauded to the skies. Now we don't quite know what to say, and so we don't say much. Moreover, as the London *Times* puts it, "Nothing is more difficult than to be perfectly just to those of the artists of to-day and yesterday whom one does not wholly like."

The *Times* then turns to the case of Bouguereau and to that of Henner, and shows how their public betrayed them.

Reaction and revolt—these are what account for the languid tributes to Waterhouse, Henner and Bouguereau. The "Cosmopolitan" therefore advises architects and painters to die before reaction and revolt have set in. It is the tragedy of art that the artist works for the art public and that the art public won't and can't and mustn't stand by the artist—else, where were progress? —"Cosmopolitan" in *Boston Transcript*.

POROSITY AND FROST RESISTANCE OF BRICKS.—The prevailing idea about these qualities is that a brick with high percentage of porosity will crack or burst when soaked with water and afterward exposed to a freezing temperature, due to the expansion of the water when changing to ice. This defect will show itself plainer the higher the percentage of absorption. The conclusions usually following such arguments are that a brick with moderate porosity is preferable for building purposes. It is, therefore, very interesting to know the results of experiments made along this line, and the following table was published by the Royal Technical Experiment Station. The tests were made on ten bricks, and the results are the average of the obtained data. The tests constituted a twenty-five times freezing and consequent thawing. In order to find the frost resistance the bricks were subjected to a compression test, and the percentage resistance was figured from the same. To make the results plain the bricks were arranged in order of their percentage absorption, and in case there is any relationship between porosity and frost resistance the last columns should maintain the same ratio as the absorption column. It is evident from these results that these two qualities do not have anything in common. Increased absorption does not always mean less frost resistance. There are a few exceptions, but the main results are very irregular. No. 2, a nearly vitrified brick, shows the least frost resistance. No. 8 and No. 16 also show great variations. The results in the lowest part of the table are very interesting, as it shows high porosity and high frost resistance. Rather remarkable is the increase in compressibility after freezing in several cases:

No.	Kind of brick.	Absorption percentage.	Compression. Before freezing.	After freezing.	Percentage loss of stability.
1.	Buff face brick	1.32	687	667	-2.9
2.	Paving brick	2.41	764	419	-45.2
3.	Paving brick	3.31	455	432	-5.1
4.	Face brick	3.50	465	411	-11.6
5.	Face brick	4.10	1,197	1,136	-5.1
6.	Hardburnt brick	4.70	508	431	-15.2
7.	Buff face brick	4.98	375	358	-4.5
8.	Face brick	5.63	706	517	-26.8
9.	Paving brick	5.80	342	280	-18.1
10.	Face brick	6.80	227	215	-5.3
11.	Red face brick	6.84	484	469	-3.1
12.	First-class paver	6.90	452	411	-8.9
13.	Common brick	7.70	308	314	+1.9
14.	Face and paving brick	7.82	444	1,488	+9.9
15.	Common brick	8.17	206	211	+2.4
16.	Backing-up brick	8.30	349	270	-22.2
17.	Common brick	8.30	127	103	-18.9
18.	Sewer brick	8.41	439	354	-19.4
19.	Common brick	8.50	252	246	-2.4
20.	Face brick	9.22	374	383	+2.4
21.	Common brick	9.94	554	423	-23.7
22.	Machine paver	10.60	229	232	+1.3
23.	Common brick	10.80	397	271	-31.8
24.	Face brick	11.10	331	310	-6.3
25.	Common brick	11.58	237	227	-4.2
26.	Backing-up brick	12.24	271	205	-24.3
27.	Face brick	12.29	251	237	-5.6
28.	Face brick	12.48	384	315	-17.9
29.	Arch brick	13.20	189	180	-4.7
30.	Common brick	13.30	85	74	-12.3
31.	Common brick	13.46	268	277	+3.3
32.	Machine brick	13.60	369	360	-2.4
33.	Common brick	13.70	207	196	-5.3
34.	Buff face brick	15.16	596	614	+3.0
35.	Backing-up brick	16.31	249	310	+24.4
36.	Backing-up brick	18.85	263	240	-8.8
37.	Machine brick	19.54	218	201	-7.8
38.	Machine brick	19.70	389	356	-8.5
39.	Backing-up brick	22.40	166	172	+3.6
40.	Backing-up brick	24.11	105	101	-3.8

—*Thonindustrie Zeitung*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, OCTOBER 28, 1905.

No. 1557.

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THE preliminary enquiry into the building of the Small-pox Hospital in Philadelphia, to which we referred last week, has resulted in the holding under bonds for trial of the architect, contractors and sundry officials involved in the alleged conspiracy. In addition to the more generally understood methods of securing to themselves a goodly "graft," the contractors in this case seem to have discovered a wholly new way of avoiding performing the work for which they collected the price. Naturally, included in the contractors' contract was the draining and grading of the grounds and as this work was evidently done there was no apparent reason why the city should not pay for it, and so the contractors did receive pay in full on these items. But it appears by the testimony that, by the use of "influence," they had dexterously arranged with the Superintendent that the work should actually be performed by the inmates of the House of Correction without a cent's outlay on their own part. The records of the latter institution show that during two hundred days a gang of ten men from the House of Correction were employed for six hours each day in saving from depletion the bank-account of these very ingenious hangers-on of "the Ring" which Mayor Weaver is endeavoring to destroy.

ONE of the most curious cases of obfuscation we have ever seen is that of the writer of an article in the San Francisco *Post* for September 22. It seems that the report which Mr. Daniel H. Burnham has for several months been preparing on the proper plan to be adopted for the improvement and beautification of the city is intended to be a very elaborate and handsomely illus-

trated affair. The citizens are deeply interested in the project, which has been under discussion for several years, and it is quite proper that the report should be complete and first-class in every way. Naturally, proposals were invited from the printers in the city and as naturally there was universal outcry when it was discovered that the lowest bid came from an "unfair" shop where the wretched slaves employed were actually willing to work nine hours per day in place of the eight ordained by Union magnates. Unfortunately the city charter contains a section which recites that on all city work "eight hours shall be the maximum hours of labor on any calendar day." One would think this ought to settle the matter, but the writer in the *Post* in his indignation goes on in this strain: "Aside from this technical objection, however, is the broader and more important principle that the bid is *in direct competition with nearly every other printing business in the city* [the italics are ours], and that if the award is made the entire taxpaying community will contribute to the support of a business in direct antagonism to Union labor." The *Post* writer's idea of the purposes of competitive bidding seems to be as hazy as his belief in the supreme right of Union Labor is typical of the feeling that prevails in that Union-ridden city.

ANOTHER instance of lack of clarity in reasoning appears in the reply to the recent special report on the results of the operations of the Illinois Tunnel Company which is now made by Mr. George W. Jackson, the general manager. It will be remembered that the result of the filing of the experts' report was the issue of an order that practically put a stop to the operations of the Tunnel Co. pending an agreement with the public authorities as to how the further tunnelling operations shall be conducted. Naturally, it is Mr. Jackson's cue to argue that the settling of buildings along the route of the tunnels is due to some other cause than the tunnelling, and yet while denying that the sinking in question can be caused by his own horizontal bores he asserts the belief that the trouble lies with the buildings and their method of construction and draws attention to the well-known fact that when foundations are prepared by sinking caissons down to bed-rock a settlement of the adjoining building usually results. It seems to us that just here Mr. Jackson proves too much, for every one knows that the back-filling about a vertical caisson can be made more solid than the back-filling about a horizontal tube constructed in a larger horizontal bore hole.

IN his letter, Mr. Jackson expresses views directly in opposition to those we enounced last week as to the duty devolving upon the maker of a deep excavation of preserving the stability of buildings adjacent to it. Mr. Jackson writes: "As I understand the law, any property-holder has a right to construct a building to any depth he may desire on his own property without any liability to adjoining property-holders, simply having to

give notice to adjoining property-holders that he is about to construct a building to such a depth and it is the duty of each property-holder to protect his own building." We believe Mr. Jackson's view is distinctly a misapprehension. The law cannot put a poor man so completely at the mercy of his richer neighbor, as he would be in such a case as this: Suppose that A, a poor man, without money or credit, but yet the owner of a substantial building and the site on which it stands, receives notice that B is to dig a thirty-foot excavation next door and he must look to the securing of his own building, since B will be at no charge in the matter. A cannot and B will not do the needed underpinning and so A's building falls into B's excavation. Is it supposable that, in such a case as this, a jury would not give A damages in full against B? The law will not justify a man in using his own property in such a way as to inflict injury on his neighbor, and this is shown daily by the ease with which nuisances are suppressed on the complaint of adjoining owners, and yet there is nothing unlawful in itself in using one's own property as a shooting-gallery or a boiler-shop.

THE fact that, as we recently recorded, New York City increases in population by about two hundred thousand persons per year is impressive, but not quite so impressive as the fact that in the same city something over two hundred cadavers have to be disposed of each day throughout the year. To be sure, two hundred funeral cortéges do not make much of an impression trickling through the gayety of the usual street scene, but they must have a very depressing effect on the rental value of houses on the routes leading to the ferries. Even disposed of with the severe economy of space that prevails in the Potters' Field, a little figuring will show that a considerable area of ground is permanently withdrawn from use each year, and that very shortly, owing to the demands of the increasing hordes of the living, there will be very little space left for the dead within such easy reach of the centres of life as will make it profitable for undertakers to follow their calling, as it obviously will not be if the time consumed per funeral is to be greatly increased, for the expenses attending death and burial have already reached a limit which the family of average means cannot consent to have exceeded. For this ever-nearing perplexity there is one relief, the general adoption of cremation.

IT was fortunate for the growth of the feeling in favor of cremation that the death of Dr. James R. Chadwick, of Boston—who was killed by a fall from a window a few weeks ago—did not occur before his tact and convinced energy had nursed the Massachusetts Cremation Society to a stature that now promises a long and useful life. We do not know the total number of cremations in this country since, in 1876, the first furnace—an absolutely private undertaking—was established in Washington, Pa., but there were, during the year 1904, thirty-two hundred and twenty cremations effected in the United States at crematories in many cities. Of this number the two crematories of the Massachusetts Cremation Society, at Forest Hills and Mount Auburn, were, next to that at

San Francisco, most largely patronized, and this was due to the skill and industry with which Dr. Chadwick had conducted his propaganda. As compared with the number of incinerations twenty years before, when there were, in the whole country, only twenty-five bodies reduced to ashes, the growth of the practice seems fairly rapid and satisfactory, and promises to gain favor in geometrical rather than arithmetical proportion.

WE have more than once expressed the belief that a mistake is being made in the establishment in this country of so many architectural schools, as the almost inevitable effect of the competition is to prevent or delay the growth of any one of them up to the fullest possible stature. But the present attempt at decentralization of instruction in art in France and the establishment of sundry "*écoles régionales*" show that the existence of a single great school, such as the *École des Beaux-Arts*, is nowadays in France held to have certain disadvantages in that it essentially encourages merely official art and hampers the growth of that which is more purely individualistic. At present, in this country, the leading architectural schools are perhaps too compactly grouped—in Boston, Cambridge, New York, Ithaca and Philadelphia—and a wider geographical distribution of such educational centres would have certain unquestionable advantages, so we believe that in time the architectural departments of Washington University, at St. Louis; Tulane University, at New Orleans, and the University of California, at Palo Alto, will be found to be judiciously distributed with a view to permanent usefulness. The Northwest as yet lacks a similar educational centre. Chicago, where one would naturally expect to find a school that would seriously compete with the older ones in the East, seems to be content with the classes at the Art Institute and the Armour Institute, which, to be sure, are rendering very useful service. Perceiving the lack, and believing in the opportunity, the University of Michigan, at Ann Arbor, one of the great universities of the country, now announces that, "if possible," a chair of architecture is to be added to its department of engineering next year, and we cannot believe that it will be found impossible to procure either the needed endowment or a proper and efficient staff.

THE President of the Architectural Association, Mr. E. Guy Dawber, in his annual address expresses the opinion that there is every reason why architects should "sign" their work after the manner of painters and sculptors everywhere, and in consonance with the modern custom that prevails quite generally amongst architects in Paris and elsewhere on the Continent. It is curious that, when professional opinion both in England and in this country is so generally favorable to this proposed custom, it should make such slow headway in both countries. To our mind the name of John R. Thomas, Architect, modestly cut on a stone in one of the basement courses of the New York Hall of Records adds distinctly to the interest and value of the building, and is in better professional good taste than if found on a bronze or marble tablet inside the vestibule, companied with the names of mayor, aldermen, contractors and politicians.

SOME ITALIAN LOGGIAS.—II.

I ABANDON the Middle Ages in favor of the Renaissance and the times that followed, which, in Italy, are enriched with an unheard of number of loggias. Filippo Brunelleschi, the Columbus of Classic architecture, built the loggia of the Hospital of the Innocents at Florence, a building that has been the model of many a Tuscan loggia. It belongs nearly to the first quarter of the

which is attributed to Brunelleschi and, at any rate, is in the style and taste of that master of Italian architecture. Rich, outside and in, with della Robbian terra-cottas, those who admire the work of that family admire here especially a bas-relief, of incontestable beauty, that represents the meeting of SS. Dominic and Francis.

Florence contributes to our subject a unique monument, the



LOGGIA DI S. PAOLO, FLORENCE.
Brunelleschi, Architect.

14th century (1428), and, embellished as its exterior is with a very poem of graciousness—a cycle of *putti* by Andrea Della Robbia—it seems too fanciful to some who really do not understand the value of clarity and simplicity. Vis-à-vis and a little to one side, Antonio da Sangallo, the elder, followed Brunelleschi,

Loggia degli Uffizi by Giorgio Vasari, whose statue should be found somewhere in the structure, since this Aretine architect and writer here erected his chef d'œuvre, in so far as architecture is concerned—he also practised painting, it must be remembered—for this rank cannot be accorded to the loggias he built at Arezzo,



PORTICO OF STA. MARIA NOVELLA, NEAR AREZZO
Benedetto da Majano, Architect.

building a fine loggia which almost joins the first on the Piazza del Annunziata by means of a very slender portico reared in front of the church of the same name, after a design also by Sangallo. These two loggias have an evident affinity with the Loggia di S. Paolo in the Piazza della Sta. Maria Novella, also at Florence,

his native city, or to the Umilta at Pistoja, which was finished by him.

The loggias Vasari, built at Arezzo (1573-81), followed in point of time those built at Florence (1560-74) and composed a piazza which has a distant resemblance to the Piazza di S. Marco at

Venice. As Vasari could not finish his grand and architectonic monument, the Loggia degli Uffizi, he had successors, but since I have not in other cases taken account of successors to the original designer, so, here I merely mention the originator of the design. I cannot expand the scope of my study, which of itself

Sangallo's loggia thereto opposite, affirms its originality in a frieze by Giovanni Della Robbia, already known to those of my readers who remember my paper on that family.

Of greater merit than this papal loggia at Siena is the Loggia del Mercato at Monte Sansavino, also in Tuscany, which, though



LOGGIA OF THE OSPEDALE DEL CEPP0, PISTOJA.

extends in Tuscany, not only to Arezzo but to Siena and Pistoja, in the first city including the Loggia del Papa, and in the latter the Loggias of the Lyceum Forteguerrri and the Hospital.

The Loggia del Papa, designed in 1460 by Federighi, an artist we do not know much about, is not notable for its originality.

the theme is identical, achieves a vastly better effect. This is the work of Antonio da Sangallo, who also designed the loggia and portico of the Annunziata at Florence, and those who know this loggia at Monte Sansavino have the pleasure of knowing a very noble bit of classic architecture, for it is designed with a charac-



PALAZZO DEL CONSIGLIO, VERONA.
Fra Giocondo, Architect.

The Loggia Forteguerrri, on the other hand, is of a beauty that is less common and recalls Bramante's work, although actually designed, as it appears, by Gherardo Silvani, an architect, who has no great reputation. As to the Loggia del Ospedale, this imitation of the loggias of the Innocents and of S. Paolo, as well as of

teristic treatment of the architrave, a movement that is repeated in another very famous Tuscan loggia, that of Sta. Maria delle Grazie at Arezzo which, just outside the city, sets in the middle of a verdant bit of sward; this loggia is the work of Benedetto da Majano, famous sculptor and well-known architect. The Are-

tine loggia, poorly restored, is attached on three sides to a church begun in 1449 by Domenico del Fattore. About half a century later, Benedetto da Majano built this loggia which holds to his life as architect about the same place as his famous pulpit in Sta. Croce at Florence—a very lyric of love petrified in stone—holds to his life as sculptor.

Near Montemarciano, on the Provincial route styled "Seven Bridges" (Arezzo), there is an oratory called the Oratory of Montemarciano, wherein in his youth Masaccio was to have executed certain paintings. Indeed, there is there a fresco of the Virgin and Saints by the great master. This oratory somewhat recalls Sta. Maria delle Grazie at Arezzo, with its loggia about it, full of charm. The loggia has a less age than the church, since the oratory belongs to the 15th century, while the loggia dates from the following century, being carried out seemingly at the time the oratory was restored.

Once more Tuscany was to see a treasure, thanks to the talent of Giuliano da Majano, in the loggia at Macerata, again "dei Mercanti," erected in 1505. The common ascription is erroneous, and the loggia at Macerata must be assigned to Cassiano di Fabriano.

I will not speak of the loggias of the Vatican, for, to-day, I do not care to be drawn into a discussion of painting, and the great interest of these loggias centres in the frescos painted on the vaults and pilasters by Giuliano Romano, Perino del Vaga, Polidoro da Caravaggio, Gianfrancesco Penni, Giovanni da Udine. I prefer, rather, to speak of the loggia at Brescia, an exquisite creation assigned to Tommaso Formentone, a townsman who, however, only prepared the wooden model in 1489. Luigi Vanvitelli worked on it as late as 1749, and in 1876-1900 there was a lively dispute as to whether it should or should not be restored to its original fifteenth-century condition.

Il Formentone carries us to Vicenza and into Venetia, the home of many an interesting Renaissance loggia.

At Vicenza the loggia in the courtyard of the bishop's palace, not very well known and wrongfully ascribed to Il Formentone, is worthy of attention, if for nothing more than that it brings to light the name of an able artist, hardly known yesterday, Bernardino da Milano, who finished it two years after the death of Il Formentone (1492).

Here at Milan, the "city of columns," according to Sthendal, we are reminded of the picturesque loggia of the "Lazzaretto" which has been destroyed in our own day. Executed in terracotta it, too, recalls the name of a little-known artist, Lazzaro Palazzi, who began the "Lazzaretto" in 1488.

Leaving the metropolis of Lombardy, it is hardly necessary to turn our attention to the story of Sansovino's celebrated loggia at the foot of the Campanile of St. Mark at Venice, which is to be rebuilt from the fragments recovered from the ruins of the great tower. It will be more useful to examine the famous loggia of Fra Giocondo at Verona which belongs to that master of Italian architecture as much, or as little, as the Loggia della Signoria belongs to Orcagna. About this structure we know that the dates relating to it run from 1476 to 1492 and we know the name of many artists who labored on it, such as Leonardo Pellegrini, a certain Gianfrancesco Cipolla, Luigi Cendrara, Daniele Banda, Zenone dei Turchi, and an attempt has been made to recognize Fra Giocondo in a bust on the first story of the structure. But the ascription must be accepted with some reserve. The beauty of the Veronese loggia is enhanced with color and gilding, and from this point of view it may well be taken as a model.

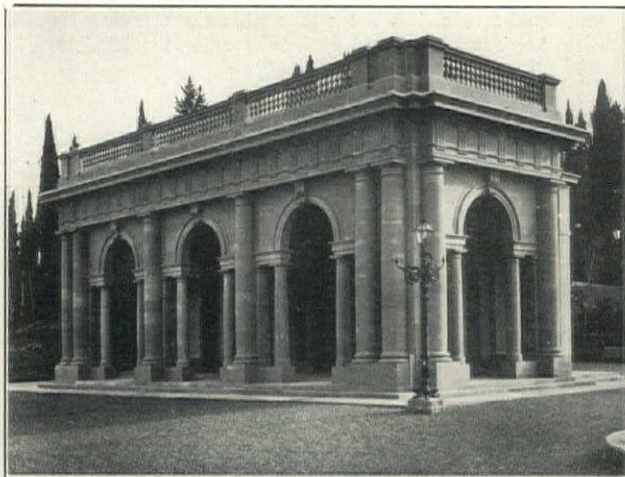
Less famous, the Loggia del Consiglio at Padua—the Veronese building is also assigned to the Council—in the Piazza della Signoria is nevertheless a satisfactory ensemble which was erected in the fifteenth century by Biagio Rossetti, a Ferrarese artist.

The compass and chisel of Venetia, which, during the Renaissance, essentially held possession of Ravenna, have produced for the horizon of our study the Loggia del Giardino Portuensi, and readers who are studying the Italian loggia should not neglect this monument of the Italo-Byzantine Pompeii.

I have to turn now to the Baroco, if I would mention, as I am going to, the Loggia di Mercato Nuovo at Florence, a structure that belongs to the last half of the sixteenth century (1547-51). The lines which Gianbattista del Tasso gave to this loggia, which is only a few steps distant from the Uffizi, border on an art which knows how to produce grand effects: it is remarkable alike for its proportions and its details: the niches which grace its piers have an air of tranquility that halts every person at all sensitive to beauty. The structure is in need of strengthening, and this has lately been ordered.

In the very depths of the fantastic Baroco period, Lorenzo

Bernini had the courage to reveal himself, at the time when he had the vision of the loggias of St. Peter's at Rome, which all the world knows. Every one knows that Bernini, architect, sculptor, painter, caricaturist, revealed himself as the Michael Angelo of the seventeenth century by creating the most scenographic square



LOGGETTA IN THE PIAZZALE MICHELANGIOLLO, FLORENCE.
Prof. Poggi, Architect.

in all Italy, with its enclosing porticos. Two hundred and eighty-four columns and almost a hundred statues combine to introduce one to the most celebrated temple of Christianity, an imposing symphony which resulted from the efforts of such contrasted geniuses as Rossellino, Bramante, Antonio da Sangallo, Michael Angelo, Raphael, Carlo Maderno and Lorenzo Bernini.

And after so much beauty and vital richness came—sterility and anemia. That is to say, there followed the portico of S. Francesco di Paola at Naples, tedious beyond expression: the Gothic eclecticism of Padua with its Loggia Amulea, designed by Ernesto Maestri; the Classicism of Florence—a branch this of the great eclectic tree—with the Loggia Michael Angelo designed by Giuseppe Poggi. This loggia, though better conceived than the one at Padua, none the less exhibits the sterility of invention and the anemia of the nineteenth century to which it belongs; so we cannot admire this art which knows neither force nor faith and expresses itself in an æsthetic impersonalism. Impersonalism is the *cachet* of these loggias that have brought us to Naples, to Padua, to Florence. And yet we must believe that modern art, in spite of the powerlessness that transforms our architects into mere copyists, is really seeking to find in the life that surrounds us the inspiration and the form for a true contemporaneous art.

I am sorry not to be able to point out any Italian loggia that expresses the present movement in art. Perhaps the twentieth century will produce one for our sons. ALFREDO MELANI.

CREMATORIES AND COLUMBARIA.¹

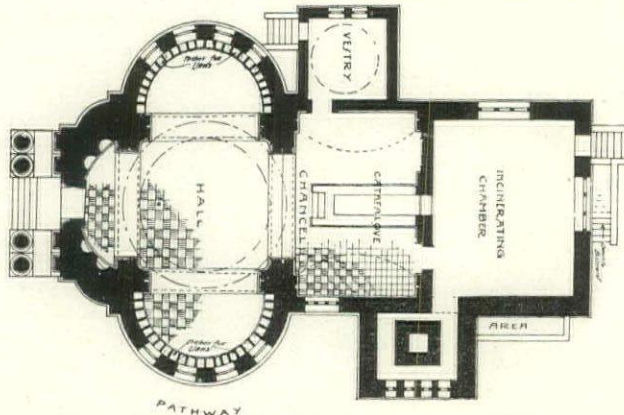
CREMATION was practised by the primitive Aryans, who consigned the bodies of the dead to the flames in the belief that by that means alone the body could be transformed into a spirit. In Rome, from the close of the Republic to the end of the fourth Christian century, burning was the general rule.

At one time all the great nations of the world, the Egyptians, Persians and Chinese excepted, practised cremation. The Egyptians staunchly adhered to their custom of embalming or dismembering their dead, thus rendering them somewhat harmless. In China cremation is, comparatively speaking, a modern practice. There is evidence to show to what extent cremation was practised in this country by the Druids, Celts and the early British; many examples of the urns used by them to preserve the ashes of the dead may be seen in the British Museum.

In 1797 a Jesuit Father, and a member of the Institute of France, proclaimed the necessity of substituting cremation for burial; there was some discussion of the ways and means, and an attempt was made to secure an enactment, but it was futile, and in the end the subject became dormant. In 1866 various papers were published in Italy commending the method of cremation, but it was not until 1872 that any practical experiments were made; in this year Gorini published the results of his experiments. In

¹Extracts from a paper by Mr. Albert C. Freeman, in the *Builders' Journal*.

1873 Professor Brunetti detailed his experience, and exhibited the results with a model of his furnace at the great exhibition at Vienna. In France the adoption of cremation was delayed by the fear of the process affording criminals an opportunity of destroying any trace of their crimes. In 1875 a report was drawn up in favor of cremation by a Commission of Municipal Councilors and Sanitarians, but the police objections nullified it. The agitation, however, continued until 1885, when the Minister of the



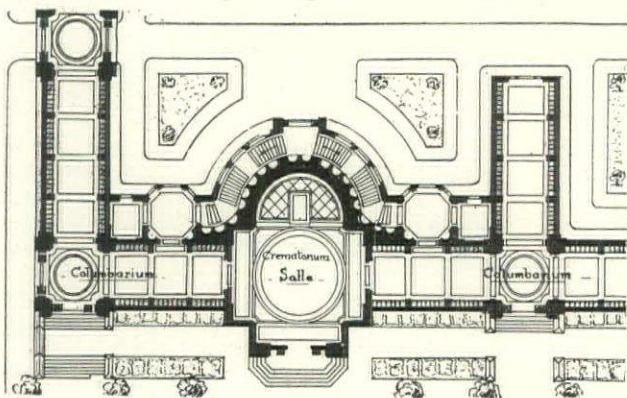
PLANS FOR A CREMATORIUM, BY THE AUTHOR.

Interior gave his permission for the establishment of a crematorium, but to be used merely as an experiment and for cremating the *débris* of the dissecting-room. In 1887 the law was so amended that any person in a position to dispose of his worldly belongings by will was given complete option in respect to the burial or burning of his body after death. In 1889 there were forty-nine cremations at the Paris Municipal Crematorium; in 1903 the number had reached 306.

The history of cremation in Great Britain dates back to 1874, when the late Sir Henry Thompson contributed an article to the *Contemporary Review*, describing the process and arguing strongly in favor of its adoption. A society was formed for the purpose of advocating cremation in April, 1874.

In 1879 the crematorium at Woking was erected, but as the Home Office prevented its utilization it lay idle for several years. In 1882 the council of the Society was requested by Captain Hanham, of Blandford, Dorsetshire, to undertake the cremation of two deceased members of his family who had left express instructions to that effect. The Society being unable to undertake the cremation, Captain Hanham then erected a crematorium upon his own estate, in which the wishes of his relatives were successfully carried out. He died a year later, his body being cremated in the same furnace.

The Government entered no protest against this operation. In 1883 a cremation having taken place in Wales in defiance of the



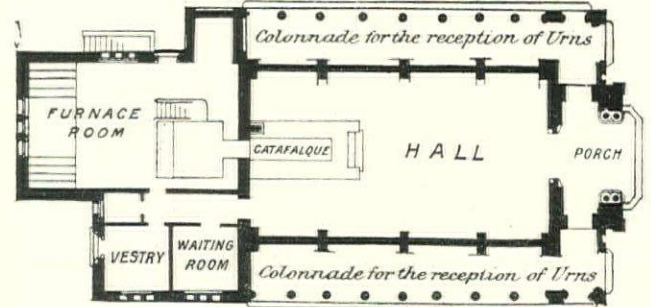
CREMATORIUM AND COLUMBARIA, GENEVA, SWITZERLAND.
J. Brocher, Architect.

coroner's authority, legal proceedings were consequently instituted. These resulted in 1884 in the decision of Mr. Justice Stephens declaring that cremation was a legal procedure, provided it be effected without nuisance to others.

In April, 1884, the House of Commons refused to pass a bill providing for the regulation of cremation. The Cremation Society of England, however, backed-up by the decision of Mr. Justice Stephen, announced that the crematorium at Woking was at the service of the public, providing certain conditions were complied with.

On March 20, 1885, the Woking Crematorium was used for the first time; during that year three bodies were cremated. Since then crematoria have been erected at Golders Green, N. W., Liverpool, Manchester, Sheffield, Birmingham, Hull, Leicester, Bradford, Ilford (for the city of London), Darlington, Headingly and Glasgow. The total number of cremations in this country to the end of 1904 was 4,407. Crematoria are contemplated at Newport (Mon.), Harrogate and Hornsey.

Cremation was introduced into Germany at Gotha in 1878, since which time several crematoria have been erected. The first cre-

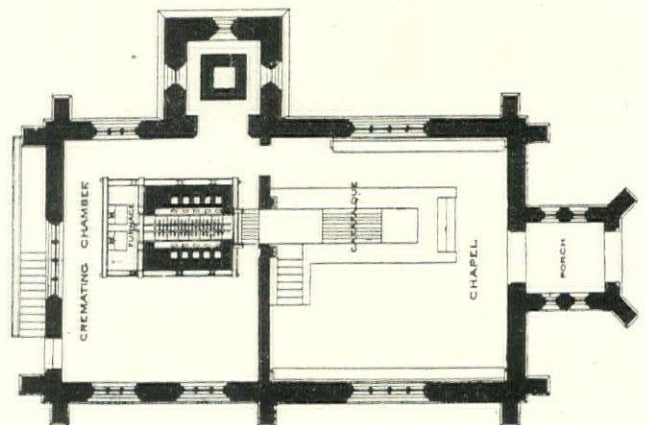


MANCHESTER CREMATORIUM.
Salomons & Steinhall, Architects.

mation took place in 1878; up to the end of 1903, 7,551 incinerations have been performed.

The first cremation took place in Switzerland in 1899, and up to the present over 1,400 bodies have been cremated. In Denmark the first was in 1893, and up to the present the total is 275. In Sweden the first was in 1887, and up to the end of 1903 the total is 915.

Cremation in the United States dates back to 1873, when it was proposed that a crematorium should be erected in New York, but the idea was not carried out. The first building was erected in 1876 by Dr. F. Julius Le Moyné, of Washington, Pa.; it was primarily designed for the cremation of his own body, but, to create interest in the subject and to assist the education of the question, he permitted its occasional use; it was utilized for the first time in December, 1876, when the body of Baron de Palm was cremated. For eight years this crematorium was the only one on the American Continent. In 1884 the second was erected at Lancaster, where three bodies were cremated during the first year; the year following the New York and Buffalo crematoria were erected, when nine bodies were cremated in the first mentioned and one in the second. Since that time year after year has seen more crematoria erected, until now there are twenty-five at the service of the public. In 1902 the total number of bodies cremated in the United States of America was 3,105, and from the commence-



HULL CREMATORIUM.
A. E. White, City Engineer.

ment up to the end of 1902, 19,071. (The complete statistics of 1903 and 1904 I am at present unable to obtain).

The first crematorium to be erected in Canada was at Montreal in 1902, and in Australia, at Adelaide, in 1903.

The indifference on the subject of cremation, we must conclude, is in a large measure due to ignorance. We may now inquire as to the process of cremation and what constitutes a crematorium and columbarium. The body is placed during the service upon a catafalque or table. When the committal sentence is reached the shell is either withdrawn through an opening at the

rear or lowered by noiseless mechanical means to the cremating-room, where it is deposited on a carriage which conveys it to the incinerating-chamber of the furnace. No flames touch it; it is placed in a chamber which presents a bright orange-colored tint, and is destroyed purely by the agency of gases generated either by the use of coal, coke or gas. In the course of an hour and a half the remains, which are in the form of ashes, are swept by an asbestos brush into the urn which is placed below the heated chamber. The remains are afterward sealed and handed to the representatives of the mourners, to be subsequently deposited in the niche of a chapel, colonnade or columbarium, or may be buried in the earth.

Among the subjects upon which the profession does not possess any great amount of knowledge, and which is before long bound to become not only an interesting but a profitable addition to architectural practice, is the design of crematoria and columbaria. Speaking generally, the following provision should be made in the planning of a crematorium: A chapel or cremating hall, incinerating-chamber, vestry and a waiting-room for the use of those relatives or friends anxious to remain until the body has been reduced to ashes.

As these buildings are invariably unconsecrated, it is immaterial whether or not they are placed upon the site with a due easterly aspect; at the same time I should certainly advocate that every building be planned so that the head of the catafalque or entrance into the incinerating chamber be arranged to face due east. The cremating hall or chapel should be planned with a minimum floor space of 1,200 feet super., this being exclusive of that space occupied by the catafalque or table upon which the body is placed during the service.

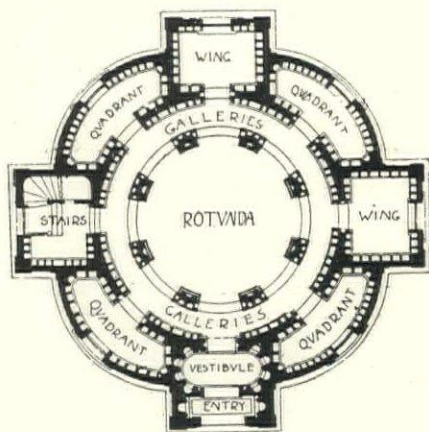
I have found in most of the foreign crematoria that niches are provided in the walls of the chapel for the reception of urns, thus making a combination of a crematorium and columbarium.

The plan by the author, above, shows a crematorium, with hall, incinerating-chamber and vestry; in this case the incinerating-

to suit the working of both Messrs. Simon's and Toisoul, Fradet & Co.'s furnaces, 60 feet will be found satisfactory. It is advisable to clothe the chimney with a tower and avoid the sight of a feature which is anything but artistic, however well treated.

In the planning of columbaria it is the general practice to arrange a large hall with the external walls honeycombed with niches or latebræ.

The vase-shaped urns measure about 1 foot 6 inches high, and those of the box-shape measure 16 inches by 8 inches and are 8 inches high. The only columbaria in this country are at Golders Green and Liverpool, but neither can be taken as a good example. There is a columbarium in the Hedon Road Cemetery, Hull, which is constructed in the form of a grotto; it is both picturesque and original. The Liverpool columbarium is arranged in the crypt under the chapel, and



I. O. F. COLUMBARIUM, SAN FRANCISCO, CAL.
B. J. S. Cahill, Architect.

has provision for upward of 480 urns. In the Manchester crematorium provision is made for the reception of urns both on the inside and outside of the external walls of the chapel, those on the outside being protected from the weather by colonnades.

The most magnificent building in existence is that of the Odd Fellows' Cemetery Company at San Francisco.

This building is planned with a large rotunda, having four quadrants leading from the same; it is arranged in two stories, and has provision for upward of 5,000 niches of great variety both in size and style.

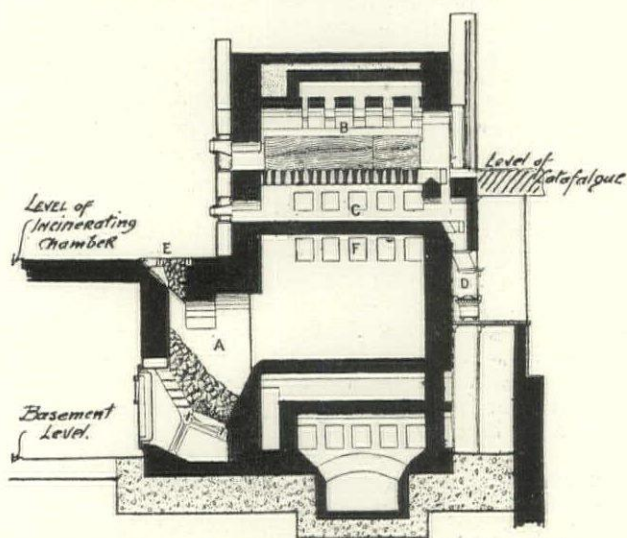
It is essential in planning a columbarium to arrange all niches so that they are easy of access. The front of each is enclosed with marble or beveled plate-glass, held in position by means of detachable copper or bronze frames, the interior being tinted, frescoed or draped.

EXCAVATIONS IN UPPER EGYPT.

THE expedition which left England at Christmas-time last year to make excavations between Edfu and Esna in Upper Egypt has returned, and the objects of antiquity discovered have arrived in England, after a somewhat prolonged season, says Mr. John Garstang, in the *Times*.

Hierakonpolis, the home of Egypt's earliest kings, was the palace selected for the first investigation. The palace site is well known from the researches of former explorers, and consequently the present excavations were made rather in the outlying township, which proved to be almost wholly of protodynastic age. Immediately below the rubbish of more recent times, strata representing the third and earlier dynasties were come upon; it was even possible in some instances to trace the walls of houses and the disposition of rooms and passages of that remote date, about 3000 B. C. Vases of alabaster and granite, as well as flint knives of conspicuously delicate workmanship, and other small objects, served to illustrate the archaeology of the time and locality. As the dry season came on, however, the ground in general proved too hard for the careful excavation demanded by so important a site, and work thereon was postponed until a more favorable season.

Meanwhile, within the great fortress which stands immediately opposite upon the edge of the western desert, and seems to have been built in a contemporary age for the protection of this palace, it was found by experiment that previous excavators had not penetrated deeply enough to reach its lowest historical strata. At a depth which varied according to the accumulation of sand from two to three metres below the existing surface, a whole necropolis of the prehistoric age was discovered and excavated; 188 graves were registered and photographed in detail. They seem to range in date from about the middle portion of the predynastic sequence until the beginning of the first dynasty. In themselves they have provided much that is of interest, and in relation to the walls of the fortress, associated



FURNACE OF THE BIRMINGHAM CREMATORIUM.

chamber is arranged on the same level as the chapel or hall. Some designers consider it a more advisable plan to arrange the whole of the cremating apparatus in the basement under the chapel, or at a lower level than the latter, so that when the committal sentence in the funeral service—"ashes to ashes"—is reached the coffin is automatically lowered as in earth-burial, instead of being drawn through the opening at the end of the catafalque. It is, however, necessary in all cases to provide a basement to receive the lower portion of the incinerating furnace, the stoking of the apparatus being performed at this lower level (see section on this page), which should have a height of about 7 feet. The majority of the foreign crematoria have their cremating-chambers under the chapels, or at a lower level than the same. In Great Britain, with the exception of Glasgow, they are placed on the same level as the chapels.

The incinerating-chamber, when planned for a single furnace, should be 35 feet 6 inches long and 21 feet in width; when two or more furnaces are provided, then the superficial area will be increased in proportion. The chimney-shaft should be arranged in as close proximity to the cremating furnace as possible; it should be erected to a minimum height of 60 feet. Some of the crematoria chimneys are carried up to a greater height; for instance, the Hull Municipal Crematorium chimney is 70 feet, but,

with the tomb structures of later date upon the outside, have furnished reliable evidence that the fortress itself belongs to a date lying between the first and third dynasties.

At the completion of that excavation, after nearly two months of work, explorations were made throughout the whole region lying southward as far as Hissayeh. Tentative excavations were made at several points. At Edfu the remains seem to be of Ptolemaic times, while at Hissayeh some interesting funereal furniture and hieroglyphic papyri of pre-Ptolemaic date were discovered in the débris of a former excavation. Plundering during very recent times had rendered these sites unsuitable for the continuous work of an organized expedition; consequently, after the third month, camp was fixed at Esna on the northern limit of the concession.

As is often the case, rumors that the place had been plundered had in some measure saved it for the excavators. The smaller tombs of the great necropolis at once gave evidence of their origin during the Hyksos period; it seems probable (though the results of further excavations must be awaited before a definite conclusion can be established) that the site came into being during the pressure from the north in those troubled times upon the capital at Thebes. During the prosperous era of the Egyptian monarchy which followed—the age of the Pharaohs of the eighteenth and nineteenth dynasties—the site at Esna seems to have fallen into neglect; but from the twentieth dynasty, which heralded the period of the decline of the Egyptian power, about 1000 B. C., Esna again came into prominence.

Two great mounds, conspicuous in the desert from afar, proved to be tomb structures of this later date. These, cleared of their accumulated sand, disclosed great structures of brick in good preservation, which comprised a series of eight or ten chambers upon the ground floor with a stairway leading up to a similar series above. The arches and vaults were pointed, in nearly every case. In a stone-lined chamber within the largest structure there was found the head of an *apis* carved in stone, of the time of Rameses VI.; and numerous remains of animals sacrificed at that shrine were found within the chamber. These structures were in reality great tombs, built, it would seem, for the permanent use of some family. Unfortunately, a conflagration within the chambers, which seemed to have been deliberately brought about, had destroyed much archaeological evidence; but the architecture illustrated is of a new interest. The largest of these tombs stood upon a base 14.8 metres (nearly 50 feet) square; and its height was half its length, measured from its lowest course, deep in the sand, to the existing summit, which seems to be original.

ILLUSTRATIONS.

FIFTH CHURCH OF CHRIST, SCIENTIST, MADISON AVENUE, CHICAGO, ILL. MR. S. S. BEMAN, ARCHITECT, CHICAGO, ILL.

The building is 165 feet deep and 100 feet front, and is built of Bedford stone. The first story is devoted to a large corridor or inner vestibule, containing the cloak-rooms, toilet-rooms, Sunday-schools, etc. The main auditorium, seating 1,500 people, is above this corridor, and is approached through it.

The building is practically fireproof, the floors being of reinforced concrete and mosaic. It is heated by steam and lighted by electricity. Cost, \$125,000.

ENTRANCE TO HOUSE OF DR. HENRY P. JAUQUES, LENOX, MASS. MR. GEORGE C. HARDING, ARCHITECT, PITTSFIELD, MASS.

IMPROVEMENTS FOR THE CITY OF SCRANTON, PA.: PERSPECTIVE VIEW AND ELEVATION OF MARKET. MESSRS. EDWARD HERBERT DAVIS AND JAMES E. COOPER, ASSOCIATED ARCHITECTS, SCRANTON, PA.

PLAN OF THE SAME IMPROVEMENTS.

SAME IMPROVEMENTS: RAILWAY STATION AND SECTION AND STORE FRONTS.

ITALIAN LOGGIAS: LOGGIA DI MERCATO NUOVO, FLORENCE. G. B. DEL TASSO, ARCHITECT.—LOGGIA DEL MERCATO, MONTE SAN SAVINO. ANTONIO DA SANGALLO, ARCHITECT.

ITALIAN LOGGIAS: LOGGIA DEL CONSIGLIO, PADUA.—LOGGIA IN THE COURTYARD OF THE BISHOP'S PALACE, VICENZA.

WASHINGTON MONUMENT, PHILADELPHIA, PA. HERR LEOPOLD RUDOLF SIEMERING, SCULPTOR.

Although this group was installed several years ago, we have never illustrated it, save by an unsatisfactory pen-and-ink sketch. Its erection is mainly due to the efforts of the Society of the

Cincinnati, who organized a competition for the monument as early as 1870.

Additional Illustrations in the International Edition.

MAIN ENTRANCE: HOUSE OF W. CAMPBELL CLARK, ESQ., BROAD STREET, NEWARK, N. J. MESSRS. HOWARD & CAULDWELL, ARCHITECTS.

A general view of this house will be found in our issue for September 16.

NOTES AND CLIPPINGS.

LONDON'S STREET GROWTH.—London was increased during the year by 374 new streets, with a total length of over seventy-four miles, and 23,269 new houses were built.

NO PICKETING LAWFUL.—"There is no such thing as peaceful, polite and gentlemanly picketing, any more than there can be peaceful mobbing or lawful lynching," declared Judge F. A. Smith, of the Appellate Court, a few days ago, in deciding against Franklin Union of Press Feeders and three members who had been fined \$100 each and sentenced to thirty days' imprisonment for violation of an injunction secured by the Chicago Typothete. The cases of Fred Kitchel, Charles Smith and John Mucher were taken to the Appellate Court by Franklin Union, against which, as an organization, a decree imposing a fine of \$1,000 had been entered. This decree is affirmed by the Appellate Court.

PROPOSED MINISTRY OF FINE ARTS FOR ENGLAND.—An article contributed recently by Mr. M. H. Spielman to the *Burlington* entered a plea for a new governmental department in England, to be called the Ministry of Fine Arts. Mr. Spielman now returns to the same charge with a paper in the *Nineteenth Century*, in which he develops his argument at greater length. The points of the discussion, the various advantages and disadvantages that might accrue under national control of the arts, are too many to be taken up here, but we may quote his closing paragraph as a summary of his opinion:

"The main point is that with a Ministry of Fine Arts there would be a homogeneity hitherto unknown in the administration of the art affairs of the nation, who would be taught to understand the educative, civilizing and commercial value of art in a way, of which there is now too little sign. With this general co-ordination and rearrangement there would certainly be a saving of energy and probably of expense, and a powerful agency for the encouragement of art and artists would be created such as we see abroad. What the outcome would be is not difficult to foresee; we should witness the greater prosperity of the artist and a vast improvement in public taste, and an advance in art production which would give the full measure of the art genius of the nation and beautify our cities and our homes and add considerably to the happiness of our national life."

RAPHAEL'S ACTS OF THE APOSTLES IN TAPESTRY.—An official statement has been published by H. M. Board of Works concerning the tapestries presented to the Commissioners of his Majesty's Works by the Baron d'Erlanger, of Paris, and exhibited in the Cartoon Gallery at Hampton Court Palace. The tapestries form part of a series made by Jeno Raes at Brussels in the 17th century. They are after the famous Raphael cartoons, representing the Acts of the Apostles, which were produced at the instance of Pope Leo X. Seven of these original drawings are in the possession of the nation, and may be seen at the South Kensington Museum. They were formerly exhibited at Hampton Court, in the gallery where the tapestries are now placed. The tapestries formed part of the collection of the Duc d'Albe, which was dispersed in 1877. They were then in thirteen pieces, four of the subjects having been cut and made into two panels. These have now been rejoined, and the tapestries thoroughly restored under the Baron's direction and at his expense. There are, therefore, nine complete panels, of which seven are exhibited in the gallery at Hampton Court, which was expressly designed by Sir C. Wren for the display of cartoons from which the subjects were taken. The subjects are: 1, St. Paul preaching at Athens; 2, the Death of Ananias; 3, the Miraculous Draught of Fishes; 4, Christ delivering the Keys of the Church to St. Peter; 5, Sergius Paulus, Roman Proconsul, converted by the miracles of St. Paul (Elymas the sorcerer struck with blindness); 6, St. Peter and St. John at the Beautiful Gate of the Temple; 7, St. Paul and Barnabas at Lystra—the Priests offering Sacrifices to them; 8, the Martyrdom of St. Stephen, and 9, the Conversion of St. Paul.—*Building News*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, NOVEMBER 4, 1905.

No. 1558.

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ONE of the most serious errors of judgment, as things turned out, with which the writer has to charge himself is the advising James R. Osgood & Co., more than a quarter of a century ago, against accepting for publication the material offered by Mr. F. E. Kidder as the base for a hand-book of architecture. The manuscript offered, which consisted largely of clippings from trade-catalogues and circulars, illustrated with the crude wood-cuts of those days, was simply frightfully "impossible," and it seemed grotesquely absurd that a raw boy of twenty, who had just graduated from a small "down East" college, should have the effrontery to think that anything he could compile or invent had the remotest chance of displacing the ever-useful "Trautwine's Civil Engineer's Pocket-book," the vade-mecum of those days. But Mr. Kidder believed more in himself and the opportunities than he did in the writer's appreciation of him and, so, kept steadily at work on his pet project, getting more material together and working it up into better shape till, finally, it reached fairly useful and acceptable form. At length, in the year 1884, Messrs. John Wiley & Son brought out the first edition of Kidder's "Architects' and Builders' Pocket-book," which achieved an immediate success—a result which might have been more doubtful if the purchasers had but known the youth and real inexperience of the author—and now, after twenty years, has been issued in a fourteenth edition, wholly rewritten and in bulk and real value being to the first edition about as five to one. How many more editions of this now standard work there may be, no one can tell; but the author's death will throw into the hands of others the task of making future revisions and corrections.

FRANK E. KIDDER, who last week died at Denver, Colo., in the forty-sixth year of his age, was born in Bangor, Me., and graduated at Maine State College as a civil engineer in his twentieth year. Later,

he studied architecture at Cornell University and at the Massachusetts Institute of Technology, and after the usual training in the offices attempted to establish himself in practice in Boston. But an unfortunate weakness of the lungs made it necessary to seek safer climatic conditions and sixteen years ago he established himself in Denver, where he gradually attained the standing of one of the safest and most reliable of practitioners. His real work in life, however, was rather that of the consulting, as distinguished from the designing, architect, and above all was he interested in his "Pocket-book" and the other literary work that naturally grew out of it; for it was not long after the appearance of the first edition of this work before he found himself welcomed as a contributor to architectural and engineering periodicals,—less often to our own pages than to others, we fancy, because of a recollection on his part that in earlier years we had, as it were, "turned him down." Besides his "Pocket-book" and a not very "precious" work on "Churches and Chapels," Mr. Kidder was the author of "Building Construction and Superintendence," a standard work of great value—of which the third volume is now but just in press—based as to method of presentation very largely on Rivington's well-known "Notes on Building Construction."

WE do not recall with what definiteness the by-laws of the American Institute of Architects rule on the matter, but it is an accepted precept in all architectural societies that it is "unprofessional" for any of their members to have a mercantile interest in the manufacture or sale of any material or apparatus that may be employed in building operations. For this reason, Mr. P. B. Wight and Mr. J. P. Putnam, amongst others, withdrew from the Institute at the time when they, measurably, "went into trade," the former as a pioneer in fireproof building, and the latter as manufacturer of the sanitary plumbing appliances he had invented. Both of these gentlemen at a later day abandoned their mercantile interests and recovered membership in the Institute. The reason for such resignations from professional societies—the custom obtains with the engineering and medical associations as well—is the same that compels public officials to withdraw from partnership in business firms which may presumably, or even only possibly, have occasion to bid on public contracts. The agent, whether acting for the public or for an individual, must be above suspicion.

THE latest case of an architect's withdrawing from a business entanglement—of course the dilemma presents two horns for his choice—is that of Mr. F. S. Barnum, who holds the office of architect to the Board of Education of Cleveland, O., who, at the suggestion of the City Solicitor, resigns his position as vice-president of a corporation engaged in the manufacture of concrete blocks. The City Solicitor, whose opinion was sought by the School Director, makes it plain that Mr.

Barnum was not doing anything unlawful, for the fact was that there were plenty of other concerns who could supply concrete blocks that would as perfectly comply with the specifications that Mr. Barnum officially prepared. He puts the case very fairly when, after promising that it is of the "utmost importance that every element and appearance of good faith and fairness should be preserved," he goes on to say that Mr. Barnum would do well to resign his office in the manufacturing concern, not because his "occupancy of such official position would in any way affect Mr. Barnum's judgment, but for the reason that the contractors might be tempted to believe that they could ingratiate themselves with Mr. Barnum and elude fair and painstaking inspection and supervision of their work at his hands, by availing themselves of the option which permitted them to use materials manufactured by the company of which he was an officer." As it was easy for Mr. Barnum to see that the existence of any such assumption, however foundationless, would be prejudicial to his professional standing, he at once withdrew from his connection with the concrete-block makers.

BY a very curious sort of transaction, the several steps of which we do not clearly understand, the French Government has just come into possession of the beautiful Château d'Azay-le-Rideau, in the valley of the Loire, which was erected in 1521. The head of the Biencourt family, which has owned the château ever since 1788, recently decided to sell the property and there was naturally a hope that, as the château was already a "monument historique," it would be purchased by the Government. Unfortunately there were no funds which could be applied to the purpose. At this juncture the present head of the Ministry of Fine Arts bethought him that some two years ago there was bequeathed to the Nation a certain Château de Vez—an interesting enough building but hardly in the same class with the one at Azay-le-Rideau—together with an endowment, the income from which was enough to keep the building in excellent repair. Just how the transubstantiation was brought about we do not know, but the result of the minister's reflection seems to be that the family of the former owner of the Château de Vez have once more entered on possession of that building and the endowment intended for its up-keep, while in return they seem to have provided the Government with enough money to effect the coveted purchase of the Château d'Azay-le-Rideau, which is now National property. The transactions must have been conducted with the most absolute discretion on the part of the governmental negotiators, as there certainly seems to have been a possibility that the family pride of the present owners of the less desirable building at Vez might have given way before the unexpected possibility of acquiring in its stead one of the masterpieces of architecture of the time of Francis First.

JUDGING from a conversation recently had with M. E. Bénard, the architect of the Legislative Palace now building for the Republic of Mexico, he is much disappointed in that he cannot find justification for placing in this country the contract for the thousands of

tons of structural steel which the building of that great structure will consume. If we had but known his dilemma in time, we might have whispered to him that his proper course was to make a contract for the needed material laid down, say, at Brest. Reshipment by tramp steamers to Vera Cruz would eat up but a small part of the saving between the price of American steel intended for home and for European consumption, and he would find his thousands of tons of American steel finally delivered at Mexico with a saving of thousands of dollars on the price which now repels him.

THE tearing down of the Plaza Hotel in New York, within the past few weeks, has furnished further satisfactory proof as to the lasting quality of the modern steel-skeleton building. The hotel was built about 1879, so it is more probable that the metalwork was rolled iron than mild steel, but the evidence is favorable in either case. The essential fact disclosed is that the metalwork everywhere was found in excellent condition, even the floor-beams of the kitchen and laundry, where there was much chance of moisture reaching them, as was shown by the rotted condition of the flooring and other woodwork, being quite unaffected by rust. This condition of the metal surfaces was all the more noteworthy because of the fact that the framework had not been protected by paint or any form of preservative compound.

WHEN it comes to the matter of municipal ownership, architects have, temporarily at least, an interest which is as great as that of any other class of citizens. If, to the schoolhouses, the fire-engine houses, the hospitals, libraries, and other municipal buildings already normally owned by the municipality, there shall be added the light-and-power stations, the electric and steam railroad buildings, the telephone exchanges and express offices, it will be seen that architects, as such, have a considerable interest in the decision of the question, where such buildings are concerned, whether it is better for themselves and their art that they should have for a client a single intangible essence expressed in official committees and commissioners of the well-known type, or a multitude of private citizens amongst whom may be found, more frequently than rarely, men of understanding and perception, who know how to draw out of an artist the best that is in him by establishing a sympathetic programme with properly related conditions. We feel it will be a sorry day for the progress of our art when municipal ownership takes on the vastly larger aspect its advocates urge. But amongst other possibilities of public ownership it had not occurred to us to include theatres, until the consular report on municipal ownership at Freiburg, in the Grand Duchy of Baden, fell under our eye. It appears that the city fathers of Freiburg consider that not only music in the parks in the summer and concerts within doors in winter are necessary, but that the dramatic theatre itself is "an essential element for educating the people," and so this town of seventy thousand souls does not shrink from making good the loss on its municipally owned and managed theatre in the amount of rather more than thirty thousand dollars annually.

CHARLES A. CUMMINGS.¹

HALF a century ago or so American architecture was at its lowest level. The New England carpenter, who planned most of our houses, had been drawn aside by changes of fashion from the sober taste in which the traditions of the Georgian school had nurtured him and, with Downing's books or perhaps Batty Langley's in his hands, was a different being from the old carpenter with his kit of quasi-Classical moulding-planes and his temperate habit of design, who had preceded him. There were hardly any professional architects among us; the influence of the training of older ones lingered in the traditions of the builder's trade, in the buildings of the Colonial time, or in a few books which contained pictures, more or less adequate, of the Classic orders, or designs based upon them. Among the few men who took the title and work of architects were capable and instructed builders, like the late Gridley J. F. Bryant and Nathaniel J. Bardley, and they gave employment to two or three designers of talent, but not of thorough training, Hammat Billings and Arthur Gilman, for instance, in whose work, so far as it remains, we still see much to admire.

At this time there came forward, under just what influences it is not easy to say, two very able artists—Edward C. Cabot, the honored first president of this Society, and George Snell, a member of the Royal Institute of British Architects—whose practice went far to set architecture on a solid professional footing, and give it the position and the quality of an understood art. They were followed by a group of young men of very different type from most of their predecessors; men of education and aspiration, the greater part of them college men, who twenty years earlier would have gravitated to the ministry or the law, but who had an artistic impulse that would not be satisfied in these. They found architecture already a profession, calling for a definite professional education. They took possession of it, and they and their successors have given Boston its prestige as a city of architecture. Among them was Charles A. Cummings, the second president of this Society, whose honored life we commemorate to-night.

I have stopped to say these things because they mark the conditions under which he began his practice; conditions that influenced the quality of his work, and gave tone to his career. They are in a way an index of the professional position in which he began his practice.

Mr. Cummings's advanced schooling was in the Van Rensselaer Polytechnic Institute, and his architectural study was in Mr. Bryant's office, where he met Mr. Sears, who afterwards became his partner. His fondness for knowledge was great, his artistic instinct strong; before he began practice he took a long professional tour through Europe and Egypt—a thing not so much a matter of course then as now—and on his return opened an office for himself. After a year or two of solitary work he made a partnership with Mr. Sears, a partnership which lasted with singular felicity and efficiency as long as he continued in practice.

This was a most stimulating period in our architectural evolution. The note of the time was innovation. Independence was in the air. The self-reliant architect had unlimited opportunity to embody his aspirations and experiments; could bring all the arts into his service. Architectural books and journals, richly illustrated, photographs, new processes of reproduction; these put before him an abundance of precedent such as had been before unknown, and were soon to become, as the late Mr. Van Brunt used to say, an embarrassment and a snare to the young designer. The Gothic movement in architecture and the Romantic movement in letters were behind the architect; the excitement of novelty was his continual spur. It became the doctrine of the day, new to our people, that the architect should be an artist broadly versed in all the arts; that the correlation of the arts in great monuments and great cities should be his special study. The doctrine was as old as Vitruvius, was the foundation of the practice of the great artists of the Renaissance; but it came like a new gospel into our profession here, and all our young architects made haste to illustrate it. The buildings of our cities took on a new aspect. There was no better representative of the new spirit than Mr. Cummings. He had a ready invention, a wider range of resource than most, a sober judgment and refined taste that held him back from unprofitable vagaries. His work from the beginning showed a dignity and sobriety that lent it character, and so it was in pleasant contrast to much of the work of those rather fantastic days. His designs were greatly varied; their composition was always well arranged; their detail animated and graceful. Per-

haps their chief distinction was a certain tranquil elegance that was certainly not the common characteristic of our revival.

I have not time or opportunity to consider his buildings in detail. The earliest that I remember, the Macullar-Parker building, designed in what we then called the Italian style, attracted much attention by its elegance, and still stands in witness of him. He did not work long in this style, for his travel in Italy had sent him home an ardent mediævalist, and the invasion of the Victorian Gothic, which swept over our country in the sixties, chiming in with his own inclination, turned him quite away from Classicism. But he was too independent to give himself over to the Victorian movement. The broadly pointed arches and the fair surface of the Italian Gothic buildings tempted him more than the buttresses, the sharp arches and crowded mouldings of the English. His liking for polychrome effect led him in the same direction. The polychrome treatment certainly was Victorian, but it was really un-English; and Mr. Cummings's tendency was, apart from the drift of his fellow architects, into a manner of his own. He was a reader and admirer of Ruskin's, though not a devotee, and one of his earliest buildings, the Mason & Hamlin building, beside the Common, is a graceful adaptation in plain white marble of Venetian forms, into which he may very well have been led by the study of Ruskin's writings. It still stands, but commercial exigencies have robbed it of the elegant loggia at its base that was its distinction.

The burning of Boston in 1872 was the greatest opportunity and stimulus that her architects ever had, and Mr. Cummings's firm, in which, as I understand, the designing fell mainly to his share, was very busy in covering the burnt district with new commercial buildings. It is interesting to see how readily, artist and student as he was, he bent his ideas to the new forms and multiplied fenestration that were called for. Much of the work of that period is already displaced, but several of his buildings on Devonshire Street are left to show how decisively he could sink the restraints of style in favor of practical wants. The Montgomery building on Summer Street is more characteristically Italian than most, for all its Victorian roof, and shows the graceful trend of his design undismayed by commercial restrictions. A competition design for a bank building, which appears in Volume II. of the "*Architectural Sketch-Book*," is a very happy example of the play of his fancy, when it was untrammelled. It does not appear to have been carried out, and I doubt if the designer himself would have chosen it for a bank in his later years; but it is a charming composition, almost purely Italian, worked out *con amore*, and with an easy command of delicate detail that would have done credit to Sir Gilbert Scott.

His sense of style was keen; a natural product of the feeling for harmony in all things that was essential to him. Yet he was very independent in his conceptions and very far from being a pedant, as the buildings which I have quoted may show; indeed, pedantry has not been the vice of American architects. His *magnum opus*, the New Old South Church, with its stately campanile, is an illustration of his free handling of his chosen style—in subservience to the exactions of Congregational worship—of the abundance of his resources and of the sumptuousness of detail in form and color that he had at command when the occasion allowed it. He did but little in other styles after he was actively busy, I suspect; but I recall one city house on Clarendon Street that he designed for Mrs. George Fiske in the modern French manner, which showed that he could successfully express himself in another language, if there were need.

With all his artistic quality and fineness of instinct, the background of Mr. Cummings's character was an eminent sanity of mind, a fairness of judgment that made his counsel valuable in practical matters and public questions. He was one of the founders of this our Society; at one time, if I remember rightly, its secretary; later its vice-president, and, as you all recall, for a number of years its president, following Mr. Cabot. As a member of many committees, both of this Society and of the American Institute of Architects, he did long and useful service to our profession. He served on many public committees—on the commission for preserving and restoring the Massachusetts State House, later on the city's Art Commission. He was a director of the Boylston Bank, president of the Permanent Committee of the school at the Museum of Fine Arts, trustee of the Boston Athenæum and of the Museum of Fine Arts. The memory of his colleagues and in many cases public record are witnesses to the faithfulness and amenity with which he performed these important duties. The last of his public services, and characteristically enlightened ones, are the bequests in his will of ten thousand dollars to enlarge the architectural equipment of the Boston Athenæum

¹A memorial address by Mr. W. P. P. Longfellow, delivered before the Boston Society of Architects at its October meeting.

and of fifty thousand dollars to the Museum to found and maintain a collection of representations—"whether medals, casts, paintings, drawings, or photographs," of the best architecture of all ages.

But to those who knew Mr. Cummings well his personality was the first thing. Like all men of real individuality, he was more than his work, excellent as that was. His interests were so wide, his cultivation so general, that he was one of the most interesting of companions, one of the most valuable of friends. If you visited him at home, you found his study table covered with stimulating books, his walls with clever sketches and pictures. His taste was as sure in literature as in art. A great reader, he was also a graceful and suggestive writer on purely literary topics as well as on professional. In his younger and more leisurely days he wrote much for reviews and magazines, especially for the *Christian Examiner* in its palmy times, under Dr. Hedge and Mr. Hale. Afterwards he was an important contributor to the literature of our profession. He had a large share in the writing of Scribner's *Encyclopædia of Architecture in Italy, Greece and the Levant*, and furnished articles to Mr. Sturgis's *Dictionary of Architecture and Building*. He wrote the architectural section of Dr. Winsor's *Memorial History of Boston*. His chief literary work is his *History of Architecture in Italy*, extending from Constantine to the Renaissance, which by virtue of its breadth of scholarship, its sanity of judgment and interest of presentation treats this difficult subject more successfully, I think, than any other book in our language.

The same qualities which made his published writings interesting and valuable gave charm to his correspondence and conversation. Whether you talked with him of politics or public affairs, of books or art, you found the same rightmindedness, the same intellectual resource, the same fertility of expression. A fortunate mingling of alertness and serenity was one source both of his attractiveness and his efficiency. Even at his busiest times he did not allow his work to ruffle him. He would come quietly down to his work in the morning—not very early, I believe—throw off his coat and sit down to his table, and do more work in two hours than most men in four.

We have lost a valued associate; a rare example of the best in private, in public, in professional life. Absolutely without self-seeking, he received ample acknowledgment: whatever of general recognition, of positions of trust, of public confidence, was natural to his profession, was given him in good measure, with no shadow of rivalry. To his intimates the loss of his friendship is very great. It is not common to meet a personality so generous and so upright, a mind open on so many sides, with so much charm of fancy and of thought, a companionship so winning—I suspect that in these eager, strenuous, prosaic days it may come to be rarer still. If you have such friends, cherish them; when you lose them, it will not be easy to replace them.

THE PROGRESS OF AMERICAN SCHOOLS IN REGARD TO HEALTH LAWS.¹

FROM AN ENGLISH ENGINEER'S POINT OF VIEW.

A SEVEN weeks' tour examining the schools of the Eastern and Central States of America raises at once a comparison with the schools visited when the writer was last in the States fourteen years ago. The progress in the provision for the health of the school-children has been most marked, and every care is now taken that the heating, ventilation, sanitation, and fire appliances are of the most perfect description. In 1891, when five weeks were spent by the writer in examining the schools in the Eastern States from an engineering point of view, the majority were warmed by hot-air furnaces fixed in the basement on what was known as the "Smead System." This system has now been almost entirely superseded by steam and hot-water heating combined with fan ventilation; but great credit is due to Mr. Smead for the educational and pioneer work done between 1885 and 1895, in raising the standard of comfort and health in American schools. No other man has done so much for the children, and in 1891 his system was in use in probably 90 per cent. of the schools in the Eastern States. It was never considered suitable for the English climate, as the air was passed over the outside of a furnace which warmed it to the required temperature, and English engineers considered such air too dry and too liable to have the nature burned out of it. America has evidently come to the same conclusion, and it is seldom one sees the furnace system except in the smallest village schools.

The State of Massachusetts was the first to draft rules and regulations for the building of schools, and even in 1891 there were most stringent regulations regarding the heating, ventilation, and sanitation of school buildings. The following extracts from their by-laws show this: "1. The apparatus, with proper management, is to heat all the rooms, including the corridors, to 70 deg. Fahr. in any weather. 2. With the rooms at 70 deg. Fahr. and a difference of not less than 40 deg. Fahr. between the temperature of the outside air and that of the air entering the room at the warm air inlet, the apparatus is to supply at least 30 cu. ft. of air per minute for each scholar accommodated. 3. Such supply of air is to so circulate in the rooms that no uncomfortable draught will be felt, and the difference in temperature between any two points on the breathing plane in the occupied portion of a room is not to exceed 3 deg. Fahr." It will be noticed that the temperature is to be maintained "at 70 deg. Fahr. in any weather." This is very stringent, and in the opinion of most English engineers is far too high. It must not be forgotten, however, that the percentage of humidity in the air is small compared with this country, and most people find that 70 deg. is not more comfortable in America than 60 deg. in England. The question of relative humidity is an important one in fixing the most comfortable temperature, and whereas records kept in American schools last winter show an average humidity of only 26 per cent., the humidity observations taken in the writer's office were never lower than 65 per cent., and the average for the winter months would be about 72 per cent.

The Chicago schools were not examined on the previous visit in 1891, as it was understood the school buildings were far behind those of the Eastern States. This has now all been altered, and Chicago is paying great attention to the equipment of all schools built within its area. On an average, twenty-five new twelve-roomed schools are built each year, and the Chicago Board of Education employ their own architect for these. In addition, they have appointed a special expert in heating, ventilation, and sanitation, Mr. T. G. Waters, who has charge of this portion of the work and designs all the necessary equipment. He aims at, and secures, a very high standard of efficiency, and the following description of one of the most recent schools shows the amount of care taken to provide fresh air and comfortable working conditions for the children. The school selected is a three-story building, 174 feet by 124 feet in plan, with 27 rooms in addition to the rooms in the basement. It was designed by the architect to the Board of Education, Mr. W. B. Mundie, and erected under his supervision. The heating and ventilation and all matters pertaining to plumbing, gas-fitting and sewerage were designed and installed under the direction of Mr. Waters. The three floors are practically identical: there is a longitudinal central corridor with the rooms at either side and a stairway at each end; the class-rooms, eight per floor, are practically all of the same size, 27 feet by 32 feet, and each class-room has a spacious wardrobe through which the group of flues in connection with the heating and ventilation rise for the rooms of that tier. Above the stairway of the main entrance, situated in what is really a mezzanine story, is the office of the principal, and over this, in the second story, is a library. The three central rooms of this part of the third story, it may be added, are formed by sliding blackboard partitions which, when rolled away, form an assembly-room with a permanent stage on the opposite side of the corridor. Air is distributed throughout the building on the plenum system. It is received by a double outlet fan in the centre of basement, and discharged in opposite directions through both tempering and heating coils located immediately beyond; and the individual room supplies are carried from the warm-air plenum chamber to the various groups of flues. The fan is run at a speed of 150 revolutions per minute, belt-driven from a 9 inch x 14 inch steam-engine, and has a capacity under an assumed air pressure of $\frac{3}{4}$ oz. of about 25,000 cu. ft. from each outlet per minute. Each outlet is provided, however, with a plate so that any desired quantity of the delivery up to 50 per cent. may be cut off. The air is carried from the plenum-chamber through the small blast ducts to vertical flues and thence to the room inlets, each room supply being independent. The air is delivered about 6 feet above the floor level; but the area of the opening is such that a considerable reduction of the velocity of the incoming air is effected. Among the requirements of the apparatus it is specified that the supply should amount to 1,800 cu. feet of air per hour per pupil, assuming an average occupancy of fifty-four pupils per room. The escape of air from the rooms is in general through side registers at the floor line in the wardrobes, this method providing for warming these rooms as well. The exhaust system is

¹Paper read by J. D. Sutcliffe, at the Institution of Mechanical Engineers, Storey's-gate, Westminster, S. W., Oct. 17, 1905.

designed to provide for the discharge of about 75 per cent. of the inflow from the fan into the building, the rest of the air escaping through the numerous inevitable points of egress possessed by every building besides the open doors. There are two boilers of the horizontal tubular type, 60 inches in diameter and 18 feet long, containing forty-eight 4 inch tubes, and a pressure of 45 pounds is carried. The exact cost of this building could not be learned; but a similar new school which is just being completed is expected to cost £29,000, of which £2,400 is allowed for the warming and ventilating plant.

Mr. Waters also gave the writer figures relating to two eight-roomed schools, each accommodating 320 scholars and which were erected in 1894. One of these was heated by steam-heating apparatus and mechanically ventilated by means of fan. The other was heated by warm air from furnaces and ventilated by natural means only. The warming and ventilating plant in the first school originally cost £1,000, and in the furnace-heated school £640. The total cost of the bituminous coal used in the steam plant (price 10s. per ton) amounted to £90 per year, while anthracite had to be burned in the furnace plant, costing 26s. per ton, and the average cost of fuel was £200 per year. The steam-heated building was also less costly to maintain, the repairs to the plant from 1894 to date amounting to only £17, whilst £90 had been spent in the same time on the furnace-heaters. The Board of Education of the city of Chicago has not installed furnace-heaters in any first-class school building for the past sixteen years, except the one referred to previously, and this is an addition to an existing building which was heated by furnaces and the character of which was such that the introduction of modern steam-heating and ventilating plant to heat both buildings was not permissible. Although one must admire the thoroughness with which the whole subject of heating, ventilation, and sanitation has been studied, and the results obtained, one cannot altogether agree with the methods that are most in favor. As an example, all the heating-surface is placed at one point in the basement. Now they frequently get temperatures of 40 deg. to 45 deg. Fahr. below freezing, and this means that the hot air has to be delivered into the rooms at a temperature of from 150 deg. Fahr. to 170 deg. Fahr., in order to maintain an average temperature of 70 deg. throughout. It cannot be considered good practice, and doubtless in time the methods will be modified to avoid such high initial temperatures.

Turning now to the city of New York, similar stringent rules affecting the comfort, health and safety of school buildings are in force. The city has its own Board of Education, and this Board has its own architect. It also appoints a chief engineer, who is a trained man and designs all the heating, ventilating, sanitary and fire-prevention appliances, and sees to their proper application. The architect's department, under Mr. C. B. J. Synder, is now spending over a million and a quarter pounds sterling each year in building new schools and in bringing the older schools up to a reasonable degree of effectiveness for their work. The writer had the pleasure of inspecting the new High School of Commerce, and there is certainly no school in England, excepting, perhaps, the Manchester School of Technology, that can compare with it either in beauty of design or in wealth of equipment for the purpose intended. The building is five stories high with basement, and has a frontage of 150 feet on Sixty-fifth Street and 100 feet on Sixty-sixth Street, and will accommodate 1,630 students. The contract price for the school was £60,500, but it has cost, with additions, over £70,000. Practically it serves the same purpose as the Manchester Whitworth Street Secondary School; but there the comparison ends. The basement contains a fine restaurant where food is supplied at cost price, a swimming-bath 50 feet by 30 feet, a fine gymnasium with a gallery round asphalted and banked to serve as a running track, besides the fans, boilers, and engines necessary for supplying the fresh air, heat, steam, hot water, and for driving the elevators. Two elevators run continuously from basement to the fifth story, and a class of forty are taken up or brought down at the same time. The steam supply is furnished by four boilers 18 feet long and 4½ feet diameter, while the conveyance of coal to the boilers and the removal of ashes from them is by an overhead trolley track which saves a great amount of floor space. It was specified that the whole building was to be kept at a temperature of 70 deg. Fahr. in any weather, and the fans are large enough to supply fresh air at the rate of 1,800 cu. ft. per hour for each pupil in the building. This air is only delivered at a temperature of 68 deg., the real warming being done by steam-heated radiators fixed in each room. The radiators are all controlled automatically, so that if the temperature in any part gets above 70 deg., the nearest radiators are partially closed off, while if it sinks below 70 deg.

the steam supply is increased. This is much sounder in principle and design than the Chicago method of concentrating all the heating surface at one point, as the air is forced into the rooms at normal temperature. The lighting is by electricity generated by a complete plant of dynamos and high-speed engines on the premises; and this is the case with most New York schools, although occasionally it is obtained from one of the supply companies. An interior telephone system is so arranged that the principal can be in constant touch with all parts of the building. In a crowded city like New York, the playground problem is a very serious one. In this country we require a minimum unbuilt or open space for a playground equal to 30 square feet for each child. In New York the architect is pleading for a minimum playground space of at least 5 square feet per child; but in some of the more crowded areas it is almost impossible to get this. Considerable precautions are taken to minimize fire-risks, and the new schools are all in direct electric communication with the fire-stations. All school doors open outwards and are fixed with automatic bolts, so that it is only necessary to push against them from the inside for them to fly open. The scholars are regularly drilled in fire exercises, and at the High School of Commerce the building can be cleared in less than four minutes.

In Boston, the writer had a long and interesting talk with Professor Woodbridge, who is recognized as an authority on the warming and ventilating of American school buildings. He recently designed a very effective plant for the Senate Chamber at Washington, and is a great advocate of the plenum system of combined warming and ventilation. Speaking to him of the difficulties of keeping the ducts clean and free from dust, Professor Woodbridge said he had made numerous tests of this dust, and had always found it perfectly harmless. His theory was that with the large volumes of air passed through these ducts the oxygen so thoroughly purified the dust and dirt that no harm could possibly come from it. The writer spent one whole day in examining the new Harvard Medical Schools, Boston, which are fast approaching completion. There are five huge schools in separate blocks, and a large power-house occupying another block similar in design to the schools. Each block is three stories high, and some idea of the equipment may be gathered from the fact that ten fans, each 15 feet diameter, are used for supplying fresh air to the various rooms; and thirty-two fans, 7 feet diameter, for exhausting the foul air. The heating of the building is on what is known as the "Forced Hot-water System." That is, water is heated by exhaust or live steam, and then forced through the pipes and radiators, completing the circuit back again to the heaters. The circulation in the pipes is so rapid that in sending the water round a circuit of 2½ miles it only drops about 7 deg. Fahr. in temperature. Some idea may be gathered of the enormous size of these buildings when I say that 104,000 square feet of heating-surface is used for warming the buildings, about half of the surface being placed close to the fans, and the other half distributed in the form of radiators in the different rooms and corridors. The filtering of the air has received considerable attention, and each fan has its own air supply and its own filter. The filter for each fan consists of 260 bags or sacks 6 feet long and 10 inches diameter. Fresh air enters at the front of the bag, and must, of course, pass through the fine canvas bag before it can reach the fan. The bags are easily taken down and cleaned or washed, and others take their place while this is being done.

The State of New York (as distinguished from the city of New York) last year passed an Act to "Amend the Consolidated School Law relative to the proper Sanitation, Ventilation and Protection from Fire of School Houses." This act is very drastic in some of its provisions, and insists on all plans deposited with the Board of Education showing in detail the proposed heating, ventilating, lighting and sanitation. The act goes on to say: "The Commissioner shall not approve any plans that do not provide at least 15 square feet of floor space and 200 cu. feet of air space for each pupil. Provision must also be made for assuring at least 30 cu. feet of pure air every minute per pupil, and the facilities for exhausting the foul air shall be positive and independent of atmospheric changes." This, of course, means that no school can be built without providing mechanical ventilation of some description. The fire-protection clauses are worth quoting, as these matters are entirely neglected in many English schools, and it is a custom in some schools to lock the outside doors—a most reprehensible practice. "All exit doors shall open outwardly, and shall, if double doors are used, be fastened with movable bolts operated simultaneously from the corner face of the door. No staircase shall be constructed except with straight runs, all changes in direction being made by platforms. No doors shall open immediately upon a flight of stairs, but a landing, at least the width

of the door, shall be provided between such stairs and such doorway." The State of Pennsylvania has, so recently as the 22d of April last, passed an Act, entitled "An Act for the Purpose of Governing the Construction of Public School Buildings in order that the Health, Sight and Comfort of all Pupils may be Protected." The Act declares that "Whereas it is of great importance to the people of this Commonwealth that public school buildings hereafter erected by any board of education or school trustees shall be properly heated, lighted and ventilated, no school house shall be erected in this State until the plans, specifications, etc., for the same, showing in detail the proper heating, lighting and ventilating of such building, have been approved. Light shall be admitted from the left or from the left and rear, and the total light area must equal at least 25 per cent. of the floor space. Each class-room shall have at least 15 feet of floor space and not less than 200 cu. feet of air space per pupil, and shall provide for an approved system of heating and ventilation by means of which each class-room shall be provided with fresh air at the rate of 30 cu. feet per minute for each pupil, and warmed to maintain an average of 70 deg. Fahr. in the coldest weather." These new Acts show that the school authorities in America are keenly alive to the necessity of healthy school buildings, and one cannot help asking when our education authorities are going to wake up to the vital necessity of fixing some definite health standard for all our schools.

BOOKS AND PAPERS

THE discovery of different forms of burial during excavations made upon the west bank of the Nile and in the district between Abydos and Hierakonopolis have led Egyptologists to thrust back the history of the country and its people to a period long preceding the First Dynasty, when mummy-burial was unknown. "Certain erratic Egyptian antiquities in the way of flint implements," says Miss Edwards,¹ "stone vases, well-marked varieties of pottery, carved ivories and slate 'palettes' have now been traced to their source in cemeteries where the style of sepulture was wholly different from, and far more primitive than, any formerly regarded as Egyptian. The preponderance of stone and bone implements, and the evidence of the contemporary use of copper, point to the less neolithic or early metal culture ('chalcolithic' it has been called) as that of the people so buried."

It has so far been impossible to date these examples of primitive burial definitely, but as time goes on, and further excavations are made, it may be possible, by comparison, to place them in some sort of order and period. A link has been found between the pre-dynastic period and the old kingdom in the excavations made in the Royal Cemetery of Abydos, where the early kings, those of the First and Second Dynasties, were buried; and no doubt before very long further discoveries will throw a clear light upon the early inhabitants of the country whose art was not that of a sudden burst of perfection as has hitherto been assumed by archaeologists.

The various forms of burial, of course, overlapped each other; but the earliest graves contained skeletons of a contracted form, having the legs bent in the manner of a sleeping babe. This form, belonging to a period when stone implements were used, was in vogue as late as the Fourth Dynasty, but curiously, whereas at first the skull was placed on the south, the face turning west, in the later period, the head was to the north and the face to the east. In the earliest graves the body was placed in the ground; then a bricked recess was adopted and a clay, wooden, or pottery coffin was used. From these niches a system of sepulchral chambers was developed, a central grave with many smaller ones surrounding it. These were entered by staircases sometimes descending as much as 24 feet below the surface. In all cases the graves were below, while the chapel or chamber for offerings was above ground. No traces of mummification have been found either in the pre-historic or First Dynasty tombs; indeed it has been thought that it was not practised before the period of the Middle Kingdom.

Some of the pre-historic pottery is decorated in a primitive manner, but the forms resemble those of later periods, and indeed of other parts of Africa, as for example, some specimens in the Carthaginian Museum of St. Louis. Possibly the intercommuni-

cation between Egypt, the Greek Islands and the north and south coasts of the Mediterranean may have been, most probably was, common among the peoples of the earliest times both pre-historic and historic.

This book is really an excellent guide to Egypt, whether the traveler be an architect, a painter, or a dilettante; and probably even the "tripper," if he have time and a small amount of intelligence, may find something to add to the contents of his much-worked and feverish head-piece.

MR. KENYON COX has done something more than gratify that love of book-making that taints all of us, in bringing together in book form a score of essays and fugitive "articles" that have appeared at different dates during the last twenty years in *The Nation*, *The Century Magazine*, and elsewhere.

It is always a pleasure to find an artist writing about art simply and sanely, without indulging in transcendent hypercriticism on the one hand or maudlin cant on the other, willing, that is, to believe that he is actually writing about fellow-men and not about demi-gods, condescending to use adverbs and adjectives with the decent reserve the common writer exercises and seeming ready to acknowledge that there are a good many people able to make their own deductions if only the case and the supporting evidence are but fairly submitted.

The author's predilection might fairly be derived from the subject of his essays: Puvis de Chavannes, Whistler, Burne-Jones, Baudry, Ford Madox Brown, Sargent, Michael Angelo, Veronese—decorators all, though most of them much else besides, and the fact that the author's work has been largely in the same field of art makes his comments the more intelligent and his appreciations the more just.

It is not possible to pick up a book at all worth while without finding something new in it or without having dispelled some old misconception. In this case the writer, whose chance it was to be in Paris when the *Nouvel Opéra* was opened, discovers how much more of a man, and how much older, Baudry was than he at that date understood to be the case. Somehow, the impression was then gathered that Baudry, like Garnier, was "made" by his work at the *Opéra*; that the overstrain in painting the decorations of the *foyer*—which actually led to his final illness—cut off in his early youth a man whose career was just opening with singular promise.

The fact is that Baudry was just twenty years older than we supposed to be the case, and was actually in his prime, well known in the world of art and already a chevalier of the Legion of Honor—in fact, before he actually began work on the *foyer* he had been raised to the grade of *officier* and, furthermore, had been elected, without any canvass on his own part, a member of the Institute.

We are glad Mr. Cox's book has come in our way, as it has dispelled a misconception. While we have always admired Baudry's work, we have always looked upon it as a "fluke," the lucky hit of an untried man. Now that we know it to be the work of a tried and tested man in his prime, we feel that it will have still more interest and meaning than it had before.

"THE most complete and beautiful piece of work² done upon the chemistry of Portland cement," as the translator calls it, is certainly a brand worth plucking from the burning or, in other words, transferring from French to English literature.

This "classic work," as the translator calls it, this work which, the author says, "has been for fifteen years the starting point of numerous studies" of other people, it appears was the thesis prepared by M. Chatelier at the time he secured his degree as Doctor of Science, and examination seems to show that it probably deserves the praise it has received. But, alas, the work, brief as it is, is one that can properly be appreciated only by chemists. So far as we can discover, it has little that would interest the average practising architect, unless, perchance, he is thinking of acquiring stock in or otherwise investing money in the manufacture of hydraulic cement of one kind or another, and the consumption of Portland cement is increasing so astonishingly that it may well be that not a few architects have already invested in or are thinking of taking an interest in some cement-

¹"*Old Masters and New.*" Essays in Art Criticism. By Kenyon Cox. New York: Fox, Duffield & Co., 1905. Price, \$1.50, net.

²"*Experimental Researches on the Constitution of Hydraulic Mortars.*" By Henri Le Chatelier. Translated from the original by Joseph Lathrop Mack. New York: McGraw Publishing Co., 1905. Price, \$2.00.

¹"*Manual of Egyptian Archaeology: Guide to the Study of Antiquities in Egypt.* For the use of students and travelers. By G. Maspero, D.C.L. Oxon. Translation by A. B. Edwards. Fifth edition with supplementary chapter by the English editor. Grevel & Co., London. 7/6.

making undertaking. In such cases it would be distinctly worth while to secure this little book and give it the study it deserves. It is clearly and understandably written and so admirably translated, that we regret that we cannot find in its matter reason for giving it more than this brief commendation.

THE LATE CHARLES A. CUMMINGS.

BOSTON, Oct. 26.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir:—At the last meeting of the Boston Society of Architects a very interesting paper was presented and read by Mr. W. P. P. Longfellow on the life and work of the late Charles A. Cummings, and it was voted that this paper be sent to *The American Architect* for publication.

I also enclose a copy of the Resolutions which were unanimously passed at that meeting.

Yours very truly,

C. H. BLACKALL,

Secretary.

Resolved, That in the death of Mr. Charles A. Cummings, for sixteen years Vice-President and President of this Society, we have lost a member who, by a life of high-minded endeavor and honorable achievement, did much, both through his example and by his counsels, to raise the tone of our profession, and to secure for it the confidence and respect of this community. His excellent natural gifts, both literary and artistic, were fostered by liberal studies, which helped to give his architectural work an unusual freedom and individuality of style, while they emphasized a native sobriety of judgment which manifested itself in the reticence and the distinction that marked whatever he did. This breadth and even balance of mind made him, in the discussion of the important practical questions which from time to time came before us, a most sagacious counsellor and a safe guide, while his courteous and sympathetic attitude obtained for his opinions, even with those most disposed to differ from him, a fair and friendly consideration.

Resolved, That the secretary send to Mr. Cummings's family a copy of these resolutions, as a mark of our sympathy and respect.

ILLUSTRATIONS.

RENAISSANCE CAPITALS: PLATES 49-56.

PERHAPS the most interesting subject in this month's collection is the capital from the pulpit in the Cathedral at Cremona, at the top of Plate 55, with its curious blending of Byzantine, Gothic and Renaissance reminiscences. Aside from the air of great refinement it has, which is largely due to the prolonged and graceful sweep of the volute scroll, this capital is interesting because of the introduction of the down-hanging, and so naturalistic, leaf that replaces the time-hallowed acanthus leaf on end.

Next in interest to this seems to come the modern capital at the top of Plate 52 from a house in Lille. Here the designer has made very ingenious use of selected elements and by expanding here and suppressing there has ended in producing a capital which one has some difficulty in perceiving is directly founded on a Corinthian capital. It is a very legitimate piece of design, with a firm architectural feeling about it.

In the way of oddity there is nothing shown this month that equals the two-story capital from S. Fantino at Venice, at the foot of Plate 50. It is hardly possible to believe that this combination of forms was ever intentionally designed. Rather, it has the air of having been copied from an exhibit in some museum or from the refuse heap in a marble-worker's yard, where a cap of Ionic proclivities had been placed accidentally on the lower fragment of one based on Corinthian forms. Possibly, somewhere, such a combination was actually made out of pillaged fragments and built into some earlier church and then copied, more or less textually, for S. Fantino. The peculiar two-story division gives a reason for associating it with the capital just above it and the others from the same tomb of the Sieur de Vaudrey on Plate 53, where the cymatium is exaggerated for the sake of offering a protecting background to busts and torsi; and these capitals are naturally allied in form with the better-known ones at the Château de Chambord on Plate 51. In the case of the capital in the centre of Plate 50, the cymatium is so exaggerated that it has quite the value of the stilt-block used in the Byzantine capitals at Ravenna and elsewhere, a feature which is faintly echoed in the capital from the Church of S. Michele on the Island of Murano, also on Plate 50.

For real grace, however, nothing is shown here that surpasses the capital from the old Hôtel d'Écouville on Plate 52. Here, as the cornucopia volute is finished *à jour*, the vertical line of the pilaster shaft is shown carrying the line of support directly up to the crowning mouldings, and the cornucopias are frankly added as decoration pure and simple, for, touching the crowning member only with their inner edges, they make no pretence to

be carrying any weight whatsoever. The cornucopia volute is largely, if not entirely, a French device, and is just as natural a derivative from the conventional volute as is the dolphin. Of this latter treatment only a single example is shown, a capital from the tomb of Louis XII. at the foot of Plate 52. But the example is excellently adapted to show how naturally the dolphin grew to be one of the accepted animate forms that might properly be introduced amid the conventional forms of architectural decoration. From the cornucopia volutes of the Hôtel d'Écouville and the Hôtel Lasbordes, on Plate 53, to the volute-replacing *putti* on the capital from the Hôtel de Ville at Beaugency, shown at the top of the same plate, is a merely natural progression, another instance of which is shown in the lower left-hand capital from the Château de Chambord on Plate 51. Here the twisted foliage, from which the infants' bodies emerge, recalls the drooping line of the volute scroll even more than do the legs of the little *putti* on the example at Beaugency.

More frequently than not the designers of the Renaissance capitals have been content to ring the changes on the distinctive element of the Corinthian capital, the acanthus leaf, in conjunction with the volute, and their treatment is as various as the designers, almost, one might say, as the individual examples. But throughout the greater part of the series a fairly close adherence to Classic forms and conventions has been maintained. But now and then a distinctly novel treatment is introduced. A little examination of the examples here brought together will show how foliated forms of different kinds and in different degrees crept gradually into what once were the plane faces and members of the Ionic volute, though these foliated forms are still always based on the acanthus leaf. In the capital from Sta. Croce at Florence, shown in the centre of Plate 55, however, we find the distinct novelty referred to. Here the foliage is mixed, the acanthus is there, but so, also, is the palm branch—one might almost think it a fern, reminiscent of some Gothic carving.

The designer, who is tempted to think that in "feeling round" for just the right thing his pencil has at last worked out some combination of line and form that is not only good, but absolutely novel, will do well, before saying aloud that he is deserving of a laurel crown, to look carefully through this collection of capitals to make sure that some long-departed designer has not already invented the combination. At all events, he would do well to study carefully the capital carved by Pietro Lombardo for Sta. Maria dei Miracoli at Venice, shown on Plate 54, and also the capitals on Plate 56, from the Palazzo Zorzi at Venice and the Palazzo Guidotti at Bologna, each in their several ways interesting and suggestive.

THE MCKINLEY MONUMENT, SAN FRANCISCO, CAL. MR. ROBERT I. AITKEN, SCULPTOR. MR. B. J. S. CAHILL, ARCHITECT, SAN FRANCISCO, CAL.

This monument, at the entrance to Golden Gate Park, which eventually will face a long, broad and formal avenue, was unveiled on Thanksgiving Day, 1904. The total height of the monument is 35 feet, the bronze figure of the "Republic" measuring 15 feet. The granite pedestal, 6 feet square, rests on a circular granite platform 44 feet in diameter. The medallion bas-relief portrait of President McKinley is cut in marble. The total cost of the monument was \$34,000.

HOUSE OF CHARLES M. SCHWAB, ESQ., FROM THE SOUTHEAST, 73D STREET AND WEST END AVENUE, NEW YORK, N. Y. MR. MAURICE HÉBERT, ARCHITECT, NEW YORK, N. Y.

NORTHWEST VIEW OF THE SAME HOUSE.

GATEWAY: BRYN MAWR COLLEGE, BRYN MAWR, PA.—MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

Additional Illustrations in the International Edition.

WINDOW DETAIL: HOUSE OF W. CAMPBELL CLARK, ESQ., NEWARK, N. J. MESSRS. HOWARD & CAULDWELL, ARCHITECTS.

NOTES AND CLIPPINGS.

THE CRACKED WALL OF WINCHESTER CATHEDRAL.—Being desirous of learning the extent of one of the cracks on the inside wall of the south side of the east end of Winchester Cathedral, the Chapter directed their architect to open the floor close to the wall, to see how far down the crack extended. To their amazement, it was found that the crack rapidly widened as the excavation proceeded, and when digging ceased it was quite a foot across at the bottom of the hole, with the appearance of its being wider farther down. Moreover, by this crack the authorities were able to ascertain the alarming fact that the wall which

being built a little distance apart, and the space between filled up with rubble and mortar—a common method of building in early times. Besides this, it has been found that one of the main buttresses outside, which should support the wall, now ceases to do so, for the reason that it has become detached from the main wall.—*British Architect*.

THE COST OF RESTORING YORK MINSTER.—The "Occasional Papers" which the Dean of York has issued during the past five or six years describing the progress of the work of repair and restoration at the Minster have now been collected together and issued in volume form. It appears that between 1829 and 1899 the following sums were spent on restoration and rebuilding work:

1829—Rebuilding of choir	£55,882
1840—Rebuilding of nave	24,560
1859—Restoration of chapter-house	4,200
Organ-chamber	1,200
Organ nave	1,000
Restoration of south transept	20,000
1890—South window of choir transept.....	610
1891—Nave roof	1,200
1893—North window of choir transept.....	572
1896—South aisle of nave pinnacles.....	1,200
Total	£110,424

In October, 1898, Mr. Bodley reported that another £50,000 would be needed to carry out the essential restoration, and that this would occupy fourteen or fifteen years. The work was undertaken, and has been carried on for five or six years on the lines recommended by Mr. Bodley, though much yet remains to be done. The total amount subscribed towards the restoration fund up to June 17 last was £22,857, and there had been expended £16,238, leaving a balance in hand of £6,619.—*The Builders' Journal*.

THE DECORATION OF THE MAIRIE DU XME ARRONDISSEMENT.—The Mairie of the Xth Arrondissement, of which M. Rouyer was the architect, has remained still unfinished in regard to its decoration. The Municipal Council have now taken the matter up, and have selected the artists who are to put the finishing touches to the building. The two principal fronts are to be decorated with eight stone statues symbolizing the principal industries of the quarter. Those on the façade towards the Faubourg St. Martin are to represent river navigation, glass-work, embroidery, and ceramic ware; these will be executed by MM. Barrau, Demaille, Moncel and Larche. The four on the façade towards the Château d'Eau are to represent silversmiths' work, artificial flowers, perfumery, and theatrical art. They will be executed by MM. Carlus, Caussé, Chrétien, and Gaston Leroux. In the interior M. Henri Martin is to take in hand the large panel in the Salle des Mariages, and a number of other artists, among whom are MM. Paul Baudouin and Bérout, are to paint the vertical panels and the ceilings of the two rooms which adorn the Salle des Fêtes. A sum of 118,000 francs has been voted for the work.—*The Builder*.

SUGGESTED ALTERATIONS IN WESTMINSTER ABBEY.—The revival of the discussion of the enlargement of the Abbey for the burial of national heroes is not timely since the use of cremation has suggested great economy of space in future burials. Moreover, there is no immediate risk of overcrowding the space beneath the floor, since there is hardly anybody in art, letters or politics of equal pre-eminence with Sir Henry Irving in his own profession with as valid a claim for honors of sepulture, yet the proposal is renewed with precipitate haste for the erection of a new chapel with enlarged accommodations for the burial of greatness and the celebration of its virtues by statuary and wall brasses. *The Times* even suggests the removal of the Westminster School into the country and the construction of a national hall of heroes on the site, but this will not be welcomed by the dean and the chapter, who have a costly plan of their own for the enlargement of the Abbey. The present condition of English cathedrals does not warrant expenditures so rash as these. Money is needed for a new series of works for the preservation of Peterborough Cathedral, where the evidences of mediæval jerry-building on a large scale have been disclosed. Winchester has also been found in a worse condition than first supposed, and the cost of putting it in proper condition will be £20,000, not £5,000.—*I. N. F.* in *N. Y. Tribune*.

THE VALUE OF THE GROUTING MACHINE.—Mr. Francis Fox, M.Inst.C.E., forwards to the *London Times* a communication deprecating the methods, which he describes as frequently illusory, generally employed in the restoration of ancient architectural structures in Great Britain. "Thanks," says Mr. Fox, "to the grouting machine invented by the late Mr. Greathead for tunnel purposes, it has been applied by skilled men to various structures; ancient towers have recently been restored which were cracked from top to bottom; historical walls, bridges, and churches have been repaired, all of which to-day are stronger and firmer than they ever were. Cracked structures on railway and other works have been dealt with at a tithe of the cost which would have otherwise been necessary. A stone or a wall which is cracked is very seriously reduced in strength, but the usual procedure is to point it up by trowel. This is absolutely useless as regards restoring strength, though it may keep rain or vermin out, and to some extent exclude frost. If, however, the crack and any hollows connected therewith be carefully filled up with good cement, it generally becomes stronger at the point of fracture than it was originally. By means of the grouting machine of suitable design and power, liquid cement is blown by compressed air right into the heart of the wall, and whether the crack be wide or as narrow as a sheet of cardboard, the cement is forced in and the weakness is thereby to a great extent eliminated."

A PARISIAN MOSQUE.—Paris will soon have a Mohammedan mosque in the neighborhood of the Invalides. For some years a French Mohammedan, living in Cairo—M. Lambert—has been at work collecting subscriptions, and he has now received the consent of the Ministère des Cultes to build one mosque in Paris and another in Marseilles. The State is expected to grant free building sites for the structures. The establishment of these mosques has been a matter of anxious concern to the Moroccan sheikh Abd-el-Rahman-el-Malachi and the three other sheikhs of Ez-al-Haar University, and the news of the support given to the scheme by the French Government is likely to enhance France's influence in Mohammedan centres—an influence which has been rather on the wane of late. M. Lambert has been a resident in Egypt for forty-three years. He went there with M. Ferdinand de Lesseps. England and Germany have several mosques, and it has been a subject of complaint among the thousands of Mussulmans who visit Paris every year that no place of worship had been provided for them. There is a very large floating Mohammedan population also in Marseilles.—*N. Y. Evening Post*.

PEAT GAS AS A SOURCE OF POWER.—A great difficulty to be met is the rapid formation of tar, which has to be separated and which carries away a large percentage of the heat which would otherwise be available. Tests in a Deutz producer-plant showed that with peat containing 16.5 per cent. moisture the fuel used was 2.8 pounds per horse-power hour. In a Koerting producer the fuel per horse-power hour varied from 6.2 pounds when the heating value was 2250 British thermal units, to as low as 1.65 pounds when the calorific value reached 9000 units. In the same cases, when used to produce gas utilized in a gas-engine, fuel of a value of 6300 units showed an economy of 33 per cent. over the results from a steam-engine using the same fuel.—*The Metal Worker*.

STATUE OF FRANKLIN FOR PARIS.—When the two hundredth anniversary of the birth of Benjamin Franklin is celebrated next January, a bronze statue of this the first American Minister to France will be unveiled in Paris. It is the gift of John H. Harjes, an American living in the French capital. The statue, which is to be a replica of the one in front of the Philadelphia post-office, will be placed in a small grass-covered square just in front of the Trocadéro Palace. John J. Boyle, the New York sculptor, who made the original statue, is to reproduce it for Paris.—*N. Y. Evening Post*.

SAFEGUARDING THE LOUVRE.—An arrangement has been concluded between the city of Paris and the State by which the city cedes to the State the land occupied by the premises of the Frères de la Boulevard des Chrétiennes, rue Oudinot and Boulevard des Invalides, to which site the Ministry of the Colonies will be transferred from the Louvre Building. The State hands over to the city the Caserne Lobeau, which is needed for the extension of the Hôtel de Ville. The Ministry of the Colonies, at present in the Louvre, was regarded as placing the invaluable collections in the museum in continual danger of fire.—*N. Y. Herald*.

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, NOVEMBER 11, 1905.

No. 1559.

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THE bad leaven sown by the Cleveland architects—if leaven can be sown—is, we regret to say, working. Through the process of inoculation the virus, however, takes on a more beneficent character in Louisville, Ky., than it had in Cleveland. In the Kentucky metropolis, in place of the architects sounding their own trumpets, it is the Building Contractors' Association who have just passed a resolution—self-suggested and uninstituted, we hope—"respectfully urging those who contemplate building to avail themselves of the services of Louisville architects." The grounds for this request are found in the Association's stated belief that Louisville architects "occupy a position with regard to competency second to none in this country." As a voluntary expression of opinion this may be very pleasant; but we think the incident regrettable. Although it does not reduce Louisville architects to trade-union membership as the Cleveland architects were reduced by their own voluntary action, it does not exactly add anything to their dignity of professional standing.

WE hope that the St. Louis Chapter, A. I. A., has not been influenced by the motives assigned to it by the newspapers in voting not to take part in the proposed competition for the Roman Catholic Cathedral to be erected in that city, at a cost of a million dollars or so. The ostensible reason is that no prizes are offered and that the compensation to be paid the successful architect is wholly inadequate. Behind this is said to be a feeling of irritation because Archbishop Glennon has manifested a certain distrust of "home talent" by inviting certain French, German and Italian architects to compete, extending the invitations personally during a recent trip abroad. The duty that the profession owes to the public is a greater and higher one than that which it owes to itself. Just as the Boston Society of Architects, in voting not to enter the competitions for the Suffolk County Court-house and for the State-house An-

nex, and the Philadelphia Chapter, A. I. A., in refusing to have anything to do with the Pennsylvania State-house competition, were guilty of lapses from good citizenship, so it seems possible that the St. Louis architects may be now taking a step that may lead to lasting regret on their own part and that of their fellow-citizens.

THE Grand Jury for Cook County, Ill., has just returned an indictment against one Frank Koenig, a contractor, who is charged with practising as an architect without a license, in disregard of the Illinois Architects' License Law. If we are right in thinking that this is the first suit of the kind, we hope that Mr. Koenig has money or backing enough to fight the case through the courts. We believe the constitutionality of this law has never been passed upon, and the fact that courts in other States have declared similar license laws as affecting other trades unconstitutional makes it desirable that the constitutionality of license laws as applied to architects should be passed on.

ONE of the most curious appeals, from Philip drunk to Philip sober, has just been made by Signor Ernesto Biondi, who cannot swallow his defeat in the "Saturnalia" lawsuit against the Metropolitan Museum of Art and now, seemingly, feels sure he has found the way at last to make the matter a real "international incident." It was only some six weeks ago that the New York Supreme Court decided that the sculptor had no case against the trustees of the Museum, and now he lodges with the Secretary of State, with the assurance that he will accept his decision as final, a plea that he shall act as arbiter in the matter, thus saving him the cost of pursuing his suit through the higher courts. The significance of his appeal lies in the fact that the present Secretary of State, Mr. Root, was, and, it seems, still is, one of the trustees of the Museum against whom the sculptor unavailingly brought suit. Signor Biondi feels that Mr. Root, because of the position he now fills, can no longer be influenced by sordid regard for the pockets of himself and his co-trustees but can afford to take a more ethical, or, perhaps, a more eleemosynary, view of his contention. Mr. Root, however, has declined to serve.

FOR several weeks we have watched daily the interesting operations involved in moving a brick building in the grounds of Columbia University, but, interesting as they are, they are as nothing in comparison with similar operations going on at the same time in Jefferson Avenue, Brooklyn. In the first case, the building is a two-story brick building, reasonably well built, essentially a Greek cross in plan and about fifty feet square. This building has to be raised and moved backwards, and a little to the left, about one hundred and fifty feet and set upon new foundations. The interesting features here are, first, that the building does not move along two sides of a triangle, but in an irregular way along the hypotenuse, and secondly that no rollers are used, the building being made to slide along

well-greased ways or tracks. In the Brooklyn case, a block consisting of five three-story brick and stone houses, built at different times by different builders and, so, in no sense homogenous, is being raised and transferred to the opposite side of the avenue, to a site some little distance below the original one. Here the interesting and very extraordinary feature is that, during the process of moving, this huge mass, weighing some five hundred tons, is to be turned half around, so that the fronts of the buildings may once more face upon the street, but with a diametrically opposite aspect. In this case the operations, which promise to be successfully carried out, are expedited and facilitated by the use of rollers, as usual. In both cases the movers were so sure of themselves that they didn't take the trouble to remove the glass windows and tenants were assured they could remain in and use the premises in entire safety.

THOSE who saw the Boston Fire of 1872 will never forget one picturesque element there that has attended no other great fire, for, owing to the "hippozoötic" which at that time placed practically every horse in Boston and its neighborhood upon the sick-list, the fire-apparatus had to be drawn to the fire by men, or oxen, aided now and then by a light carriage-horse from some private stable. The Chief of the Fire-department at that time was John S. Damrell, who died last week, and he handled the fire, probably, as well as any one could have, and, when a few years later he retired, it was felt that his knowledge of the action of fire upon buildings peculiarly fitted him for the post of Inspector of Buildings, and accordingly he was appointed to that post and filled the position for some twenty-five years. His early experience, during more than a score of years, as a builder, added to his qualifications, and for many years his conduct of his office gave general satisfaction; but, latterly, when architects were beginning to introduce improved methods of construction, his "rulings" were found to be not a little obstructive and more than one quiet attempt to bring about his resignation was made by them. But the service he had rendered to the city was so unquestionable and his good intentions were so apparent, that these attempts had no fruition. But, at length, a few years ago, he was removed by Mayor Collins because, we believe, of the corruption that was alleged to exist in his bureau. Captain Damrell attempted to stem the Boston conflagration by blowing up a large number of buildings, for the value of which the owners thereof endeavored to hold him personally responsible, since, besides being fire-chief, he was at that time partner in a firm of builders upon whose contracts an attempt to levy could be made.

IN connection with Captain Damrell's death, it is well to chronicle that of another famous fire fighter, Mr. Frederic Grinnell, who, however, fought with his wits rather than with his hands. The fire losses saved to the textile manufacturers alone of this country through the invention and enforced adoption of the automatic sprinkler is simply incalculable, and, as every fire is the potential focus of a conflagration, the money saved to the people at large is still more vast. The Parmelee sprink-

ler, invented in 1874, was not a practicable apparatus until Mr. Frederic Grinnell took hold of it and made such improvements and changes that the Boston Manufacturers' Mutual Fire Insurance Company and its allies saw it was worth while to make the introduction of the Grinnell sprinkler obligatory upon their members. From that time, 1881, Mr. Grinnell began to build up a large and very profitable business, which has been of very great value to the country.

AT the recent annual convention of the Massachusetts State Firemen's Association, William T. Cheswell, Chief of the Boston Fire-department, read a paper on the danger to life from fires occurring in crowded stores—a topic to which we have more than once referred with much anxiety. In addition to well-known recommendations relating to limitation of space between fire-walls, brick-enclosed staircases and fire-proof elevator shafts, Mr. Cheswell lays particular stress on the planning and placing of stairways in the positions that they would most naturally be expected to be found, and the importance of the fact that the foot of one flight should conduct naturally to the head of the next lower one. He also condemns the use of the revolving door and calls attention to the fact that storekeepers, who wish to display large stocks, do not provide in the passages between counters and showcases a sufficient and reasonable amount of space. Here is a matter which it seems to us should be regulated by ordinance, even though it would in a manner interfere with individual liberty of action and the right of use of private property. These great modern temples of trade should be in every detail as much subject to public control as are theatres, factories and churches.

WHETHER intended for one purpose or another—for elevator service, for automatic-sprinkler service or for general fire-service, a glance from the top-story of a high building in any city will show that there are, all through the business section of the town, a large number of water-tanks, of many makes and more sizes, perched precariously on roofs and walls, ready to do large damage if not properly cared for. The Boston Manufacturers' Mutual Insurance Company has been insistent in instructing its members as to the kinds of defects this useful receptacle is heir to; but though the impossibility of protecting the hoops from rusting on the inner surface and the probability of the rotting of wooden staves have often been pointed out, we do not recall that any recommendation has been made that the slender steel framework upon which many of these tanks are reared should be protected with fireproof material. At many a fire, a fall of roof and floor has been caused by the fall of a roof tank, whether full or empty, and it is easy to see that a flame playing for a very short time on the slender framework would cause it to crumple up under the weight and let the tank fall upon and through roof and floors. A law that should oblige roof tanks to be encased in and supported by masonry would in time, perhaps, give to our cities something of a mediæval air, and might do much to banish the terrible monotony of the present sky-line.

THE TOWER AND SPIRE OF ST. NICHOLAS'S CATHEDRAL, NEWCASTLE-ON-TYNE.—I.

WE are all, I am sure, admirers of the beautiful steeple of St. Nicholas's, which, from so many points of view, crowns the city of Newcastle. Many, no doubt, have sketched it, but as probably few have made measured drawings of it, those I am about to show will, I hope, be interesting. A measured drawing is often a surprise to those who have only made mental records or perspective sketches. I have read of an over-zealous restorer who, when remonstrated with for his suggested destruction of an old church tower in order to replace it with something more "medieval," replied: "Yes, I admit that the tower looks all right, but if you will step into my office I will show you a measured drawing of it, and you will see what an absurd thing it really is!" I do not, of course, mean that you will find the steeple of St. Nicholas's absurd in elevational drawings, but you will probably find that the contours and general proportions appear different from your expectations.

It might not be out of place here to suggest that drawings of the "artistic draughtsman" type were not used by the old masters of our profession, either Medieval or Renaissance, who were content with little more than diagrams and rough sketches; while models were much more used than now for judging of the ultimate effect of the work—a practice much employed by Sir Christopher Wren and the late William Burges.

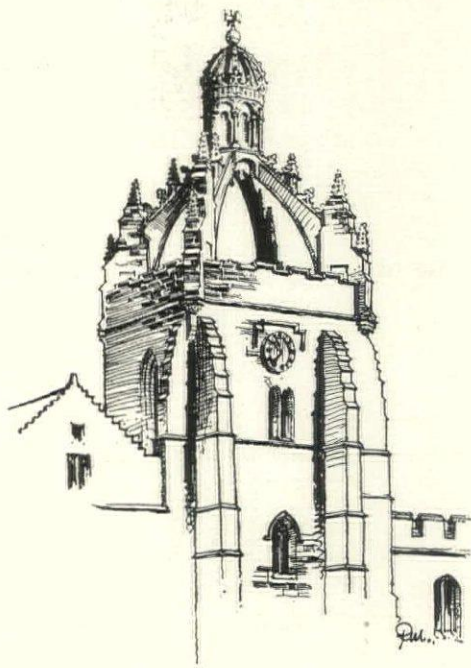
One peculiarity about this steeple is the liability of the Corporation for its repairs; this has been so ever since its erection, and when the last repairs were done in 1895 they were carried out at the expense of the Corporation of Newcastle by our firm. The same is the case at Antwerp, where the northwest tower of the

of the tower, which must have been screened off from the rest of the church. Here they received their orders for the night, and a picturesque sight they must have presented as they each emerged from the doorway of the tower, carrying bills and lighted lanterns, and proceeded to their several posts.

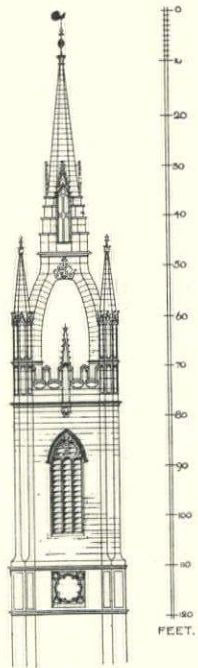
As for the adoption of this particular form of steeple, tradition says that it was erected in this manner, so that a lighted lantern could be suspended in it to guide wayfarers across the moor at night. Sykes says that it was "illuminated antiently for the conduct of travelers." There is a record of payment made in 1566 by the Mayor of Newcastle and his brethren "for four pounds of wax made in candle for the lantern of St. Nicholas's Church, and for the working three shillings, and for two pounds of wax wrought in candle for the lantern of St. Nicholas's Church eighteen pence." We know that this was the custom in other places. According to Stowe, the steeple of old Bow Church, London, was "antiently illuminated for the conduct of travelers at night." Anyhow, for whatever purpose erected, there can be no doubt that the steeple of St. Nicholas's is a most striking object, and certainly is the feature of the building.

This steeple is of the type called the "Scottish Crown," and is, with the exception of St. Nicholas's and St. Dunstan-in-the-East at London, only found across the Border—the two well-known examples being St. Giles's, at Edinburgh, and King's College, Aberdeen. There was one at Linlithgow, but it is now destroyed. None of these, however, at all equals St. Nicholas's in grace of outline, both the Scottish examples appearing heavy and lumpy in comparison.

To take St. Giles's first. The tower itself is a plain rectangle without any buttresses, and with three single-light belfry win-



KING'S COLLEGE, OLD ABERDEEN.



ST. DUNSTAN-IN-THE-EAST: STEEPLE.



ST. GILES'S CATHEDRAL, EDINBURGH.

Cathedral is entirely under the control of the Corporation of the city, and all expenses connected with the up-keep of the tower come out of the town revenue.

This gives the corporation the control of the bells, and at St. Nicholas's the corporation can have them rung at any time, so long as it does not interfere with Divine service.

Of course, the primary reason for the existence of a church tower is to hold bells; and we must remember that bells played a very important part in the Middle Ages, being rung not only for the calling of worshippers to the church and on occasions of public rejoicing and festivals, for the summoning of guilds, as the freemen of Newcastle are to this day, but also in case of alarm to call the citizens to defend the walls against assailants, to dispel tempests, to drive away evil spirits, to avert plague and pestilence, while the tolling of the passing-bell besought the hearers to pray for some fellow-Christian at that moment passing from this life into the intermediate state, and the solemn note of the "death-bell" gave warning that all that was mortal of the departed was being carried to its last home.

In Newcastle the town-watch used to muster in the lower part

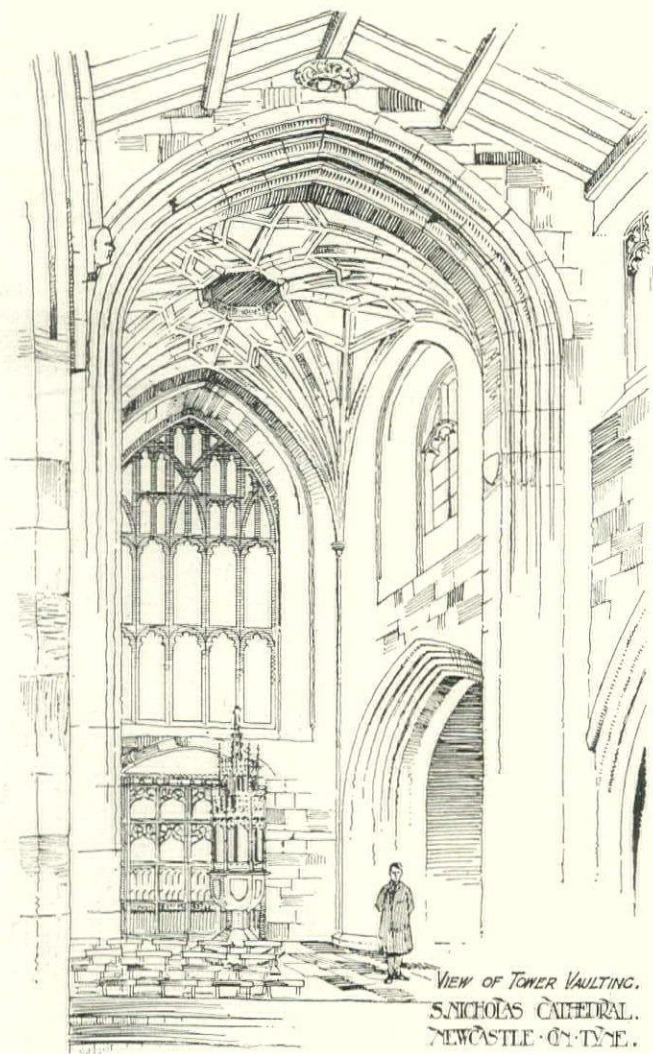
dows on each face. The crown consisted of eight arches springing from buttresses rising from the cornice of the tower, one at each angle and one in the centre of each face, one of these latter being enlarged to form a stair turret. These buttresses terminate in small, ill-proportioned pinnacles. The back of each arch, ornamented with a cresting, is a straight, raking line forming an abrupt angle with the buttress, and giving the idea of thrust. The lantern carried by these eight arches is merely a pinnacle surrounded by eight smaller pinnacles at its base. The parapet of the tower is very elegant, and consists of a row of pierced quatrefoiled circles surmounted by a cresting of the same design as used on the backs of the arches. The author of a book entitled "A Journey through Scotland," published in 1732, speaking of St. Giles's, Edinburgh, says: "Atop of this church is erected a large, open cupola in the shape of an imperial crown. King David erected a copy after this over St. Nicholas's Church, Newcastle, but it does not near come up to it."

In the Aberdeen example the crown consists of four arches springing from the angles of the square boldly buttressed tower, and supported, as in the case of St. Giles's, by stumpy buttresses rising from the cornice and terminating in small pinnacles. In this case, too, the backs of the arches are straight, ornamented

¹A paper by W. H. Wood, read before the Northern Architectural Association, February, 1905.

with a cresting, and having a pinnacle placed half-way up the slope. The lantern is solid and larger than that of St. Giles's, and finishes with an arched royal crown surmounted by an orb and cross. St Dunstan-in-the-East, designed by Sir Christopher Wren, is a small structure, but elegant. The four arches spring from the corners of the tower; they are unmoulded and of high pitch, the extrados being carried up by a reversed curve to the lantern, which is better proportioned than in the Scotch examples, and surmounted by a spire. Four pinnacles of good outline stand against the arches, into which they are bonded, thus giving a good mass of masonry where required to resist the thrust.

We will now proceed to examine St. Nicholas's. The tower stands at the west end of the nave, with which it communicates by a lofty four-centred arch, moulded with a series of splayed orders, each having a deep hollow sunk in the splay. These orders are continuous on jamb and arch without the intervention of an impost. The side arches opening into the aisles are similar but



much lower, and with a three-light window over each. The mouldings of these and the arch to the nave stop on a boldly moulded plinth, which is unbroken except where the base of the vaulting shaft penetrates it. This omission of the cap is found in the fourteenth-century nave arcade, and in the nave arcade of St. John's Church, Newcastle; but in these cases the orders of the arch die into the sides of the octagonal piers at the springing line, and are not carried down to the base.

The west side of the tower is occupied by the doorway having a depressed four-centred arch, and with a five-light transomed window over it. In each angle is a small quarter octagonal shaft, from the cap of which spring the ribs of the vaulting. This is a lierne vault of beautiful design, all the ribs being of the same size and section, a splay with deep hollow, the same as to the arches below. Shields with the arms of the founder (three annulets, two and one, in chief a greyhound courant) are placed at the four points where the main ribs abut upon the octagonal well-hole, the other four points being occupied by carved bosses. Carved round the inner side of the well-hole is the inscription: "Orate pro anima Roberti de Rodes." Robert Rhodes, who lived in Newcastle from 1427 till 1445, and died in 1474, was a great benefactor

to the Newcastle churches; and tradition has always credited him with the erection of this tower, probably somewhere about the year 1470.

The plan of the tower is, approximately, square, but owing to some irregularity in the setting-out of the east is narrower than the others, so that none of the corners are truly right angles. The spiral stair leading to the roof is in the northwest corner and does not show externally. The entrance to it is in the north jamb of the west doorway.

The staging of the tower is good, although unusual in this part of the country, the belfry stage being tall in proportion to the rest. Well-marked horizontal members coincide with the internal divisions, the first being a heavy string at the level of the ringing-chamber floor, and the second, which is formed of three courses of offsets, at that of the belfry. Staging, or the marking of the horizontal divisions of towers, is an art in itself. Many simple but very dignified towers owe their success to skilful staging. Take St. Margaret's at Durham, for instance, a simple square tower without buttresses or ornamental features, but divided into stories by bold offsets in such a way as to produce a most satisfactory effect.

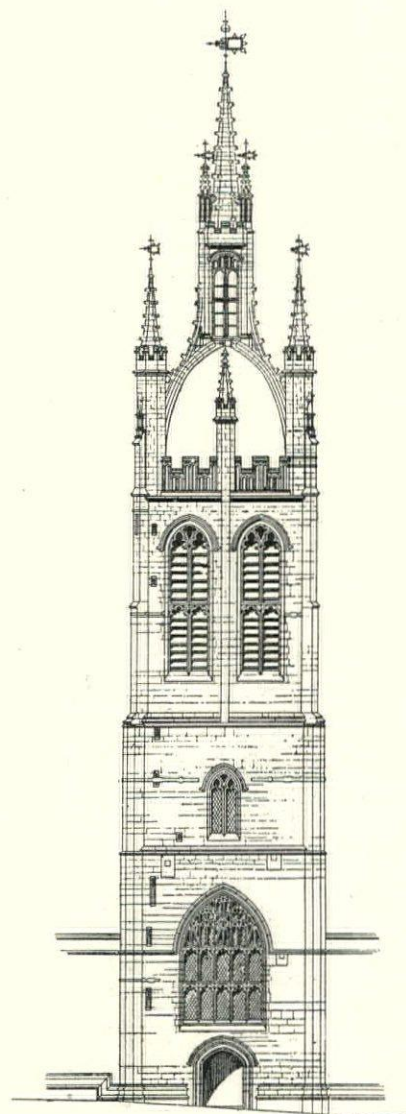
To return to St. Nicholas's. The angle buttresses are semi-octagonal up to the bottom of the belfry stage, where they are weathered back, and somewhat abruptly change to square, set diagonally, and in this form are carried half-way up the four large angle pinnacles, where they terminate in pedestals, each supporting a life-sized figure, representing Eve, at the

northeast corner, Adam, with the apple, at the northwest, Aaron with mitre and book, at the southwest, and David with the harp, at the southeast. These statues are very rude as works of art, and are now considerably weather-worn.

From the offset at the belfry stage there rise smaller square buttresses on the centre of each face of the tower. These are carried up through the cornice and merge into the face of hexagonal pinnacles, between which and those at the angle is a pierced battlemented parapet. This has been entirely renewed, and suggests in design the similar finish to the two stages of the central tower of Durham, which latter were entirely renewed about 1859, replacing those of about 1474.

The angle pinnacles are octagonal, 5 feet 9 inches in diameter, and 43 feet high above the cornice of the tower. They are beautifully designed, the height of the battlemented parapet being well-proportioned to the rest, and, as you will notice, the sloping sides of the upper portion curve out at the base with the most graceful effect.

There is a peculiarity in the arrangement of the crockets, which are placed on four angles only of these octagons, while in the smaller hexagonal pinnacles they are placed on every angle, but at



alternating levels, and this arrangement is adopted on the spire itself.

Internally, corbelled squinches are formed in each corner of the tower, but do not carry anything, as the angle pinnacles scarcely overhang the line of the inner wall face, but they help to bind the angle of the tower. From the inner faces of these angle pinnacles spring the great arches carrying the lantern and spire. These are 31 feet in span, and, as you will see from the section, are four-centred, but with the largest curve of 23 feet radius at the bottom, and the smaller curve of 14 feet 6 inches radius at the top, the intersection of the curves being exactly at two-thirds of the distance from the springing to the apex, where the arches meet on a key block. Through this block there is a hole 4 inches by 3 inches, probably for dropping a plumb-line during the erection of the spire, and it may have been used for suspending a pulley for hanging the light from at night. It seems hardly likely that the light would be placed in the lantern itself, as it is difficult to see how this could have been accomplished except by a man going up a ladder to do it—anything but a pleasant task on a stormy night—and if it were placed there the stonework would hide the light from any one approaching towards the angle.

The section of the arches is built up of four orders, the upper one, which is crocketed, being carried in an ogee curve half-way

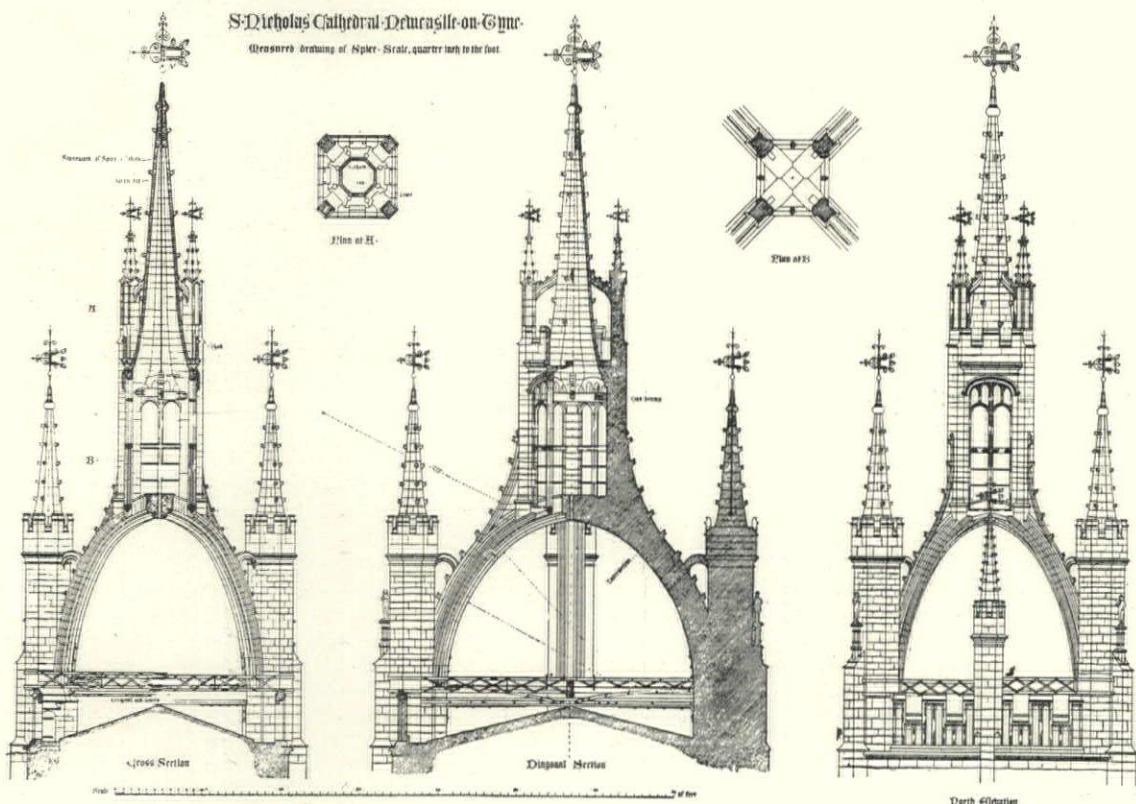
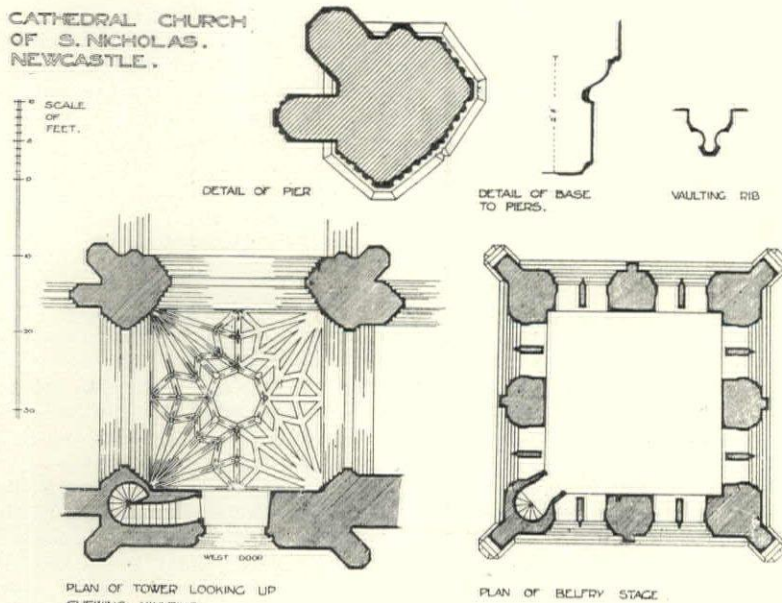
There is a popular belief that there is an iron core bar in the arches, but this is a fallacy; they are stone throughout.

The structure of the lantern itself is singularly light, and consists of four angle buttresses set diagonally, between which are two light-transomed windows, the mullions being carried on arched sills spanning from arch to arch. The lights of these windows are now filled in with strong bronze frames, inserted when the steeple was repaired in 1895, in place of the iron saddle-bars, which had rusted and split the stonework.

At the springing of these window-heads, from which point the spire commences (see section), are two oak beams 12 inches by 6 inches, placed crosswise and fastened to each angle of the structure by iron straps. The angle buttresses terminate in pinnacles with panelled sides, from which spring small flying-buttresses to the sides of the spire, which has the same graceful spreading curve at the base as have the angle pinnacles.

These concave lines are characteristic of the fifteenth century—you find them at Sedgefield on the tower—and mark the

greater appreciation of line which distinguishes work of this date from that of earlier periods. The masonry of the spire is laid with horizontal beds, and is 4½ inches thick, with the exception of the upper 7 feet, which is solid. The rod of the vane is brought through this solid portion, and attached to it



up the angle buttresses of the lantern, which is thus much stiffened, and the arches themselves rendered more rigid, while a wonderful grace of outline is given to the whole composition, this feature being one of the chief causes of the superior elegance of this over the other examples. The courses of these ogee curves are laid with beds none of which radiate to the center, but are approximately horizontal for the lower half, and truly so for the upper, where they are bonded in with the angles of the lantern.

is a rod with a weight at its lower end which hangs a few inches above the cross-beams and is supposed to act as a counterbalance to the spire during storms. This method has been adopted in other instances, but I am not sure that it is so good as securing the rod to the cross-beams would have been, or forking it and building the ends into the masonry, as Wren did at St. Mary-le-Bow. The parapet of the lantern is 5 inches thick, with diminutive buttresses 3 inches square behind the centre merlons, and it

stands on the cornice, the stones of which are carried through and form a walk round the spire. The water from this is carried off through small weep-holes at each angle of the spire, and drops down inside, this arrangement of the holes preventing the water falling on the beams.

As will be seen from the drawing, the large arches carrying the lantern are tied in at the springing by an arrangement of ties of flat bar-iron passing right round the angle pinnacles and crossing over the centre of the tower. They are fitted with union joints and are braced together vertically by diagonal straps, presenting, as seen from below, the appearance of lattice girders. These were added in 1868 by Sir G. Gilbert Scott, and were wrapped with spun yarn and tarred as a protection from the weather. This has proved an unfortunate experiment, as, the tar having perished, the yarn retained the moisture, thus causing greater oxidization than if they had been unprotected. This covering was all removed during the last repairs and the iron cleaned and painted.

There still remain within this modern ironwork the oak beams which fulfilled the same duty previously. These beams are arranged in pairs crossing diagonally from corner to corner of the tower, where they abut against the masonry of the pinnacles, and resting on each other in the centre where they cross, the lower one being supported by the apex of the roof. The spaces between the upper and lower beams of each pair are filled in with other pieces and the whole bolted together. The beams, which are considerably decayed in places, have been repaired at some time, new pieces being inserted attached to the old by scarfed joints. These newer pieces are at the ends, and are now decaying where they touch the stonework, owing to the latter becoming saturated by rain and retaining the damp. At the northeast and northwest corners small portions of the original iron straps remain though now corroded to extreme thinness. These had passed round the pinnacles and been secured to the oak beams by round-headed bolts. One of these is shown at A on the drawing. The straps show by their laminated structure that they had been forged. At some later time, probably when the beams were repaired, new iron straps were added. These are bolted to the oak by screw-bolts with square nuts of irregular sizes. Other straps were added above and below the beams, bolted right through and turned up against the soffits of the arches and down against the pinnacle, forged with a strong root in the bend and attached to the stonework by bolts in a much less satisfactory manner for giving a direct tie than the original straps. Although the oak beams are considerably decayed and the iron work corroded they would still be equal to their duties had the tightening up of the lattice ties by their unions not relieved them of all strain. I am inclined to believe that in the older of these beams and the traces of the iron straps remaining on the two north pinnacles we have the original ties inserted when the tower was built. When Mackenzie wrote in 1827 he mentions these beams as being encased in lead, which would account for their preservation. This was exactly what a mediæval architect would do. The encasing of wooden structures in lead is well exemplified by the lantern of Ely Cathedral. I do not know when the lead was removed, but there is no trace of it left now.

Although the structure may theoretically be capable of standing without ties, it would not do so in actual practice, exposed as it is to the fierce gales so frequent in this northeast corner of the country, to the occasional shocks of earthquake—which, happily, are of infrequent occurrence—and to the vibratory action of the bells. Experiments made with a heavy plummet suspended from the cross-beams of the lantern to just above the tie-beams below registered a swing of 15 inches in each direction during the ringing of the bells. This, of course, does not mean that the structure sways 30 inches, but certainly indicates a considerable movement, as indeed may be observed by the eye by getting the spire in line with a fixed vertical object while a peal is being rung.

The weight of a cornice pinnacle taken from the top of the cornice of the tower and including as many of the tower voussoirs of the arch as would stand unsupported (a point shown by the lower radial line on the section) is 73 tons. The weight of one arch above this point, together with one-fourth of the lantern and spire, being the weight supported by each pinnacle, is 30 tons.

(To be Continued.)

THE BUILDING AND THE DESIGNING OF THE "SKYSCRAPER."

THE materials of construction of high office buildings may be classed under three heads—namely, masonry construction, skeleton steel construction and reinforced concrete construction. The first of these methods, masonry construction, de-

pending on solid walls, is practicable to a certain limit only. As has been mentioned before, the limit is usually about ten to twelve stories in height, for the reason that beyond that height too much valuable space is necessarily sacrificed to walls. According to a table prepared by Mr. F. E. Kidder, the city ordinance requirements for a 12-story building in New York is 40 inches thickness for the first story exterior wall. The building law of Boston requires 36 inches for the same wall; St. Louis, 34 inches; Denver, 30 inches; while Chicago is satisfied with 28. Truly, a great variation in the factor-of-safety.

On the basis of the New York requirements, a building 300 feet high would require a wall 7 feet thick, which practically puts a limit to masonry-constructed walls for skyscrapers on a 25-foot lot. So we may dismiss this method of construction from the skyscraper problem.

The first advance from masonry construction was the use of cast-iron columns, which were protected with fireproof coverings. But since the possibilities of steel construction became known very little use has been made of cast iron for columns. One reason for its disuse is the difficulty of making satisfactory tests of its strength, owing to the possibility of the shifting of the core in casting. My own experience leads me to be cautious in the use of cast-iron columns. In one instance the usual tests were made for thickness of shell, no defects were apparent, but later the same column fell off a wagon and broke in two, showing a bad flaw, thus saving my reputation.

When steel columns were first used in high buildings they were merely to support the floor loads, as in the *World Building* in New York. This building is 199 feet to the roof line, with self-sustaining brick walls, faced with sandstone and terra-cotta, the thickness of the wall being 11 feet 4 inches at the bottom and 2 feet at the top. The steel columns were let into chases in the wall in the lower stories and set free above. The next step in high building construction was the skeleton steel frame, in which all floor and wall loads are transmitted directly to the columns and by them to the foundations. The girders of each floor are calculated to carry the floor load and exterior curtain-wall for that story, thus eliminating the necessity of exterior wall except for protection from the weather. The thickness of these walls varies in accordance with the ordinance of different cities, and in all cases the walls are thicker than is necessary.

The Chicago building-law requires that the curtain-wall of a building 250 feet high shall be 12 inches thick for the first 150 feet from the top, 16 inches for the next 50 feet and 20 inches for the lower 50 feet. Mr. W. H. Birkmire, the well-known authority on steel construction, recommends lighter curtain-walls as being safe and reducing expense.

Time is saved by adopting skeleton steel construction for this class of buildings on account of the rapidity with which they can be erected. The Central Bank Building in New York, 75 by 150 feet, fifteen stories high and two below the sidewalk, was entirely completed in seven months.

The most essential part of the construction of a skeleton steel frame is the actual support or column. Other parts of the structure may be weak without causing more than local damage, but when a column fails the entire structure is liable to fall, and hence the greatest care of architect and engineer must be used in calculating stresses and framing columns and their connections.

There are various shapes of built-up columns, each with some particular feature, all suitable for this class of construction and used at will by the architect, the design depending largely on the time limit under which manufacturers will agree to fill orders. Whatever structural shape is used, whether for columns, girders, floor beams, trusses or braces, actual tests have proved that the burning of the ordinary contents of a room will heat unprotected steel to a degree that will entail disastrous results when a stream of water is thrown on the heated metal. This fact renders it absolutely necessary to encase steel in non-combustible material.

When we speak of a fireproof building we use the term relatively, since the expense of an absolutely fireproof building is too great to admit of general use. Buildings constructed so as to secure a salvage of 60 to 80 per cent. are considered fireproof. It is not necessary to discuss the various fireproof materials, for the the Baltimore fire proved cement is the best fire-resisting material.

While concrete has been used in building for centuries, and steel framed structures have become common, a new method of construction has come into use by the combination of these two materials, steel and concrete, in what is known as armored or reinforced concrete. The earliest record of reinforced concrete mentioned by Mr. Kidder is the invention of P. A. J. Monier, a

¹Extract from a paper by Mr. Edward S. Hammatt, architect, read before the Contemporary Club, of Davenport, Ia.

gardener of Paris, in 1867. In 1869 François Coignet, of Paris, secured a patent on a combination of iron and concrete. In 1875 W. S. Ward constructed a building near Portchester, N. Y., in which not only all the exterior and interior walls, cornices and towers were constructed of concrete, but all of the beams and roofs were exclusively made of concrete reinforced by light iron beams and rods.

European engineers have done more with reinforced concrete than American engineers, for the reason that our steel plants have produced structural steel of such excellence, the use of concrete has been neglected until within the last few years. While reinforced concrete has been used for some years for bridges and other engineering work, the first skyscraper to be built of this material was the Ingalls Building, of Cincinnati, O., begun in the fall of 1902 and designed by Elzner & Anderson, architects.

From experiments with concrete and steel made by M. Considère, Capt. John S. Sewell, U. S. Engineer Corps, and others, and the exhaustive tests at Watertown Arsenal, we learn many interesting facts. One of the latest investigators, Mr. J. W. Schaub, makes the statement that if a rusty bar of iron is inserted in concrete mortar for fifteen to twenty days it will be found free from rust, due to the iron giving up its oxygen to the cement. He adds: "The cement being anhydrous and alkaline in its reaction, will prevent the formation of rust, so that a coating of cement mortar should be, from a chemical and physical standpoint, an absolute protection against rust."

While engineers are making these and other tests¹ with many different assumptions and empirical formula, we are impressed with the lack of uniformity in the factor-of-safety.² We are impressed with this lack in all structural designing.³ In ordinary construction, such as we have to deal with in a city of this size, it is the writer's custom to take the average given by available authorities. This should not be necessary and could be avoided if all tests of strength of materials were made and formulated under Government inspection. It has been shown that steel reinforcement prevents shrinkage of the concrete and greatly adds to its tensile and compressive strength. Further advantages of reinforced concrete are its cheapness of construction in comparison with structural steel and its fireproof quality. This last characteristic was thoroughly tested in the late Baltimore fire. After the fire, interest centered in a small four-story brick building, with a cast-iron front, the interior of which had been remodeled shortly before the fire, the exterior walls had been retained while the new columns, girders and floors had been constructed of concrete steel. The exterior walls were found demolished, but the interior walls were intact, except where injured by falling walls, proving beyond doubt the fireproof qualities of concrete construction. Another advantage of concrete is that ornaments and other details can be moulded of it.

There are many systems of reinforced concrete, the variation being due to the different forms of steel reinforcement. That in the Ingalls Building, mentioned above, is of cold-twisted square bars, used throughout. This system greatly increases the tensile strength of the bars after twisting and increases the mechanical grip of the bar on the concrete. The Ingalls Building is 50 by 100 feet on the plan, sixteen stories high, 210 feet above and 20 feet below the sidewalk to bottom of foundations. The entire structure is reinforced, consisting of steel bars imbedded in concrete with their ends interlaced, making a concrete monolith. The exterior walls are faced with marble for the first three stories, glazed gray brick for the next eleven and glazed white terra-cotta for the last story and cornice. The foundations are all of reinforced concrete.

In New York City, when it is necessary to go to great depths for foundations, the pneumatic process is successfully used. In Chicago a system of grillage, on piles, of I-beams and concrete, has been in use for several years. And now that reinforced concrete piles are available, and do not have to be cut off at the water-line to prevent decay, we have a fireproof, windproof and practically indestructible building as the result.

In view of the possibility of conflagrations liable at any moment to temporarily jeopardize the business interests of every city, it is necessary that the requirements for materials and construction of buildings in such districts should be most rigid. It should be made a criminal offense to erect a building that is not fireproof in congested business centers.

The business interests are not the only interests to be safeguarded. Thought should be given to the æsthetic side of a city's life and provision made for it. There should be in force in every city laws regulating the height of buildings. European cities, backed by centuries of art training, regulate the height of buildings on purely æsthetic grounds.³

When we consider the last division of our subject, the æsthetics of the skyscraper, we must remember that our æsthetic training is based on the proportions of Classic architecture—the low buildings of the Grecian archipelago. We are appalled at the seeming hopelessness of reconstructing our æsthetic ideas on such a gigantic vertical plane as a skyscraper demands. It may be said that architects have had a vertical problem to deal with before, in the Gothic cathedral. That is true, but the conditions are entirely dissimilar, there was a proportionate breadth at the architect's disposal.

Many of the skyscrapers are on lots so narrow in comparison with their height that little remains to deal with but a vertical streak, as in the acute angle of the "Flatiron" or Fuller building of New York. Attempts have been made to reduce the apparent height of these buildings by the use of repeated horizontal lines. The result of such treatment is seen in pronounced form in the St. Paul Building in New York. Here the designer has grouped two stories together and piled section on section in monotonous uniformity until the client's money-limit was nearly reached, when, in a sublime effort, three stories are grouped above a sub-cornice and his attempt is finished—a procedure, as one writer puts it, "Quite as sensible as if a man were to thrust his head through the crown of his hat and wear it below his head instead of above it."

Various other styles of high office buildings are seen. Few are satisfactory in appearance. Their designers strive for effect by dividing the façades horizontally and vertically. Pretentious detail runs riot. All our architecture needs restraint, needs a more refined sense of proportion—a more conscientious use of detail.

There are a few skyscrapers which are designed in a rational way, their architects realizing that the problem is one of vertical design and treat it accordingly, not even attempting to work out the design in any of its existing architectural styles. The original Monadnock Building in Chicago, designed by Mr. John W. Root, is one of the best examples of good design in skyscrapers. It is a building of the severest plainness. The necessary strength of base is secured by a gentler outward curve above the first story, an effect of batter being secured by champfering up the angles, widening as it rises several stories in height. The superimposed stories have plain, rectangular openings. The expanse of blank wall is broken up by shallow oriels, equally spaced, starting above

¹The U. S. Weather Bureau has made a series of experiments to determine the necessary reductions for wind velocity and pressure required to correct the anemometer record. As the writer has never seen any mention of such reductions, in works on strength of materials, these formulas with a table of indicated and reduced velocities and pressures are given, through the courtesy of Mr. Sherier.

PRESSURES AT STATIONS NEAR SEA LEVEL.			
Indicated velocity.	Corrected velocity.	Indicated velocity.	Pressure (lbs. per sq. ft.).
0	...	0	...
10	9.6	10	.369
20	17.8	20	1.27
30	25.7	30	2.64
40	33.3	40	4.44
50	40.8	50	6.66
60	48.0	60	9.22
70	55.2	70	12.2
80	62.2	80	15.5
90	69.2	90	20.2

Formula for determining wind pressures:

$$P = .004 SV^2.$$

$$P = \text{Pressure, lbs. avoirdupois.}$$

$$S = \text{Surface sq. ft.}$$

$$V = \text{Corrected wind velocity, miles per hour.}$$

Formula for reducing indicated velocity to corrected velocity:

$$\text{Log } V = 0.509 + 0.9012 \log v.$$

$$V = \text{velocity of wind in miles per hr.}$$

$$v = \text{linear velocity (miles per hr.) of cup centers of anemometer.}$$

²A factor of safety of 4 is legalized in the States of Michigan, Ohio, New York and Pennsylvania.

³Letters of inquiry were sent to the U. S. Consuls at a number of European cities, asking what restrictions are in force regulating the height of buildings and the reasons for such restrictions. I am indebted to the courtesy of the Consuls-General and Consuls of the following cities, and the city engineer of Birmingham, England, for replies tabulated below:

Birmingham, England.—No limit to height of buildings, except as to thickness of walls, and the law regarding ancient lights.

Edinburgh, Scotland.—Height of all buildings, from level of pavement to ceiling of highest room, must not exceed the width of street, and in no case more than sixty feet high without the consent of the Town Council.

Paris, France.—Height of building must not exceed width of street by more than 6 metres (19½ feet) for every additional metre in width of street ¼ of a metre (about 10 inches) may be added to height of building until the limit of 20 metres (nearly 66 feet) to the eaves is reached; but no building may exceed that.

Rome, Italy.—Height of buildings limited to twice the width of street.

Berlin, Germany.—Limited to 22 metres (about 72 feet) from curb to cornice. The reasons are (1) Height of building limited to width of street. (2) That is as high as the fire department can work effectively in extinguishing fires or rescuing people from upper stories. (3) It secures a uniform sky-line and preserves the architectural beauty and harmony of the street.

Vienna, Austria.—Height of buildings limited to 25 metres (82 feet). The reason is, so light and air be not too much shut off.

the outward curve of base, at top of second story and extending to the story below the frieze line.

The cornice is formed by repeating the gentle curve of the base. The proportions of this building are so carefully studied that in spite of its austerity it is one of the most pleasing and satisfactory of skyscrapers. The pleasing effect of the building could have been heightened by using a lighter colored material, the dark-colored brick and terra-cotta being almost too somber for such a massive structure.

Among other skyscrapers of successful design there are but two I shall mention as being exceptionally satisfactory. One is the Schiller Building, of Chicago, designed by Mr. Louis H. Sullivan, and the other is the preliminary sketch for the *Times* Building, New York, by Mr. Cyrus L. W. Eidlitz. This sketch is Gothic and of unusual charm. Unfortunately, the design was modified in construction.

While we have a few individual examples of fine design the problem of effective treatment of the skyscraper is one still open to solution.

A TROUBLESOME BRIDGE PAVEMENT.

WITH the exception of a small part of the sidewalk on the Cambridge side, says the *Boston Transcript*, the satisfactory paving of Harvard Bridge has at last been accomplished. Workmen are now engaged in putting the finishing touches on the eastern walk on the Boston side, and when the Cambridge sidewalk has been relaid the long chapter of failure and experimentation that this bridge has undergone will be closed. For the first time in its existence of fourteen years it will have a pavement that will stay in place, regardless of weather conditions and traffic stress. The history of the attempts to bring about this apparently simple state of affairs is one of considerable interest, and shows with unusual clearness the difference between theoretical design and actual accomplishment.

When this great traffic way between the Back Bay and Cambridge was first opened it was paved with concrete from rail to rail. The bridge presented a smooth surface that was both pleasing to the eye and ideal for travel. This condition of affairs was short-lived, for hummocks and cracks appeared that made walking or driving both unpleasant and dangerous. Paving experts were called in, and the conclusion was reached that the concrete was not heavy enough to withstand the strain imposed upon it by the stress of traffic. More concrete was added, and a temporary improvement resulted. The cracks soon reappeared, wider and deeper than before, while in other places the pavement rose in mounds like the waves on some solidified sea. It was then that the Harvard Bridge began its career as a trouble-maker—a career which has attracted wide attention in engineering circles.

On either side of the draw, in the centre, Harvard Bridge consists of ten arches, arranged alternately, 105 and 75 feet in span. These arches are formed of parallel rows of plate-girders, which rest upon masonry piers. The longer spans rest solidly upon the stonework of the piers, but the 75-foot ones are loosely swung from the ends of the longer ones, this plan having been adopted to give play for the expansion and contraction of the metal comprising the bridge floor. The total length of the bridge is 2,157 feet, including the swinging draw in the centre. Aside from the twenty arches mentioned, there is a 90-foot arch on each side of the draw, and an extra arch at the Cambridge end of the bridge. As less than half of these arches are arranged to move with the expansion and contraction of the bridge floor, it can readily be seen that the movements of the stationary arches were sufficient to cause the cracking and heaving of the concrete pavement which stretched in an unyielding sheet from either shore to the central opening for the swinging draw.

Engineers, called in consultation, soon demonstrated this fact, and then all efforts were devoted to discovering some method whereby this expansion and contraction could be compensated. It was first decided to lighten the concrete pavement, and in order to do this the former roadway was torn up, and a thin layer of concrete was put down on a plank foundation. This soon proved unsuccessful and was taken up, and a plain plank roadway was substituted in the centre of the bridge, the concrete pavement being left on the sidewalks. A marked improvement was at once noticed, as the wood was sufficiently elastic to accommodate the strains put upon it by the movement of the metal floor of the bridge. But a new difficulty soon appeared; the constant wind dried the wood and gave it a tendency to flake. The exposure to rains, the alternate wetting and drying, and the continual crush-

ing of wagon-wheels soon turned the planking into a spongy, unsafe mass that needed frequent renewal.

Various woods were tried, various methods of laying the planking, but all to no effect. Scarcely a month passed that some part of the bridge was not blocked off from use while the roadway was being relaid. This condition was kept up for years with little change. Then the use of wooden blocks as a pavement was suggested, and this scheme was tried in an experimental section. The results were most satisfactory, and it was decided to pave the entire roadway in this manner. This has now been done throughout, with the exception of the draw, and the plan is giving perfect satisfaction. The wooden blocks are set on end on a foundation of planks laid at an oblique angle to the axis of the bridge, thus presenting a yielding mass of wood to the strains of compression brought about by the movement of the anchored arches. As the grain of the wood in the blocks runs perpendicularly, a hard and practicably non-crushable surface is presented to the wear of passing wheels, thus saving the roadway from being cut into ruts.

This solution of the problem was found to be financially impracticable for the sidewalks, however, and there the concrete and asphalt pavements were continued in use. They eventually became so uneven as to be actually dangerous to walk upon. Experiments were then begun to find a suitable pavement for this portion of the bridge, and the most successful method devised is now nearly completely installed. The former concrete walks have been removed, and in their place a board walk has been laid, a space being left between the narrow strips of hardwood that make up the pavement to allow for the movement of the bridge-floor.

One other bridge, because of its construction, has shared with Harvard Bridge this misfortune in pavements. This is the Washington Bridge, a steel arch that spans the Harlem River, in the northern part of New York City. The expansion and contraction of the metal work in this bridge has been so great that it has entirely wrecked the roadway that traverses it, making it necessary to close it entirely upon certain occasions. This bridge, also, has an ornamental stone railing on either side, and the heaving and subsiding of the bridge-floor underneath has at times dislodged portions of this rail and sent them hurtling to the water below.

ILLUSTRATIONS.

ROCKEFELLER HALL: BRYN MAWR COLLEGE, BRYN MAWR, PA. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

THE TOWER OF THE SAME.

"OVERLEIGH": HOUSE OF SAMUEL FROTHINGHAM, ESQ., LENOX, MASS. MESSRS. ADAMS & WARREN, ARCHITECTS, NEW YORK, N. Y.

FRONT AND REAR VIEW OF THE SAME.

CONGREGATIONAL CHURCH, WAKEFIELD, MASS. MESSRS. HARTWELL, RICHARDSON & DRIVER, ARCHITECTS, BOSTON, MASS.

BANK BUILDING, LEOMINSTER, MASS.: WALTHAM SAVINGS BANK, WALTHAM, MASS. MESSRS. HARTWELL, RICHARDSON & DRIVER, ARCHITECTS, BOSTON, MASS.

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ENTRANCE PAVILION: HOUSE OF SAMUEL FROTHINGHAM, ESQ., LENOX, MASS. MESSRS. ADAMS & WARREN, ARCHITECTS, NEW YORK, N. Y.

NOTES AND CLIPPINGS.

THE DETROIT MUSEUM OF ART.—The Detroit Museum of Art has almost completed the large addition to its building which was authorized by an issue of bonds to the amount of \$50,000 by the city of Detroit. In the new part is a fine lecture hall, accommodating nearly one thousand persons. Last month two of the new galleries were opened with an exhibition of pictures by Michigan artists. There is another gallery to be completed. On the lower floor the additional space almost doubles the capacity of the museum.

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, NOVEMBER 18, 1905.

No. 1560.

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IT will be interesting news to many, that the Corcoran Art Gallery, at Washington, one of the buildings for the housing of art collections most recently built, is now held—by some—to be unsuited for its purpose, and that, because of this, steps have already been taken by the United States Government that may lead to the establishment at Washington of a National Art Gallery in which can be gathered and exhibited such possessions coming from the various fields of art as the Government may acquire by gift, bequest or purchase. To leave the matter with this crude statement would do injustice to a very serviceable building and a capable designer, so it should be explained that the gravamen of the charge is not so much directed against the building as against the manner in which it is heated—the steam-radiator is the guilty party. We say this without personal knowledge of the actual conditions at the Corcoran Art Gallery; but it is not likely that President Roosevelt would have instructed the Department of Justice to take any action in the matter, unless there were satisfactory evidence that the facts were substantially as alleged.

IT appears that Mrs. Harriet Lane Johnson, once "the Lady of the White House," in James Buchanan's administration, and lately deceased, was the possessor of certain art-collections which she, at least, valued highly. These collections she bequeathed to the Trustees of the Corcoran Art Gallery under certain conditions and unless the National Government should at any time create and maintain a National Museum of Art, in which case the Trustees were to surrender their charge to the keepers of the national galleries. The conditions originally attaching to this bequest were of the ordinary kind, and merely

provided that the collection should be suitably housed and cared for, should be kept together and be known by her name. In a supplementary codicil, however, Mrs. Johnson required that the Trustees of the Corcoran Art Gallery should build an "annex," of such construction and arrangement as should meet the approval of her executors, especially for the reception of her collections, and stipulated further, that "said annex shall not be provided with any means for artificial heat, and shall be so constructed and arranged as to protect, as far as possible, from the heat of summer the articles therein deposited." The codicil then recites that the ground for making this stringent condition is to be found in the fact that many of the pictures in the collection "are of a character to become cracked and ultimately ruined if deposited in a place subject to the heat ordinarily maintained in said [Corcoran] art gallery."

THOSE who are familiar with the mists that in spring-time and autumn rise from the Potomac will shudder at the thought of the ruin of mildew that would probably fall on Mrs. Johnson's beloved paintings unless her unheated gallery should be provided with an air-lock tended by a careful custodian. But it is not probable that a literal compliance with the stipulation that all "means for artificial heat" shall be excluded would ever be exacted by the executors or the courts. Mrs. Johnson was quite right in fearing the injury that might be done by the ultra-dry and unduly heated atmosphere maintained in the ordinary public art gallery, and it is well that architects who may be charged with the building of such structures should, in this way, be reminded that the physical comfort of the visitor is not the first consideration after all, and that they have not discharged their full duty when they have caused to be installed the air-tight and dust-proof cabinets for small *objets de vertu* which are now made with such excellence of workmanship. It seems more than likely that the glories of the Italian galleries, which, during centuries, have endured satisfactorily under what may fairly be considered natural conditions, would have deteriorated rapidly if subjected to the hygroscopic vagaries accomplished by the American climate aided by architects and heating engineers.

THE Trustees of the Corcoran Art Gallery have, wisely, declined to accept the bequest, and, under instructions from President Roosevelt, steps are now being taken to secure the collection for the Nation—the course Mrs. Johnson hoped would be followed—the expectation being that, for the moment at least, they can be housed in the new building for the National Museum, wherein a special unheated gallery can probably be provided without much trouble at this stage of the work of construction. Started in this way, it is more than probable that, very shortly, steps will be taken to provide a National Gallery building on some suitable site along the Mall, wherein the now scattered artistic treasures of the Government may finally be arranged for a wider exhibition and a greater usefulness than they now enjoy.

PLANS now under discussion at Harvard University will probably result in bringing about the elevation of the Lawrence Scientific School to the educational plane that is already occupied by the other professional schools in the University—the Medical, Law, Divinity and, possibly, the Dental Schools—entrance into which requires, as a prerequisite, the possession of a Bachelor's degree by the applicant. One result of this, since the Department of Architecture is attached to the Lawrence Scientific School and not to the College, will be that, very shortly, the architectural school at Cambridge will have advanced to the position of a purely graduate school—a position which it already measurably holds. This step will assure in the students a certain maturity not only of years but of intellectual development and judgment, and should produce an output of a high average excellence. But we gravely question how far the holding of a Bachelor's degree and the practical assimilation of the things it stands for are essential parts of the equipment of architects of a certain type or temperament. If architecture be a science and only a science, naught but good can come through admitting to the department only graduates from colleges of a certain standing. But if architecture be an art, should not the aspirant's admissibility be measured by something other than the possession of a Bachelor's degree?

FORTY years ago a student at Harvard received his Bachelor's degree at the end of four years and, if he was vain enough to value a Master's degree, he came back a year later and acquired it by the simple process of paying five dollars. Nowadays a Master's degree means more, and one must pursue certain prescribed post-graduate studies to acquire it, and the same with other degrees. In many cases the studies for these higher degrees have been pursued elsewhere than in Cambridge—often abroad, to the manifest widening of the mental horizon of the student who adopts such a course. Perceiving the peculiar advantages that such a course has for architectural students, the authorities at Columbia University have made it known that graduates of the School of Architecture who desire to acquire one of the higher degrees may, after a year's residence at Columbia, pursue their further studies in Europe, where they can take advantage of the lecture-courses in Rome, Paris, and presumably any of the German university towns. Of course, the thesis work and, in a general way, the course of studies are to be done in conformity with a programme prescribed by the Columbia authorities who finally will confer the degree. But there is to be a considerable real liberty accorded to the student, who will not be obliged necessarily to enroll himself in any school or academy, but will be left free to gather his honey in whatever garden appears to him to furnish flowers best suited to his taste.

WHEN the great insurance scandal began to develop, it did not seem likely that, other than as individual policy-holders, architects could have any particular interest in the matter. But now, quite apart from the fact that insurance companies are given to building

elaborate offices for themselves and are, moreover, one of the main sources for the procurement of building-loans, it appears that architects have a very direct interest in the enquiry. One of the matters uncovered during the past week has a very sinister aspect, since it appears that amongst the legislative measures which were beguiled into paths leading to destruction by the wiles of the corrupting agents of the insurance officials have been several excellent bills providing for the fireproofing and general betterment of tenement-house property. We imagine this revelation must be as much of a surprise to the fire-underwriter as it is to us, and we can imagine that the discovery of this game of cross-purposes may lead to reprisals of some sort on their part. But for the other evils that have been disclosed, it would be astonishing to discover that, just because the life-companies chanced to have an owner's interest in certain property that would be affected by the proposed legislation, they did not hesitate to procure the defeat of good bills by bribery and corruption.

IT will be recalled that on the morning after the burning of the Iroquois Theatre in Chicago certain employes of the contractors were seen upon the roof of the building busily engaged in removing the temporary fastenings of the skylight over the stage. But for the forgetfulness of the contractors' workmen, this skylight would have opened automatically and fewer deaths would have resulted through suffocation. Because of the evidence of their constructive responsibility for the disaster, the contractors, the George A. Fuller Construction Company, were made joint defendants with the owners of the building in certain suits brought by the heirs of the victims. But when the first of these cases came to trial, late last month, in the Federal Court, the judge ruled that, in order to be able to hold the Fuller Company to any responsibility in the matter, the plaintiff must prove that at the time of the fire the theatre was still in the hands of the builders and had not been accepted by the owners! In later cases the plaintiffs' lawyers will probably find means of so framing their complaint as to bring these contractors into court and have determined at length their degree of responsibility for a very grievous catastrophe.

A RATHER curious educational undertaking has just been established in Paris by two well-known architects, MM. Bouvens Van der Boyen and Bonnier, which is to be known as the School for Mutual Practical Instruction in Art. It is open to all those artists and amateurs of art who feel not only that they wish to learn something about the practical workings of other arts than their own, but that they are able and willing to impart to others interesting practical information as to their own. It is not easy to see how such a school can have a permanent existence, though it can readily be perceived that a coterie of artists might associate themselves together temporarily to their very real mutual advantage. The course of instruction includes not only lectures, illustrated by experiment and example, but visitations to the ateliers of various art industries, and excursions to points of interest, the expense being defrayed by assessments levied upon those who take part in them.

THE ROMAN MONUMENT TO VICTOR EMMANUEL II.

UPON the announcement of the loss of so able an architect as Count Giuseppe Sacconi, it is fitting that the attention of our readers should be drawn to the latest, and probably the greatest, work of this well-known Italian artist. Upon the Capitoline Hill, in Rome, a striking colonnade is now rising to view above the cornices of the lower buildings which line the narrow streets surrounding the base of the hill: it is the long-expected monument to Victor Emmanuel II., the plans for which were first obtained by a competition held in 1881. Signor Giuseppe Sacconi was appointed the architect and the cornerstone of the structure was laid in 1884.

Several years passed before much progress upon the works was made, and even in 1894, on visiting Rome, one saw little of the construction. However, in the following years the works were advanced greatly and, since 1900, the monument has grown rapidly up to the recent illness of Signor Sacconi, which began last January. During the past ten months, in the absence of the architect, the work has progressed more slowly under the direction of the assistant architect, Signor Giovanni Battista San Pieri, and his engineer, Signor Crimini. This hesitancy has been due to the fact that Signor Sacconi has been so ill at Pistoja that he has personally visited the works but seldom during the past year and not at all during recent months.

The monument is now well advanced, as is made plain by the accompanying drawings that illustrate the general arrangement, the grand approach in the foreground being upon the axis of the Corso at its southern extremity. The elevation published is the view seen from the Corso and the axis of the entire system is placed directly upon the axis of this avenue. An excellent site is thus provided and, when completed, this extensive monument may be seen from the distant Piazza del Popolo more than a mile away.

The visitor is first affected by the brilliant sunlight upon the white pile. The glare is particularly strong at noon and is a great contrast to the gray coloring of the closely surrounding older buildings, many of which date from the period of the Renaissance. Its architectural composition appears grand in general scheme, with its impressive colonnade looming up high above the dignified approach; but in detail it seems strangely weak and indecisive in character. The general architectural effect is certainly agreeable, even with the old hovels so closely pressing about the monument. Upon closer examination the heavier detail of modern French architecture is found, although the master-hand of the French draughtsman is not discoverable in its design. The general conception and the effect of the broad colonnade before which the equestrian statue of Victor Emmanuel II. is to stand, all so well exhibited by the grand approach, is very striking, and for this the architect should be accorded great praise.

The interior is still in an unfinished state. The important parts are outlined in rough stone and brick, but only portions of the marble covering are in position. The staircases are in place, but remain in the rough, and the few rooms in the structure are now used as studios by the sculptors and modelers for the preparation of their work. The general arrangement of the interior is simple, as but little room is available inside this monument, which evidently has been designed chiefly for exterior effect. A museum of various objects will be placed beneath the grand staircase of the main approach, a museum of relics taken by armies victorious in battle will be situated below the main portico, and a few offices for the administration, architects and engineers will be at the upper levels. These rooms, with space for the heating system and storage at the lower levels, will probably prove to be all the chambers the structure will contain. Large staircases will lead to the main portico from which visitors may view the city.

The central feature of the composition has not yet been placed in position. Facing the main approach, and upon the landing of the second system of steps in front of the monument, a rough stone pedestal now stands upon which will be placed the gilded bronze equestrian statue of Victor Emmanuel II., of which so much has been heard. This statue was designed by the sculptor Chiaradia, who died in 1902, but who left the work substantially completed. The sculptors now upon the works in Rome state that it is this completed statue which at last will surmount the main pedestal. However, as the exterior of the works will not be completed until 1911, future architects may decree otherwise and re-design the statues and architectural details which still remain to be placed in position, and Chiaradia's statue of Victor Emmanuel II. may be replaced, although this is unlikely as, up to the present time, it has cost, approximately, 1,200,000 lire.

It is expected that this edifice will cost 30,000,000 lire (\$6,000,000) upon its completion in the rough, in 1911, and that the sum of 15,000,000 lire more will be required to furnish the interiors with necessary mosaics, stucco, frescos and decorations. Probably these interiors will not be completed before 1920, and if a new architect should not be appointed soon, and one who will energetically advance the work, it is impossible to forecast the date of completion of this most interesting of modern Italian monuments.

FRANK E. PERKINS.

To the foregoing paper we add these further particulars gathered by the Rome correspondent of the *Morning Post*:

"Count Sacconi's plan, now in course of execution, comprises a great colonnade flanked by two square towers, in front of which is the huge pedestal which is to support the equestrian statue of Victor Emmanuel II.; the east of his horse is now finished, and the horse itself will shortly be founded in Rome. Beneath this central figure it is proposed to have an allegorical representation of the cities of Italy doing homage to Rome. The monument will also contain large chambers, which will serve as a museum for the banners and other trophies of the *Risorgimento*. There will be two entrances—one in the front, up a flight of steps, from which a second flight will lead to the base of the great statue, and yet another to each side of the colonnade; while a second entrance at the back will pass through a tunnel beneath the steps of Ara Cœli and thus communicate with the Campidoglio. The monument will stand at a height of 235 feet and will face straight down the Corso. The inside will be ornamented with rare old marbles found in the bed of the Tiber and elsewhere. Undoubtedly the whole when completed—and that cannot be before 1911 at the earliest—will be grandiose, like the now almost finished Palace of Justice at Rome. Whether it will be beautiful is a point on which opinions differ. 'Very modern Italians assure me,' says the correspondent, 'that people will cross the Atlantic to see it. Personally, I think that Americans and Englishmen would prefer to see what it has displaced.' These 'displacements' include the picturesque sixteenth-century tower of Paul III., the Franciscan monastery belonging to the Church of Ara Cœli, fifty houses, and, worst of all, the picturesque Palazzo Zucchetto, adjoining the Palazzo di Venezia. 'Finally, it seems a crime against history to burrow under the steps of Ara Cœli, erected to commemorate the Black Death and the one considerable monument of the Avignon Papacy now left in Rome. Fortunately, the authorities have spared the interesting and massive blocks of the ancient Wall of the Kings, which were found during the excavations for the foundations of the monument. It is appropriate that the first kings of ancient Rome should have their monument by that of the first king of modern Italy.

"Down to the middle of June, 1902, when no visible constructive work had been done, no less than £324,520 had been spent on prizes, models, funicular railways, foundations and compensations for houses destroyed, the last item alone amounting to £149,320, which might have been enormously reduced had the statue been erected on the Janiculum or on Monte Mario. The desire to have it on the Capitoline has thus not only led to unnecessary destruction, but to unnecessary waste of money also. Down to the end of last year an additional £400,000 had been spent, and there is more than five years' work still to be reckoned before the bill is complete. Thus the original sum of £320,000 voted by the Italian Parliament, even with the addition of another £57,509 subscribed by the public, has long ago been exhausted, and last year another £120,000 was granted. Continual strikes among the workmen—of whom there are 450 engaged on the monument itself and in the adjacent small stoneyards, as well as in the larger ones outside the Porta Maggiore—have caused extra delay and expense. Now arises the question of a successor to the architect—a man who will loyally carry out his work, and not seek to earn fame for himself by altering the design."

THE TOWER AND SPIRE OF ST. NICHOLAS'S CATHEDRAL, NEWCASTLE-ON-TYNE.—II.

ABOUT the year 1832 the church authorities became alarmed at the condition of the tower, which was leaning over 12 inches to the south and 9 inches to the west, and John Green, the architect, did some undersetting, and built the two large buttresses with raking joints on the south side; he also added the porch on this side, and two years later built that on the north. Previous to this the tower had no footings, but the wall rested on the clay at a depth of from 4 feet to 5 feet 6 inches. It was not an uncommon practice in the Middle Ages to build direct on the surface of the ground. The tower of St. Margaret's

Church at Durham and Chester Cathedral are examples. A good deal of tying-up was done at this time by John Dobson, the architect acting for the Corporation, iron bands being inserted at the level of the clerestory window-sills, that on the south side being continued right along the nave; other bands were inserted at the ringing-chamber level.

The work done in 1832 did not have as much effect as was anticipated, and in 1868 Sir G. Gilbert Scott reunderset the tower to a depth of 14 feet below the nave-floor level, putting in a proper concrete foundation. This was an operation of great difficulty, the tower having to be shored up on the south and west sides from the ground to the parapet.

When, in 1895, Mr. Leeson was employed by the Corporation to make certain "repairs," to use an ancient term, he found it necessary to take down the upper part of the angle pinnacles as far as their parapets. This was a somewhat delicate operation, as there was a danger of the haunches of the arches rising when the supporting weight of the pinnacles was reduced.

To obviate this, it was suggested to put centering under the arches, wedged up so as to relieve the haunches of all strain; but in this there was an element of danger, as had the centering got wet it would have swollen and dislocated the whole structure. The plan adopted was to replace the weight of each stone as it was removed by an equal weight of pig lead suspended by chains from the parapet of the pinnacle, and removed in like manner as each stone was replaced.

You will see from the section that the courses of these pinnacles are fastened together with square slate dowels, while the separate stones of each course are bound together by copper cramps.

In addition to this, the bronze rods of the vanes, 1½ inch in diameter, are continued down to the twelfth course from the top, where they are secured by a plate and nut, to which is attached the lightning conductor. All the vanes, of which there are thirteen, have been remade, only the web and scroll-work being retained; in the case of the five large vanes they have been made to work on ball bearings.

In connection with this work Mr. Hamilton Rendel, of the Elswick firm, took a great interest in the subject and made several experiments to determine the best mixture for the supporting rods and ball bearings. For the rods, phosphor bronze was tried and subjected to a test equal to 80 pounds wind-pressure upon a fixed vane assumed to have got stuck fast. This was not successful, the phosphor bronze at once taking a permanent set. The metal eventually used was the mixture known as "Elswick" bronze,

which was subjected to the same test and immediately returned to its original line when the pressure was removed.

Mr. Leeson, having decided to adopt the principle of ball bearings for the vanes, at first thought of agate for the balls, but was doubtful about the effect of frost on them at that height, so gun-metal was tried; but after a few weeks the vane began to work stiffly and would only move with a strong wind. Upon examination it was found that although enclosed in an air-locked chamber a black greasy deposit had formed on the balls. On the advice of Mr. Rendel these were removed, and others made of hardened copper substituted, which have proved thoroughly satisfactory. The old vanes had been made to work with a glass socket resting on a steel point, and in every case the latter had quite drilled through the glass, the broken fragments of which were jammed between the rods and the enclosing tubes, entirely preventing any movement. This shows that glass is a most unsuitable material for the purpose, and should always be avoided.

In the smaller vanes the supporting rod has a blunt end, and between it and the metal socket is interposed an agate skate of lens section, an arrangement not so sensitive as the balls, but which acts fairly well and cannot get out of order.

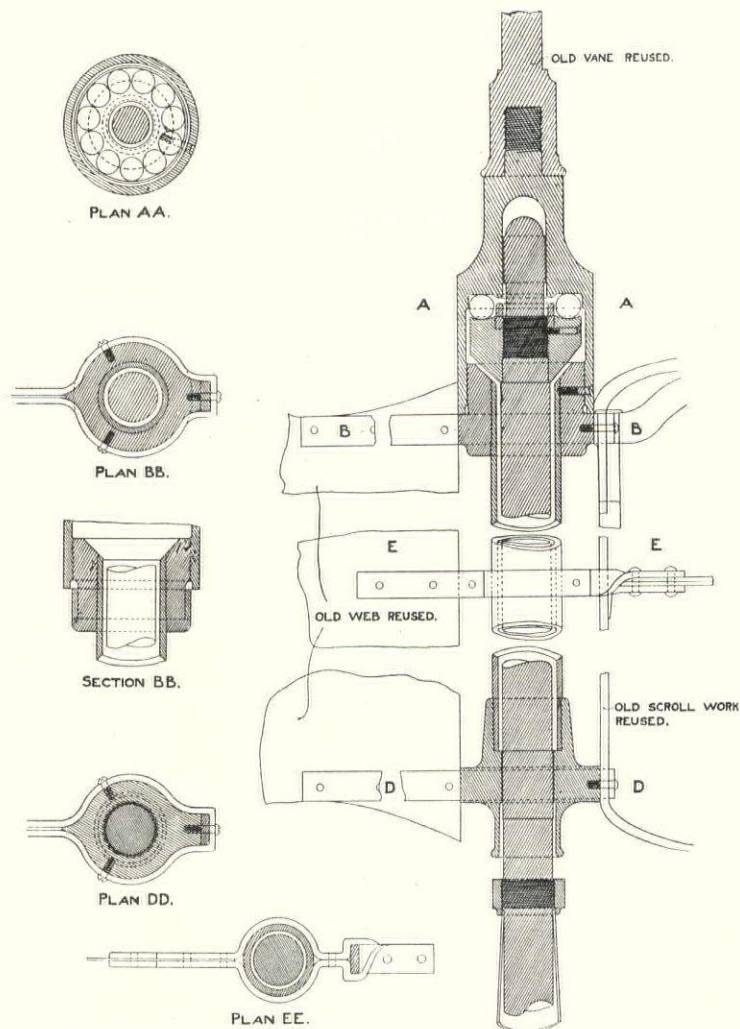
It is interesting on a windy day, if the wind is blowing on to a corner of the tower, to see the vane on the lee side being whirled round and round by the eddying currents; the stonework breaking the force of the wind causes a partial

vacuum on the opposite side into which the air is drawn in a manner resembling the whirlpool in a stream.

At some time numerous steel wedges were driven into the joints of the great arches carrying the lantern with the idea of tightening them up. These had oxidized, swelling to twice their original size and severely splintering the stone. All these had to be removed and the stonework repaired. In one case two of the voussoirs on the upper side of the arch had been kicked up several inches by this action of the wedges. Sir Gilbert Scott had very carefully examined them, but left them alone.

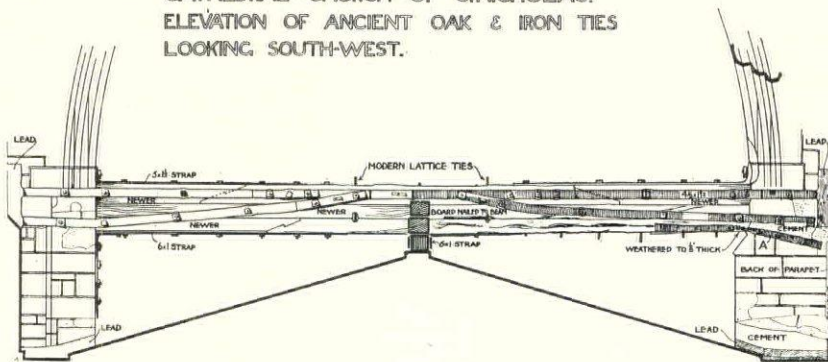
Of course, matters had not improved in the twenty-seven years which had elapsed when we (Oliver, Leeson and Wood) took it in hand, and it was imperative that something

should be done. Small pieces of the displaced stones were cut away to allow strong shores to be inserted to support the voussoir immediately above; the old stones were then rapidly removed and new ones which had been prepared were at once inserted and grouted up with cement. During these works it was found that the old mortar had been completely reduced to dust by attrition,



CATHEDRAL CHURCH OF ST. NICHOLAS, NEWCASTLE-ON-TYNE: DETAIL OF VANES ON LARGE ANGLE PINNACLES.

CATHEDRAL CHURCH OF S. NICHOLAS. ELEVATION OF ANCIENT OAK & IRON TIES LOOKING SOUTH-WEST.



due to vibration, and when a rod was inserted into the joints the remains of the mortar ran out like the sand of an hour-glass. The joints were thoroughly washed out, lead wedges being inserted and then grouted in with liquid cement.

I have already referred to the fact that the tower is out of the vertical. The cause of this failure has been attributed partly to intermural burials close up to the bases of the piers, partly to accumulation of water in the foundations or to movements of the subsoil. The bed of sand and water which extends all over Newcastle at depths below the surface, varying from 2 to 20 feet, is responsible for the fact of so many of the buildings of the city which have been erected any considerable time being out of the vertical, and in all cases the inclination is towards the river. This is most noticeable in those buildings nearest the river; those in the Close, for instance. It is quite perceptible in Dean street, while as far away as Grainger street a careful test shows that on the east side the buildings lean back from the roadway, and on the west side they lean forward towards it, showing that the water is constantly carrying away the sand through which it is finding its

subsoil, causing the southeast pier and southwest angle to sink, which they have done to the extent of 4 or 5 inches. Whatever the reason of the settlement was, they must have got onto the boulder clay, as after this movement was once over nothing further has taken place during the last 400 years, as shown by the verticality of the spire. This bed of sand and water is most capricious, being found sometimes almost immediately below the surface and sometimes dipping almost vertically to depths of 30 to 40 feet, as we found during the excavations for the foundations of Milburn House immediately to the south of the Cathedral churchyard.

The dimensions of the tower are as follows: Diameter, 36 feet; height from the ground at centre of west side to the cornice, 113 feet; from the ground to the top of the angle vanes, 162 feet, and to the top of the centre vane, 204 feet.

The stone used in the steeple appears to be from Black Pasture, near Chollerford—a stone used by the Romans—

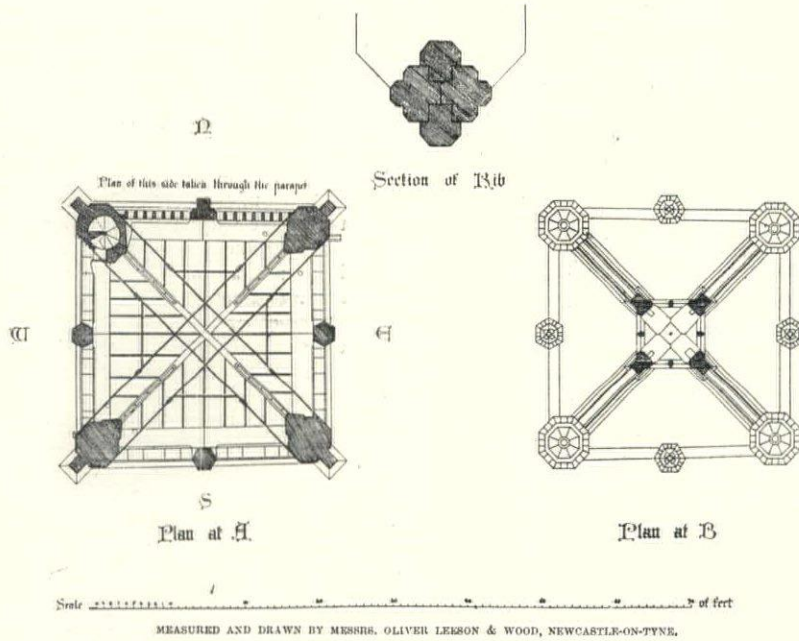
and which when carefully selected weathers well, a necessary quality in a structure of such attenuated substance, with the wind blowing through and eddying round it—a condition very conducive to decay of the surface. In some spires it has been found necessary to glaze the openings to arrest this action.

The name of the architect who designed this masterpiece is not known, but he was undoubtedly a man of great ability and artistic perceptions, as testified by the admirable balance of the design, the carefully studied outline, satisfactory from every point of view, and suggesting most conclusively, to my mind, that the steeple was executed from a carefully prepared model, as it is difficult to imagine that the beautiful outline and proportion could have been obtained in any other way.

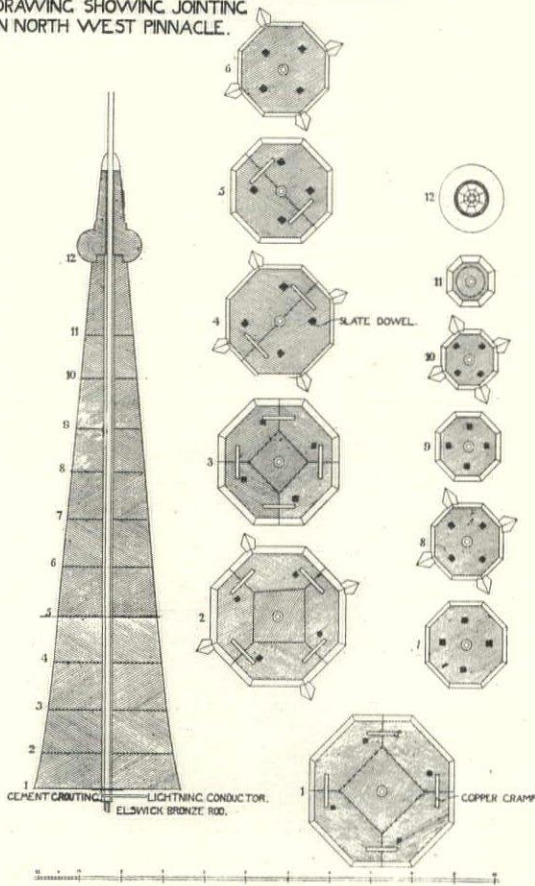
And here I may remark that although there are captious critics who condemn this steeple as a species of stone acrobatics, on account of its dependence on ties, they are, fortunately, very much in the minority. They should remember that many of the most admired buildings of Italy, notably some of the projecting porches, would not stand were it not for the tie-rods inserted at their erection. Our own Westminster Abbey has tie-rods at the springing of the pier arches from end to end. As for critics like Dibdin, who considered it ill-proportioned and ugly, we can only conclude that their artistic perceptions have not been developed.

The design is obviously the result of careful study and experiment, in which the clumsiness of the earlier examples has been avoided and a work of art produced which has a picturesque grandeur that is unique, and is justly the admiration and pride of the citizens of Newcastle of the present day as it has been of those of the past.

We should be grateful to that very worthy Mayor who was the means of saving it from destruction at the hands of the Scots. During the siege of Newcastle, in 1644, the general of the besieging army threatened to destroy the temple unless the keys of the town were given up. Sir John Marley, the Mayor for the time, with ready presence of mind, had the chief Scottish prisoners confined on the top of the tower and returned the general the answer: "That they would upon no terms deliver up the town, but would to the last moment defend it; that the steeple of St. Nicholas's was indeed a beautiful and magnificent piece of architecture and one of the great ornaments of their town, but yet it should be blown into atoms before ransomed at such a rate; that, however, if it was to fall it should not fall alone; that the moment he destroyed the beautiful structure he should bathe his hands in the blood of his countrymen, who were placed there on purpose either to preserve it from ruin or die along with it." This was, fortunately, the means of saving the building from destruction, and during the rest of the siege not a single shot was fired against it.



S. NICHOLAS CATHEDRAL, NEWCASTLE. DRAWING SHOWING JOINTING IN NORTH WEST PINNACLE.



way to the river—an action much facilitated by the dredging of the bed of the Tyne.

None of these causes will explain the inclination of the Cathedral tower, as although, on carefully plumbing it, the tower is found to lean 13 inches over to the south, yet the spire is vertical, proving that the movement of the tower must have taken place before the spire was added. This, I think, points to some local defect in the

THE CAMPANILE OF ST. MARK, AT VENICE.

AS architects know, the "stones of Venice" are falling, but they probably do not realize the general extent of this settlement nor the general and energetic manner in which the Italian people are endeavoring to save the chief monuments of that city. The collapse of the Campanile of St. Mark, on July 14, 1902, caused to be taken the first energetic step towards a careful examination into the condition of many Venetian monuments, although, since 1897, many restorations had been carried on. It was through the fall of the Campanile that the attention of the world was attracted to a condition already partially appreciated by Italian architects and for the amelioration of which unfortunately only inadequate steps had been taken. As a result of this national calamity architects and engineers of first ability—Boni, Beltrami, Ongaro, Moretti, Manfredi and others—were officially called upon to examine into the state of the foundations of the important buildings in Venice and yearly they have reported progress in their work of reparation. In private conversation some of these experts have expressed views which they might not state officially, but which really seem to indicate that a very simple and natural cause has brought about this critical situation. Sig. Gaetano Moretti, who is now the president of the commission restoring the Campanile, states that a general settlement has been constantly going on in Venice and that probably at the present time it amounts to about six inches in one hundred years. To American imagination this will not seem alarmingly great, but in a city where, after centuries of such movement, large monuments and towers are canted to the angles one sees to-day, there is excellent cause for alarm.

It is probable that this gradual settlement is the only general influence acting upon the foundations at Venice. In the opinion of the architects in charge of the restorations, the so-called movements of the ground, said to be caused by dredging of canals and the installation of other improvements in the city, do not constitute an influence of importance. After a careful examination of the foundations and ruins of the Campanile, Professor Ongaro officially reported that supporting piers a few feet above the ground level had proved weak and these piers had been the first to rupture, thereby causing the fall of the tower. In conversation Professor Ongaro stated that portions of the original piers had been removed to increase the size of a small room occupied by a keeper in the base of the tower, and the remaining portions had proved unfit to do their duty as supports. At some past time, possibly more than one hundred years ago, this fact had been discovered by engineers, as one of the supporting piers was found to be bound with iron bands at points where it was failing. The interior wall of the tower had later been built up over this reparation and the defect had remained invisible, only to cause finally the fall of the tower when an unusual strain, by settlement, was thrown upon it. Without doubt it was the failure of this re-enforced pier which permitted the fall of the tower.

At the present time a commission of architects, of which Gaetano Moretti is the working chief, is carrying on the reconstruction of the Campanile and also the restoration of the Loggetta crushed by the fall of the tower. A museum of fragments has been arranged in the Ducal Palace and there the remains of one end of the Loggetta have been fastened together, forming a restoration of one entire bay of the arcade. Sufficient portions have been preserved to substantially reconstruct the tower, hence the question of the foundations has received the most careful attention, consulting engineers working in conjunction with the architects.

During various discussions between the examining architects, several methods of laying new foundations were proposed, in general based upon one of two principles. First, a restoration of the old foundations of wooden piles, and second, the installation of a monolithic construction of concrete. From some points of view Professor Ongaro seemed to be in favor of this latter construction, but realized that the concrete should not be re-enforced with steel at a level so near tidewater. Iron tension-rods have recently failed in a tower near Venice and, although the cause of the final rupture was due to lightning, they were found to have lost the greater part of their strength on account of corrosion caused by the salt air.

The proposition of Sig. Moretti, based upon the first method, of pile construction, has been adopted, and the new foundations have almost reached completion along these lines. The original piles and supporting wooden platform have not been disturbed and the first few tiers of stone, reaching nearly to the ground level, remain as they were. Nine rows of new piles have been

driven about these old foundations to a thin bed of clay a short distance below the ground level, beneath which lies a region of quicksand. A wooden platform of logs, similar to the old one, has been laid upon the new piles overlapping the edges of the latter and forming the base for a continuation of the old stone construction above. Every second course of this stonework is bonded into the original foundation. It is apparent then that the new foundation merely consists of an enlargement of the original construction and the tower above the ground level will be as careful a resoration as Sig. Moretti and his associates can accomplish.

So much for the Campanile; but what is to be done with the other buildings which tremble upon their foundations? Their walls bulge and crack, and nearly every large church in Venice appears to be uneasy upon its supports. Venetians apparently believe that these walls may be pushed or pulled back into position, as in few instances are they actually reconstructing. In general they have not attempted to enlarge or repair the foundations of these monuments and are content to straighten the walls a trifle by re-enforcing them with an occasional tension-rod or a wooden strut. Portions of the side wall of the church of Santi Giovanni e Paolo have fallen and have been rebuilt; but in most cases, as in that of the Church of the Frari, unsightly wooden struts span the naves, constantly calling attention to their dangerous condition. If the artistic beauty of these imperiled structures is to remain permanently, the day evidently will come when new foundations must replace the old. Venetians are now doing much to protect their architectural gems, but the problem now confronts them, a problem great enough to draw upon the resources of the world's ablest advisers: How may the falling monuments of Venice best be preserved? P.

THE SACRED LOTUS TREE.

AMONG the most conspicuous trees which were both sacred and ornamental in ancient Rome was the lotus tree, otherwise Diospyros Lotos. The plant may have been imported from Africa in the early days of Roman maritime power. The name having been applied to quite a number of different plants, has led to no little confusion, and this confusion is of old standing, for Pliny himself fails to make necessary distinctions between one and another. Suffice to state that it "had no connection with other plants of the same name," belonging to the water-lily genus, symbols of Isis in Egypt and of Divine Beauty in India. It possesses a mountain-ash-like foliage, a brownish blossom, and small berries like prunes, which were accounted good to eat. Of the wood, according to Pausanias, the statues of the gods at Megara were made.

In his *Metamorphoses* (ix. 346) Ovid relates how a beautiful nymph, escaping from the attentions of Priapus, became changed into a tree which bore her name, Lotis. It would be interesting could we ascertain which was the first example of this plant raised as a sacred one in ancient Rome, but that in all likelihood we shall not learn. One fact is noticeable regarding the specimens recorded by historians as having flourished—namely, that they nearly all occur within an area of a few hundred square yards. This suggests that birds may have carried the seeds from temple to temple, though very few took root. A lotus tree, we are told (Pliny says "planted by Romulus," "ex victoria de Decumis, æquæva Urbi intelligitur"), grew on the Volcanal beside the temple of "Concordia," and in this protected position it so survived as ultimately to thrust its roots into the Forum Julium ("per stationes Municipiorum," Plin. *H. N.* xvi. 86), a topographical record of no little importance. From the same source we learn that yet another flourished on the opposite side of the same temple of Concordia—namely, toward the temple of Saturn. Pliny, however, informs us regarding a still more remarkable specimen than these. This grew in the atrium of the temple of Juno Lucina, on the Cispian portion of the Esquiline. In it several men could stand together upright. Gossip gave this tree a greater antiquity than the temple itself, which had been built in 374 B. C. There likewise seem to have been beautiful examples of the same tree planted on the Palatine, probably hard by where the casino of the Farnese now stands—namely, in the gardens of Lucius Crassus, the orator, the same whom Cicero nicknamed the "Palatine Venus." Cicero, however, purchased the house himself in the year 62 B. C. in order to enjoy increased splendor. One of its peculiar attractions, we read, consisted in a peristylum containing six great lotus trees. These outlived their various masters, until we hear of Cæcina Largus, Consul in A. D. 42, being the proud possessor, and showing them to his friends. They may have perished in Nero's fire.

But the most interesting example of all was a lotus tree whose appearance must have seemed truly portentous, and that not merely from its great age, which is given as 500 years, but because it was hung with virginal tresses of hair, and was therefore termed "Capillata." This grew in the garden-court of the Vestal Virgins, and the tresses dark and fair upon its boughs had belonged to those ladies themselves. I believe that the novice of to-day, on entering an order of nuns, loses her hair ruthlessly, once and forever. On the other hand, the vestal, upon initiation, lost her tresses, *but only once*, and for a time. The surviving statues clearly reveal that they were permitted to grow again. Whether they were removed again and again in accordance with any as yet unknown votive ordinance it is not possible to determine. The severed tresses, at any rate, were taken and attached (possibly ticketed with the owner's name and date) as votive tokens to the lotus tree (Plin. *H. N.* xvi. 85). What was ultimately done with them who shall say? We do not yet know where the Vestals were buried! Their convent has been thoroughly explored for the first time by Commendatore G. Boni, but the exploration has not revealed this secret.

The question arises, Why was this custom observed? It would be manifestly difficult to explain this, except as a survival of tree worship—that is to say, the trees had originally served as a very personal substitute for its owner, dedicated to a tree-deity, and in later days may have been regarded as a symbol of purification, typifying severance from the secular world. The cropped hair of the Flamen Dialis had to be buried under an arbor felix. It would be interesting to know how this particular tree got there. It is possible (but not probable) that the earliest "Nemus Vestæ" was composed of lotus trees, of which this was a survivor and representative. There may be reason to connect it with the medical divinities (Pausanias, 2, 22, 5; and 1, 35, 3). For Diospyros Lotus is the green ebony tree.

The "Nemus Vestæ" was probably much reduced in extent before Caligula pushed northward the line of the Nova Via for the purpose of overbrowsing the Forum with his gigantic palace (Domus Caii). If any shred of it survived, it must have perished in the fire of Nero, A. D. 65. New Zealanders still offer locks of hair to sacred trees at fords of rivers and landing-places. The Malabarese exorcise demons from possessed folk by cutting off their hair and hanging it on a tree as a propitiation to the wood-fiend. Tylor says there is ground for interpreting the consecration of a boy's hair in Slavonic countries as a representative sacrifice. After all, do we not still have our Christmas trees, and decorate them with yellow tinsel still called "angel's hair"?

In passing to another sacred plant, I will merely notice what is apparently a coincidence connected with the lotus tree. Dioscorides states plainly that a decoction of its juice—but it scarcely seems to have been the Diospyros of which he was speaking—is exceedingly beneficial both for dyeing the hair yellow and for preventing it falling out. "Rubrificat capillos, et stringit eorum radices ne cadant," and Galen confirms this finding. Whether or not it may have been *de rigueur*, for any State reason, for the Vestals to adopt a particular color or tint for their hair, evidence is not at hand to prove. But yellow or golden hair was fashionable, and probably a Hellenism, which survived throughout the Empire until the Middle Ages, with the Angevins ("flavi leones") and Venetians. Probably fair hair was a token which helped the Flavian dynasty to popular favor, seeing that, according to one tradition, Romulus and Remus were fair-haired ("flavæ comæ"), as also was "the goddess Roma." It is interesting to find this Lotus still known in Southern Italy as "legno santo."—*St. Clair Baddley, in the Nineteenth Century.*

TREATMENT FOR ELECTRIC SHOCK.

AMONG the papers read before the recent meeting of the Ohio Electric Light Association was one by E. E. Noble on "Resuscitation from Electric Shock." Commenting upon this the *Electrical Review* declares that the topic deserves thorough discussion, as any additional light that can be thrown upon the effect of electric shocks is of great value. Not only should every physician be familiar with the effects of an electric shock upon the human system, but every worker about electric plants of any kind who is at all exposed to shocks, even though of low voltage, should be taught the best methods to be applied to resuscitate a victim.

"As is well known," the *Electrical Review* continues, "the treatment to revive a person rendered unconscious by an electric

shock is similar to that used to revive those rendered unconscious from lack of air. Some suitable method of producing artificial respiration should be applied immediately and kept up until all possible doubt of death has been removed, always until a physician arrives to take charge. The effect of the current is first to stop the action of the heart and lungs, and if this can be restored the victim will generally recover, provided no other injury has resulted. When, however, current has been applied for a longer time, the vital organs of the body may be so injured as to make death certain.

"That part of Mr. Noble's paper which lays stress upon immediate and faithful work with the patient we heartily endorse, but there is some question in regard to other portions. Results are given of experiments on animals with comparatively high voltage, from which the subject suffered no permanent injury. Current was drawn from a 2,300-volt supply in one case, and passed through the brain of a dog for one minute without any bad effect. Other instances equally surprising are mentioned, and then emphasis is laid upon the statement that it is the amount of current which passes through the body, and not the voltage, which causes the damage. Unfortunately, the experiments described in the paper are not sufficiently detailed to enable one to understand exactly how they were performed, and they leave some doubt as to whether in speaking of a pressure of 2,300 volts the experimenters do not mean rather the voltage of the supply than the voltage between the two terminals when applied to the animal.

"As is well known, the resistance of the body varies considerably, and the resistance of the contacts is probably even more important. A person might easily suffer no damage from shock obtained from a high-voltage supply, provided only that there was sufficient resistance in the circuit of which he formed a part to reduce the current which passed through his body to a certain value; but this would be in effect reducing the voltage of the shock. It is not safe to draw conclusions from experiments stated so incompletely, and on the face of them it would be unwise to spread the feeling that electric shocks are much less dangerous than they are supposed to be. It is better to be on the safe side and have a wholesome dread of an electric shock, rather than to be rendered careless by a false feeling of security. We, on the one hand, have no patience with those who are always speaking of the 'deadly wires,' but, on the other hand, we prefer that those who have no business about an electric system should believe that it is dangerous to approach.

"Holding to the opinion stated above, that it is the amount of current which passes through the body, and not the pressure applied, which causes the damage, it is suggested by Mr. Noble that a metallic gauze jacket be worn next to the skin by those who are obliged to work on electric systems; or that a system of metallic bracelets, worn around the upper arms and connected by means of flexible conductors, take the place of the metallic jacket. While it is conceivable that such a garment might be useful in some cases, it is a question whether, in other cases, it would not prove a source of danger. The object of these metallic protectors is to shunt any current which might pass through the wearer's body around the heart, and thus prevent inhibition. Now, suppose that contact be made by the two hands, it is a question how much of the current will leave the body at one upper arm to pass through the metallic conductors and back into the other arm. It might happen that the presence of this low-resistance portion of the circuit would cause so much current to pass through the hands and arms as to paralyze them, rendering it impossible for the victim to let go.

"It is possible that a smaller current, applied for a longer time, would cause more danger than a heavier current for a shorter time. Then, too, should by any possible accident this metallic protector itself establish a short-circuit, it is very probable that a terrible burn would result which might cause death; or the protector itself might serve to establish one good contact with disastrous results. To act as a shunt around a body it should be in intimate connection with the skin, but we doubt if there are many workmen who would care to wear such a coat of mail next to their bodies. These doubts may prove to be quite unfounded, but the evidence so far presented has not seemed sufficient to warrant any great expectations. On the other hand, it is a good thing to have the matter discussed and the utility of any suggested safeguards carefully investigated and their value determined."

THIS WINTER'S BRICKLAYING.—We trust that, mindful of last winter's disasters, Superintendent Isaac N. Hopper, is giving his inspectors lessons in the use of the thermometer.

ILLUSTRATIONS.

MONUMENT TO VICTOR EMMANUEL, II. ON THE CAPITOLINE HILL, ROME, ITALY. THE LATE SIG. GIUSEPPE SACCONI, ARCHITECT. See article elsewhere in this issue.

LATERAL ELEVATION OF THE SAME.

SECTION ON MAIN AXIS OF THE SAME.

DETAIL OF THE SAME.

THE M'KINLEY APARTMENT-HOUSE, ST. LOUIS, MO. MR. W. ALBERT SWASEY, ARCHITECT, ST. LOUIS, MO.

PLANS OF THE SAME.

Additional Illustrations in the International Edition.

MAIN ENTRANCE DOORS: WESTMINSTER CATHEDRAL, LONDON, ENGLAND. MR. J. F. BENTLEY, ARCHITECT.

It will be a long time before Americans, at least, encountering mention of Westminster "Cathedral," can escape the belief that the writer in question is making blundering reference to the Abbey, and it is more than probable that many of our readers will at first sight try to determine whereabouts in the Abbey these doors, which, with the following comment, we reproduce from *The Architect*, are to be found: "In the Roman Catholic Church the portals were supposed to have a symbolic significance. As was the case with the Temple of Janus, in Rome, much was expressed when they were opened or closed. As a rule, all people could enter through them, but on occasions they were closed against the mightiest of rulers. A picture by Rubens, in the National Gallery, represents one occasion when St. Ambrose refused to allow a monarch to pass into the cathedral of Milan. As a consequence, importance was suggested by the architects to that part of churches and cathedrals in the Romanesque period, especially on the Continent, and it was continued through the Gothic period. English doorways, for some unknown reason, were less impressive than those seen in France and elsewhere. The late John F. Bentley realized that an opportunity was afforded him, and he made the entrance doors among the most interesting parts of his Westminster Cathedral. The preparation of the doors was entrusted to Messrs. Elliott, of Reading and Newbury. They are made of crown Austrian selected wainscot oak and, as will be seen from the illustration, are arranged in panels. Each is about six inches thick. The work, simple as it may appear, occupied the firm for nearly nine months, and is a most creditable example of English woodwork. The mounts are of bronze."

PROFESSIONAL AND CIVIL SERVICE ASSOCIATION'S BUILDING, EDINBURGH, SCOTLAND. MR. JOHN JAMES BURNET, ARCHITECT, GLASGOW, SCOTLAND.

This subject, together with the following description, we copy from *The Building News*: "This building has recently been erected as new premises for the Professional and Civil Service Supply Association, Ltd., Edinburgh. The site extends from George street to Rose Street lane, and the buildings have a frontage of about 80 feet and a depth of about 145 feet; they consist of sub-basement, basement, ground, entresol and four upper floors. In the sub-basement, served by a hoist from Rose Street lane, are the wine cellars, refrigerators and the general receiving department. The basement floor is occupied by grocery storage, and the despatch department with four van entrances to Rose Street lane; the ground floor, entering from George street, has the grocery and provision department, the first floor drapery and tailoring departments; the second floor drug, stationery and boots department; the third floor ironmongery and furniture; the entresol floor is used by the clerical staff, and on the top floor is a restaurant and tea-room. The front is built of Prudham white sandstone, with white and green marble enrichment on the lower floors. The drawing which we reproduce was shown this year at the Royal Scottish Academy."

"MARSH COURT," HAMPSHIRE, ENGLAND. MR. E. LUTYENS, ARCHITECT.

This plate is copied from *The British Architect*.

STORE OF FRANZ FISCHER & SON, MUNICH, BAVARIA, HERREN HEILMANN & LITTMANN, ARCHITECTS.

This plate is copied from *Architektonische Rundschau*.

HOUSES AT BICKLEY, KENT AND REIGATE, SURREY, ENGLAND. MR. ERNEST NEWTON, ARCHITECT.

These subjects are copied from *The Builders' Journal*.

HOUSE OF HERR E. SPINDLER, ZEHLENDORF, GERMANY. HERREN, ERDMANN & SPINDLER, ARCHITECTS.

These subjects are copied from *Blätter für Architektur*.

ROYAL SCHOOL OF MECHANICAL ENGINEERS, COLOGNE, PRUSSIA. HERR B. SCHILLING, ARCHITECT.

The work for construction of this school, which was completed and formally opened on October 24, 1904, was begun in July, 1902, and the architect gives the following statement of the cost:

Main school building	848,000 M.
Hall of exhibits	57,000 M.
Annexes	270,000 M.
Adjoining buildings	43,000 M.
Interior furnishings and lighting installation..	116,000 M.

1,334,000 M.

The cost of the site on which the school has been erected was 500,000 M.

The plans for the interior arrangements of the buildings were worked out with great care and forethought. The various classrooms, lecture-halls, director's and secretary's offices, etc., are found in the main building. In the centre of this building, towards the rear, a large hall for the exhibition of the students' work has been erected. This hall will also be used for public lectures, the position of the hall having been so arranged as to allow visitors to enter and view the exhibits without disturbing any classes.

While the plans were in course of preparation it was found that it would be of great value to the school to have also laboratories and machine-shops in immediate connection with the school to afford the students an opportunity to do practical work in the course of their studies, and for this purpose the annexes were erected, in which will be found laboratories and machine-shops of every description, supplied with models of the very latest invention.

It is interesting to note the growth of this school. In October, 1879, the necessity for a school of this character was first perceived in Cologne, and the matter was immediately taken up by the city authorities. In December of the same year the school was opened with thirteen students. Two old public-school buildings were used for this purpose. At the opening of the school year, 1883, the number of students had increased to 132, and this necessitated the erection of a new and larger building, which was completed and opened in October, 1886, to 265 students. The authorities believed at the time that this new building would meet all demands for future years, but in 1892 the number of students had increased to such an extent that the school authorities found themselves short by six class-rooms.

Plans were immediately commenced for the erection of a larger and much more improved school, and the result is the new building completed and opened in October, 1904, here shown by reproductions from *Zeitschrift für Bauwesen*.

ENTRANCE FEATURE OF THE SAME.

NOTES AND CLIPPINGS.

THE NORTH BRITON AT HOME.—A recent visitor to the Island of Lewis, one of the outer Hebrides, writes as follows about the appallingly unsanitary mode of life that habit and tradition have fostered amongst the peasantry of the island: "In Bragor a similar class of hovels will be found. One of them is described as follows: A heap of manure about 6 feet high was piled up to within 2 feet of the narrow and low entrance. Immediately on opening the swing door one was met by the ammoniacal odor from the byre, and was conscious of walking on and sinking into manure. The darkness prevented one seeing anything at first. Three cows occupied about two-thirds of the available space, and the darkness was so profound that one rubbed against them before seeing them. There was only a hole in the roof above the fire and one above the door through which light and air could enter, and unless the door had been open one could not have seen anything. Even with the aid of wax vestas it was impossible to make out clearly the lines of any single object. In a space about half as large as that occupied by the cows, and about 18 inches above it (owing to the surplus manure being piled outside the door), there was the living and sleeping-room. There was only a wooden plank on the earth floor, resting on stones (at least, that is all one could make out in the darkness), and no vestige of a bed or bedding. In this awful den, not fit for a pig, there are housed two wretched old paupers, who are compelled to crouch over the peat fire all night, as there is no bed to retire to."—*The Architect*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, NOVEMBER 25, 1905.

No. 1561.

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“AS civilization and government advance, the duties and obligations of citizens become more intricate and involved, and each must sacrifice something for the benefit of the other. It was the recognition of this principle that has undoubtedly led to the recognition of the so-called ‘police-power’ of the State. This power in the past has frequently been applied to what might be termed personal liberties of the citizen and has been steadily advancing in application to the property-rights as well; hence we have certain laws regulating the uses of property in regard to public health, safety and morals, and it seems to me that such regulations should be extended to the comfort and good manners of a good neighborhood.” This utterance of enlightened opinion is so different from those which we are accustomed to find coming from the mouths of judges only severely mindful of the strict letter of the law that we cannot refrain from declaring that we hold in the most distinguished consideration Judge John J. Mullins, of the District Court of the County of Denver, who, in the case of *Thompson vs. Building Inspector Willison*, arrives at precisely the conclusion that an enlightened public can appreciate and applaud.

THE case at issue is an interesting one in several ways and comes up in a form to be of advantage to many of the younger communities of this country, as it involves the as yet unsettled *lois de la voirie* of the newer towns. At the same time it has a bearing everywhere on that commonly accepted belief that a man may do what he chooses with his own, provided he does not actually transgress the law. It seems that Mr. A. R. Thompson had acquired a certain building-lot on a street occupied by dwellings of a high class and sought a permit for an apartment-house whose front wall should come to the extreme front of the lot. Learning what he desired to do, the residents upon the same side of the street protested and, because of this protest, the Build-

ing Inspector declined to issue a permit; whereupon Mr. Thompson applied for a mandamus to compel the issue of the desired grant, and it was while denying his motion that Judge Mullins used the words quoted above, he saying further, in reply to the argument of Mr. Thompson that to deny his request would be to confiscate his rights in his property: “It is no confiscation of property, as I view it, for the State to fix reasonable boundary lines for the erection of buildings when such regulations are for the benefit of all surrounding property.”

UPON the street in question no building-line had officially been determined; but succeeding owners, as they built, had agreed with one another to set their houses a stated distance back from the curb-line, and it was natural they should seek to protect themselves from the action of one who proposed to use his own property as it pleased him, without regard to the injury and discomfort he might inflict on his neighbors. Their protest was based on a County ordinance that provided that, where the owners of fifty per cent of the lots on a given residence street had amongst themselves established a common building-line, all subsequent owners must conform to the building-line thus voluntarily established; and that when less than fifty per cent of the land had been improved the owners of seventy-five per cent of the improved and unimproved lots might, by petition to the Inspector of Buildings, cause the establishment of a building-line for the neighborhood. This breezy and off-hand way of bringing about “municipal improvements” seems very attractive in some ways, as it promises to bring about the creation of certain urban oases, each of which has more reason for its existence than the prevision of the ordinary city-engineer developing his checker-board theme is able to grasp. At the same time, it seems to throw a good deal of responsibility on the first occupant who is willing to sacrifice a portion of his lot for the benefit of later-coming neighbors, for he, after all, may be totally wanting in gifts of persuasive reasoning, and he may find his immediate successors building out to the sidewalk-line. The County ordinance in question does what it can to offset this temporary defect by providing that, for such improved residence-sections, the building-line for the last fifty per cent of the lots shall be that established by the “average” building-line of the houses already erected.

THERE is something in the mere contiguity of the truly good that has on some a very irritating effect and leads to misbehavior on the part of those who feel the influence. It must be because of this that so many bits of professional unpleasantness seem to have birth in Brooklyn, “city of churches.” The latest unpleasantness involves a matter of professional ethics as well as a case of seeming misdoing politically, and is likely to result in a very pretty discussion legally. It is well known, and a matter of record, that in 1903 a competition for a new Municipal Building for the Borough of Brooklyn

was held, one of the statements in the official programme assuring competitors that "the administration has the intention to appoint, without unnecessary delay, the successful competitor as architect." Professor Despradelle acted as expert adviser and on his recommendation the design prepared by Mr. Washington Hull was placed first and adopted by the then President of the Borough, Mr. J. Edward Swanstrom. Later the design was, as required by law, referred to the Art Commission of the City of New York and approved by them, and immediately thereafter there is alleged to have been entered into a contract between Mr. Swanstrom, acting for the city, and Mr. Hull, whereby he was to be paid fifteen thousand dollars on account of his preliminary design and was to be employed as architect of the building. No appropriation for the building itself, however, was made at the time and none has since been made, although in the budget for 1904 Mr. Swanstrom's successor, Martin W. Littleton included an item of two and a half million dollars for the erection of the Municipal Building in conformity with the Hull design. At about this time disagreement of some kind seems to have arisen between the architect and the city official, the latter attempting to bring about the reopening of the competition and a resubmission of the competitive designs, a course which was combated by the architect with the aid of the Brooklyn Chapter A. I. A., with partial success, only four of the original competitors agreeing to resubmit their designs. At various times since then Mr. Hull has intimated that he was ready to proceed with the work, but Mr. Littleton proved coy and the cause of his coyness found explanation a week or two ago in the unheralded appearance in the daily papers of a design for the Municipal Building in question prepared by Messrs. McKim, Mead & White, together with the announcement that Mr. Littleton is asking the Board of Estimate for three million dollars to carry out their design. On the evidence adduced by Mr. Hull, he should have no difficulty in winning the suit he brings against the city, while professionally, sections seven, eight and eleven of the Boston "Code of Ethics," seem to have a clear pertinency.

AS at the time the Civil War broke out there were, comparatively speaking, but few architects in this country, it follows that but few architects can have been enrolled as soldiers in the confronted armies. On November 12 one of these few militant members of the profession closed his career, in his eightieth year, in the person of Stephen Vaughn Shipman, of Chicago. During the war Mr. Shipman served his country with credit as Colonel of the First Wisconsin Cavalry, but returned to civil life and the practice of his regular profession with its close. In 1871 he moved from Madison, Wis., to Chicago and during many years enjoyed there a considerable practice, his specialty being rather in the line of hospital buildings, as is shown by the Presbyterian Hospital in that city and the great asylums for the insane which he built at Anna and Elgin, Ill., and at Madison and Oshkosh, Wis. Besides this special work he, amongst other things, designed and carried out the dome of the Capitol at Madison, Wis., and the post-office building

in the same city. One of the feats he accomplished, remarkable in its time, was building within twenty-six days the old Academy of Music on Halsted street, Chicago.

A VERY unusual and not at all an unwise action, very similar to an appeal to a court of law, has recently been taken in the Northwest, one which we commend to the attention of Mr. Isaac A. Hopper, the Superintendent of Building for the City of New York. Last week the architect of the building and the officers of the construction company having the contract for the erection of the Fourteenth Ward school-house for the city of Milwaukee were required to appear before the Board of Public Works and "show cause" why work should not be stopped upon the school-house in question during the current and future cold weather, the said building seemingly being one constructed of reinforced-concrete. The members of the Board evidently read the papers and feel that, where concrete and frost are likely to combine, an ounce of prevention may prevent a collapse with the first thaw.

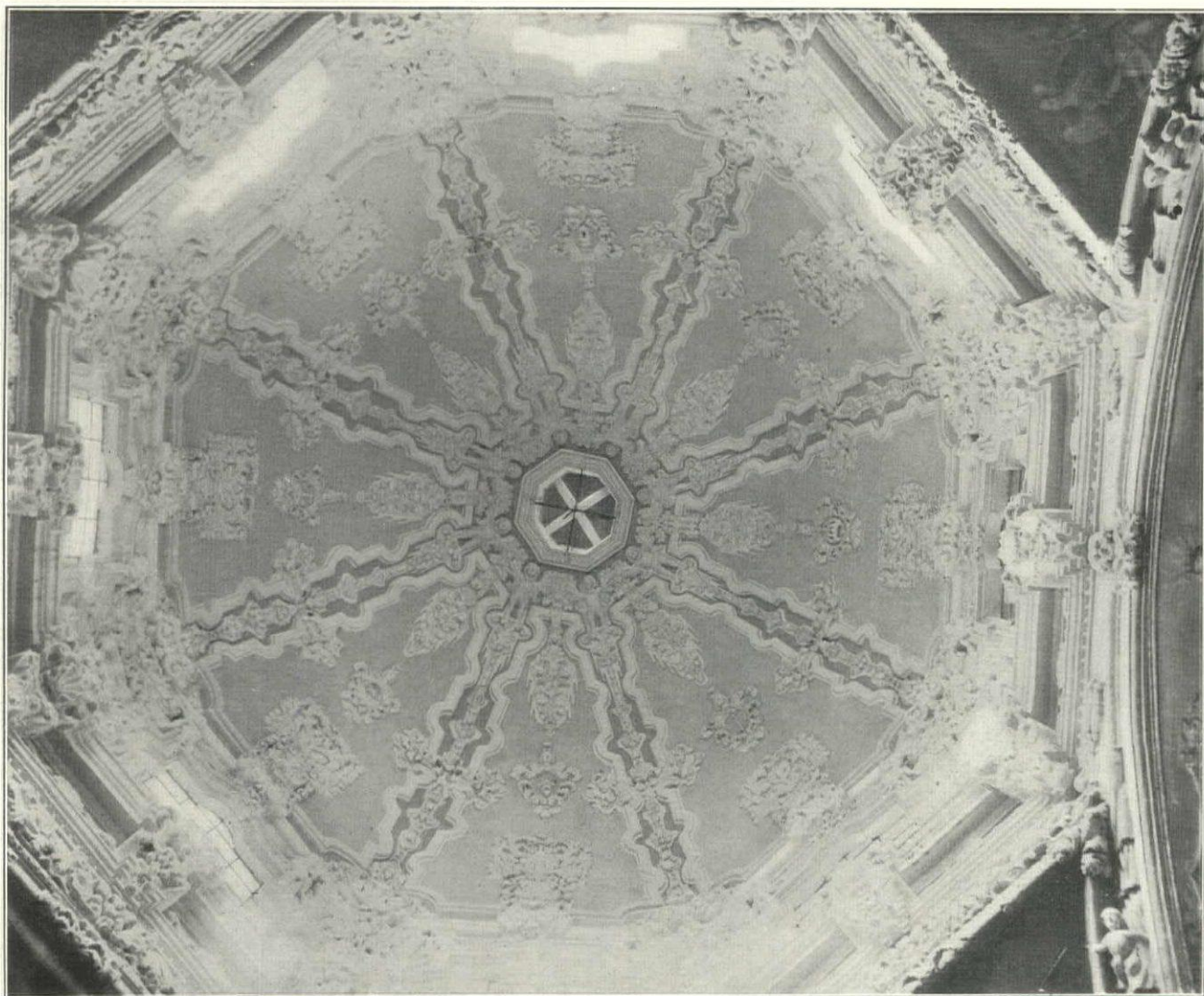
POSSIBLY some of our readers are not cognizant of the fact that in the matter of the nomenclature of centuries—or at least of some of them—Italian practice is different from that of other nations. Thus when Englishmen, Frenchmen or Germans speak of a work of the "fifteenth century" they mean that it was executed between 1401 and 1500, while an Italian would mean one that dated between 1500 and 1599. So, "tercento," "quattrocento," "cinquecento" in Italian writings relate respectively to the thirteen hundreds, the fourteen hundreds and the fifteen hundreds. So much we knew and, without stopping to think about it, imagined that the practice was all-comprehensive. But while translating, the other day, for publication Professor Melani's paper on "Italian Loggias," we noticed that while he spoke of the thirteenth, fourteenth and fifteenth centuries after the Italian manner, he assigned to the later centuries the same years that English writers would have, thus seeming to indicate either that Italian custom is inconsistent or else that the three centuries within which the renaissance of art and letters waxed and waned have acquired an artificial emphasis by a variation in the denominating of those centuries. Perhaps some better-informed reader can tell us what actually are the facts.

IF one may believe the statements that find their way into the newspapers, one of the most serious obstacles in the way of the very desirable coalition between the National Academy of Design and the Society of American Artists, is the unwillingness of the Academicians to waive their prescriptive right to have hung, each, three paintings at every exhibition, without first having to submit them to the jury on admission. The fact that Royal Academicians have the same privilege possibly makes the seniors of our own Academy unwilling to sacrifice any of their private rights lest by so doing they should, as it were, lose caste in the eyes of British and Continental Academicians.

THE CHURCH OF THE CARMEN, SAN LUIS POTOSI, MEXICO.

WHAT is peculiar about Mexican Architecture? I address those who are familiar with the architecture of America and the Architecture of the Classic and Renaissance periods in Europe, and to them I would say it is not like any of these, neither can it be compared to the Gothic either in its quaint or finished style. The Gothic, in its quaint style, is not as exuberant and in its finished style there is nothing haphazard; so that the architecture of Mexico cannot be compared to any of these. It is quite apart. In its first principles it is Renaissance, but on to this is grafted a free and rambling exuberance which may be partly Spanish, partly Mooresque, but largely it is the influence of the native Indian and the wild and romantic Mexican, infusing into the builders of these temples a spirit of picturesqueness, poetry and at the same time a touch of savagery. To the dogmatist who works on classic and highly-refined lines, this may not be wholly acceptable, but to the artist, the poet and the romanticist it is indeed charming and fascinating.

and illuminated letters, none of them, however, so balanced as a Greek honeysuckle. Yet, throughout, the document is interesting, has great individuality and much character. I liken Mexican architecture to this latter document. In America there is, practically speaking, nothing picturesque; in the modern work of Europe there is little or nothing. If in Europe we look for something picturesque, we go to such towns in France as Rouen or Chartres, and in Belgium to towns such as Bruges or Ghent, or to the market-place in Brussels: there we can feel the romanticism and poetry of a past time. Yet many of the most charming buildings in these cities are conglomerates and have occurred piecemeal. A highly qualified architect of to-day could not allow himself to design edifices in such a style. They would be considered ungrammatical. Nevertheless, such buildings possess a charm exceeding by far the more dry though correct compositions of most of the modern and much of the Classic and Renaissance periods. This then is my conception of the architecture of Mexico: in fundamental principles it is Renaissance, but to this is added a rambling Bohemianism, a savage decoration and unrestraint, a feeling of having



INTERIOR OF THE DOME: EL CARMEN, S. LUIS POTOSI, MEXICO.

I have in front of me two documents, the one written on a perfect piece of the finest paper of modern production: it is a proclamation. The initial letters are large and handsome and the type throughout is of the very best, here and there the more important words and sentences are printed in larger letters of different character and a few are illuminated in red and gold, at the end there is a great seal, also in red and gold, impressed, and finally a signature bold and clear. The signature is the only interesting or characteristic thing about it.

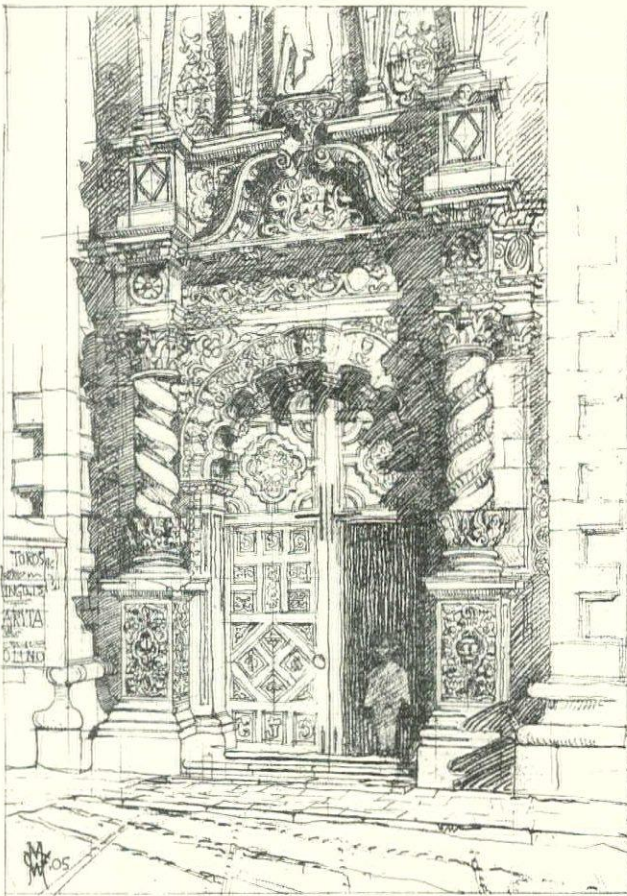
The other document is written on a rough piece of parchment or sheepskin; its shape is irregular; it has taken days of strenuous labor to accomplish. The initial letters are far from perfect, but they are full of thought, each one: they never repeat. Where the parchment has imperfections, the writing is arranged to avoid these, there is a constant variation in the style at every important paragraph, there are many elaborate

occurred in conjunction with many fine proportions that make it most interesting. But, withal, it is the very antithesis of perfection. It is the glorious colored and shaped bramble of the wilderness as against the perfect rose blossom of your carpeted lawn.

One of the most important buildings in San Luis Potosi is the Church of the Carmen. The façade is not to my liking in composition, but because it is so very different in detail from what we are accustomed to in the United States I think it necessary to give it the first place; also the interior is very ornate and many of the details are not only very unique but very good. The plan is the customary cross, with an extreme length of about 210 feet. The nave is 50 feet wide and the cross-arms extend about 20 feet on each side of the latter, while the sanctuary is about 25 feet deep. There are no aisles. In continuation of the north transept is a chapel 40 feet square,

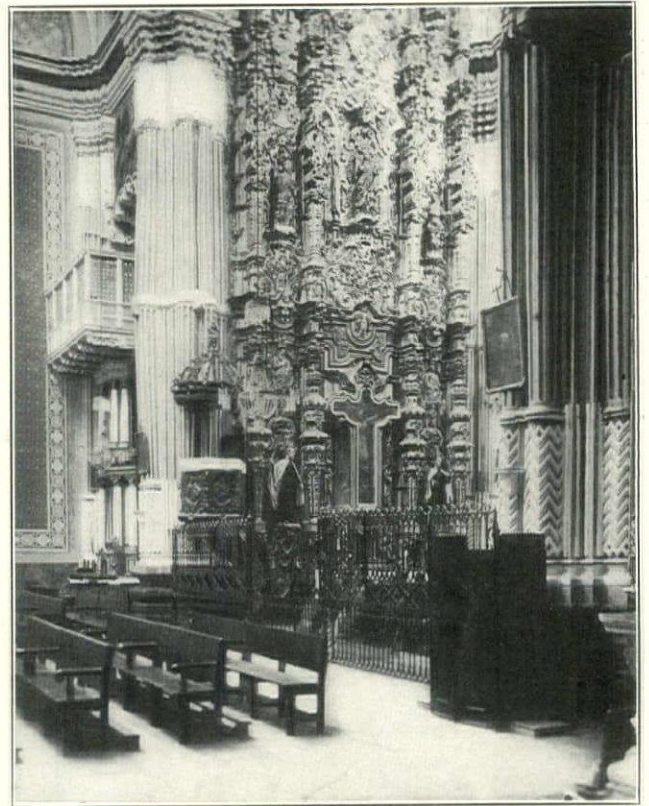
with octagonal apse; at the cross and also over the side chapel are octagonal domes. The exterior is of pink stone and the domes are covered with tiles in squares, like a checker-board, of

The illustrations accompanying this show the principal front and two principal entrances. In addition to the general view of these doors two sheets of details illustrate the character of



WESTERN DOORWAY: EL CARMEN.

green, blue, white and yellow. The roof of the tower is covered with similar tiles, dark blue and yellow. The interior is



SIDE ALTAR, NEXT TRANSEPT: EL CARMEN.

the ornament. The basin-like treatment at the base of the columns of the side door is interesting to note, and at the front door the Runic ornament. The most interesting parts of the interior are the two side altars adjacent to the transept, one



INTERIOR OF THE CATHEDRAL: S. LUIS POTOSI, MEXICO.

mostly of plaster, with semi-circular and pointed ceiling, the general coloring being shades of pale green and pale yellow, with a good deal of gold and here and there borders and smaller decorations in strong and bright colors.



SIDE CHAPEL: EL CARMEN.

on each side. They are in the most elaborate and beautiful style, peculiar to Mexico and, I suppose, old Spain. This style of architecture always appeals to me as having something of both the Gothic and Renaissance spirit about it. However, by

whatever name it may be called, it still retains this virtue, that it is most interesting to the student of either Gothic or Renaissance styles. The coloring of these altars is cream and gold for the most part, with here and there, on medallions and statuary, spots of strong color in blue, red, and so forth. These altars, in the same elaborate style, extend to the top of the arch which spans the space between the columns enclosing them. In the side chapel, Renaissance in style, it is interesting to note the carving of the pilasters at the angles of the walls, in style similar to the details of the exterior at the principal or side portals, very free, rather savage, but beautiful nevertheless. I think that here we find the influence of Mexico and the Indian people. The coloring of this chapel is pale-green and cream, with a little gold. The chapel is about 40 feet square, with octagonal apse for the altar and is surmounted by an octagonal dome at the base of which light is admitted through square windows. The dome is decorated by carvings in low relief following the lines of the eight ribs, but at the base of these ribs the carvings become much more massive and bolder in relief. At intervals between the ribs are also spots of carving, all in white, while the field or smooth surface is of pale green. With this brief description and the accompanying illustrations, I think some idea may be formed of this church which, it is to be understood, is chosen because it is typical of that which is most interesting and at the same time differs most from the architecture we are accustomed to in America and most parts of Europe.

W. G. MITCHELL.

THE ROMAN CATACOMBS.¹

AMONG the mingled feelings to which a first acquaintance with the catacombs is likely to give rise, will be one of bewilderment at the seemingly endless extent of their ramifications. It has been roughly calculated that if all the underground galleries and passages could be placed end to end in one long line, they would more than traverse the entire length of the Italian Peninsula, and that the graves enclosed in their walls would amount to at least two millions. Startling enough in itself, such an estimate as this throws an interesting light on the rapid spread of the Christian religion in the capital, since it can have been no stagnant or insignificant society which, even long before the "Peace of the Church," had come to require such an extensive area for its dead. But so meagre and fragmentary are the records of this primitive Christianity that our knowledge of the details concerning its growth and progress is necessarily very imperfect, while with regard to its ancient burial-grounds, we must accept the fact that for some three hundred years their history can only be even partially recovered by aid of the concurrent testimony of archaeology and tradition.

We are no longer invited to believe that the Roman catacombs were in their origin neither more nor less than disused sandpits. Nor would the view that their excavation was carried on secretly and by stealth find any support at the present day. Such a work must obviously have involved the displacement and removal of many thousand tons of soil, and to suppose this to have been carried out so as to evade the vigilance of the police of the capital is, as Mommsen long since pointed out, to impose too severe a tax upon our credulity. And, lastly, it is admitted that, although on the occasion of a funeral and of its anniversaries, it was the primitive custom to celebrate the Eucharist at the grave, the catacombs were, in point of fact, originally planned and designed to serve neither as subterranean places of worship, nor yet as asylums of refuge from persecution, but simply as cemeteries for the use of the Christian community.

It may assist us to understand how the Roman catacombs had their origin if we picture to ourselves the position in which, as years passed by, the Christian population would find itself placed in dealing with the problem of making suitable provision for the dead.

But for one restriction the laws of Rome presented no difficulty. Interments by Christians must follow what was the general rule and be made outside the city walls. Subject to this condition, the new sect might lawfully adopt whatever mode of burial they pleased, in the full confidence that their cemeteries would receive exactly the same protection which the municipal authorities were most watchful in extending to all tombs and sepulchres. Looking round upon the customs of contemporary paganism, the early converts would find more to repel than to attract them. Cremation, at the period with which we are dealing, had all but entirely

taken the place of inhumation. For wealthy families of position there were the stately mausoleums which flanked the great Appian Way. For humbler people there were the dove-cots of the various "columbaria," into which, at but little expenses, their ashes might be received when the fire had consumed their bodies. For the dregs of the populace there were filthy pits like those that, as Horace tells us (Sat. I. viii. 8), used to defile the Esquiline, into which their corpses were flung like so much carrion and left to rot.

But the mausoleum, with its sarcophagi of sculptured stone—so costly in construction and so burdensome to carry to their destination—and with its note, moreover, of aristocratic exclusiveness, was but ill adapted to meet the growing needs of a spiritual democracy, the great majority of whose members were of very slender means, and whose religious principles admitted of no distinction between rich and poor, master and slave. Cremation, too, was distasteful to Jew and to Christian alike, and under the influence of the new teaching as to the resurrection of the body, it passed more and more into disuse. "Christians," writes Minucius Felix, "hold cremation in abhorrence." "We," he adds, "follow the venerable and better custom of interment." Accordingly, there remained only the "commune sepulchrum," the common grave of the outlying pits. For men, however, who had but just learned that nothing which God had cleansed should be held common or unclean, it would instinctively be felt a sacrilege to cast callously to the dogs the bodies even of the very lowest of those who, through the sacrament of baptism, had been enrolled among the ranks of the redeemed.

But if paganism had no burial precedents towards which a Christian would feel himself strongly attracted, it was otherwise with Judaism, from whose bosom it must be remembered that Christianity had sprung. From the days of Augustus the Roman Jews had possessed subterranean cemeteries of their own beyond the walls, and nothing could be more natural than that Jewish Christianity in the capital should adhere to the mode of interment to which Judaism had been there accustomed. Stronger, too, than even any associations with national usage, would be the profound feeling of reverence for the example which had been rendered sacred in the entombment of Christ Himself. The hills outside Rome did not, it is true, in their nature resemble the limestone hills of Judæa, whose sides were everywhere perforated with cave-tombs, whether for individual or for family use, "as the manner of the Jews is to bury" (John xix. 40). But in lieu of limestone, most of the country round the walls had its own characteristic tufa formation, which was even better suited for purposes of inhumation, and there the faithful servants of their Lord might be laid to rest, even as long years ago in Jerusalem He had Himself been laid in the rock-hewn sepulchre of Joseph's garden.

Easily accessible from all parts of Rome, the undulations of the neighboring Campagna rose and fell in a series of pigmy hills and depressions whose soil was of volcanic origin. Differing in the dates of their deposit, the strata differed also in character. There was the red rock, the "lapis ruber," to whose durability for building purposes the ancient Cloaca Maxima could bear witness, but which defied the crude manipulations of pick and spade. There were also the loose sandy beds of the "arena," or "pozzolana," as it is now called, admirable for cement or mortar, but too crumbling and incoherent for structural stability. Mingling itself with these there was yet another deposit of igneous rock neither so hard as the one nor so soft as the other, but of just sufficient compactness and consistency to make it safely workable. It was in this intermediate formation, this "tufa granolare," that nature seemed to be offering the very material which the Christians needed, and it is accordingly in this layer of the volcanic rock that the greater number of the catacombs have been hollowed out. Porous in its structure, water drains off it with so much rapidity that inasmuch as the cemeteries did not extend to the intervening valleys, but were, as a rule, confined to the high ground of the hills, the risk of inundation was rendered inappreciable and the various galleries and chambers were kept sufficiently dry.

Thus it was that the venerated tradition of their Master's grave in the rock, the influence of Jewish custom, the law of the land, and considerations of ordinary convenience, all combined to determine for the primitive Christianity of Rome the character of its burial-grounds. Situated outside the Servian walls, as the authorities prescribed, these privately owned foundations came under the strict guardianship of the Roman College of Pontiffs who would find in them nothing to call for their official interference. Here, therefore, the solemn rites of religion would neither be insulted by contact with the idolatries of the heathen population nor disturbed by the indecent mockeries of the profane.

¹Extracts from a paper by Mr. H. W. Hoare, in *The Nineteenth Century*.

Constructed in days of religious peace, the entrances to these earliest excavations stood by the roadside, open and unconcealed, so that no passer-by could fail to see them, nor was there at first any trace of those precautions against a sudden surprise which became a vital necessity in the dark days of the third century. No uniform type of internal arrangement and structure was adopted since the design would naturally differ in each case with the wishes and wealth of the founder and with the character of the ground. Though locally distinct in their original sites, there was nothing to prevent the interlinking of adjoining cemeteries, provided only that they lay on the same hillside, by means of subterranean communications. Indeed, in point of fact, as the Christians increased in numbers, it was in this manner that their burial-grounds tended to expand, the insuperable bar to any general unification being the marshy soil of the intervening valleys.

When a suitable plot on one of the hillocks of the Campagna had been conveyed, as we might now say, in trust for a cemetery, the land as defined by its legal boundaries became what was technically known as a "locus religiosus," a plan of which would probably be filed among the city archives. This plot was thenceforth invested with certain jealously guarded privileges. Not the least important of these privileges was that in the event of a sale of the grantor's estate the burial area did not pass with the remainder of the property, but continued to be at the disposal of the founder's family and of those outside it to whom the family rights might be extended. The work of excavation would usually be begun by digging out a short staircase from the surface to the depth selected for the first level, which in most cases might be a few feet below the upper soil. Along this level, from end to end, a horizontal tunnel or narrow passage was carried, in width from two to three feet, and perhaps some eight feet or so in height, with either a flat or a slightly vaulted roof. Then, at right angles to the passage, a second gallery of similar character was constructed and continued up to the boundary. All subsequent workings on this level would be governed by these two main determining lines, which recalled the methods of Roman civil engineering and corresponded to the well-known "cardo" and "decumanus" in the plan of an encampment or of a new town.

In the vertical walls forming either side of the passage, the "fossore," or sextons, next proceeded to carve out a series of recesses, each large enough to hold one or more bodies. These were called "loci," or, less properly, "loculi," and constituted the ordinary graves which, in any completed series, closely resemble those tiers or ranges of sleeping-berths so familiar to us on board our ocean steamers. With a view, moreover, to the disposal of the bodies with the greatest possible reverence, these niches were cut parallel with the gallery, and not, as in other than Christian catacombs, at right angles to it. Coffins were not ordinarily used, and it was necessary, therefore, with a view to guarding against the products of decomposition and providing safe access to the graves, whether for prayer or for other equally solemn purposes, that the recess should be hermetically sealed up as soon as the body had been deposited. This was done either by means of a slab or by tiles, and it is curious to observe that some slabs have been used twice over, the inscription on their inner side being of a pagan and that on the gallery side of a Christian character.

As the demand for space grew greater with the ever-increasing number of converts, either cross-galleries were added, or possibly the floor of the level was lowered so as to expose more rock, to the right and left, for supplemental graves. But when the resources of one level had been exhausted further provision could only be made by sinking a new level lower down, since the available superficial area was strictly limited to the space between the legal boundaries of the property. In such an event great care was taken that the successive levels should be excavated at such intervals as to be separated by a mass of unworked soil of a sufficient density to secure adequate stability for the new passages and recesses. The usual number of such distinct and separate levels or floors is from two to three, but in a few cases as many as five occur, and in one instance (that of the catacomb of Callistus) even seven. Communication between one level and another was provided by stairs cut out of the rock, and long shafts in connection with the open air were made to convey the requisite minimum of light and ventilation.

It was in some such manner as we have attempted to depict that without let or hindrance from Rome the catacombs appear to have been constructed by their originators. But with the fifth decade of the third century there came a grave crisis in the history of the Church. The Empire was at length fully awake to the imminence of the danger by which it was being threatened,

and under Decius in the year 250 A. D. persecution began its work anew.

The external history of what may from this period be called the burial-grounds of the Church has much in it of interest, but we must here dismiss it with only a brief glance. In A. D. 257 the Emperor Valerian "forbade all assemblies of Christians, and all visits to the places called cemeteries."

It is accordingly to these years of terror that certain very remarkable alterations in the catacombs must be referred. In order, if possible, to baffle pursuit, the officers in charge set to work radically to revise their structural arrangements. Aware, no doubt, that their ground-plans lay open to public inspection in the offices of the College of Pontiffs, these resourceful engineers blocked up or obliterated the known entrances, and dug out new circuitous rambling conduits which eventually emerged in some disused and therefore unfamiliar sand quarry. This done, they proceeded to demolish large portions of the existing staircases, so that no one could use them without ladders, substituting others in changed positions, while at the same time by filling up many of the galleries with earth they rendered the approaches to the most venerated and frequented sepulchres all but inaccessible.

With the sack of Rome by Alaric in A. D. 410 began the long series of invasions by the barbarian hordes, and the Campagna, which was often the actual scene of their encampments, became better suited to the armed plunderer than to the peaceful worshipper. In spite of all the labors of successive Popes, the old reverence for the catacombs began now gradually to fade away. The material treasures of wealth which they were believed to conceal, as well as their inexhaustible store of religious relics, had made them the hunting-ground of innumerable robbers, and their custodians accordingly endeavored to preserve all that remained worth preserving by translation to the crypts of the city churches. By the middle of the ninth century this tedious and melancholy work had been completed, all interest in the catacombs had ceased, and they soon became so utterly neglected that in a few more years they had altogether passed out of human memory.

CLERKS-OF-WORKS AND THEIR DUTIES.—I.

AS the habit of employing a clerk-of-works is gaining ground rapidly in American practice, we are glad of the chance to transfer bodily from *The Building News* the following papers that deal with him and the customs that have grown up about him:

There are few more difficult positions to fill in connection with buildings than that of a clerk-of-works, yet there are none about which so little information is to be obtained, either in books or in articles contributed to our own columns or to those of our contemporaries. To a certain extent the position is more important even than that of the architect, as it is the clerk-of-works who is directly responsible for good materials and good workmanship. He is, in fact, the direct descendant of the architect, or chief builder, of former days, who doubtless designed and controlled a building himself from commencement to completion, scarcely ever leaving it, but following it day by day, and seeing that its every detail was to his perfect satisfaction. At the present time he occupies a midway position between architect, employer and contractor, and, as buildings become more complex, so do his duties become more difficult of performance.

Generally selected by the architect, and responsible immediately to him, he is paid by the building owner, sometimes directly, sometimes through the architect. In the case of municipal work, or that undertaken by any incorporated body, it is usually the building owner who pays direct; but the private individual rarely cares to be troubled with small weekly disbursements. With such a building owner, the architect hands the clerk-of-works his salary, and again charges it against the owner from time to time as it accumulates, say, for one month, or for three. Under this peculiar arrangement of joint appointment, or rather of appointment by one man and payment by another, it is not always easy, in the absence of special arrangement, to say to whom the clerk-of-works is most responsible, the architect or the employer, or from whom in case of need he must accept notice of dismissal. At the outset of his employment there ought to be a clear understanding upon these points; but even at best the position becomes an exceedingly difficult one under some circumstances. So long as all is above board, as it is in the vast majority of cases, no trouble arises. The architect, as the owner's agent, stands in his place and possesses full power. But it has occasionally been known for a clerk-of-works to condemn bad work, and for the architect subsequently to disallow his action—not once, but again and again, where large sums are involved, until the clerk-of-works seriously doubts the architect's action being *bonâ fide*—for until such a doubt arises,

the architect's decision is undoubtedly final. In such a case it has—rarely, but now and again—been the clerk-of-works' duty to report the matter to the employer by whom he has been paid, and trouble has naturally followed. Without advocating the adoption of this course, except as an extreme measure under very serious circumstances, enough has been said to show how delicate the position may become.

Except in such a rare case as has just been referred to, the clerk-of-works' position is legally that of the architect's representative on the works. The clause in which it is defined in the R. I. B. A. Conditions of Contract is as follows: "The clerk-of-works shall be considered to act solely as inspector and under the architect, and the contractor shall afford him every facility for examining the works and materials." This does not give him the right to so far trade upon his position as to actually interfere, on his own responsibility, with the planning and design of the building committed to his charge. It is, in fact, his duty to see that the drawings and specification are complied with in every possible respect, and to report to the architect whenever compliance is not possible, acting on his own initiative, however, when emergencies arise, as they sometimes do in the most unexpected way. Within these limits he has authority to order necessary extras, and at all times towards the builder he occupies the place of overlooker, against whose decision there is little appeal on matters of construction, workmanship and quality of goods supplied. With the individual workmen employed he has not much to do, his dealings being much more with the foreman, to whom alone he should make his complaints and enforce his orders, though as the architect's agent he has the power, if necessary, of insisting upon the dismissal of any particular workman, either for incapacity or misbehavior.

It will be seen that these powers and responsible duties involve the close attention of a capable man, if a building of even a moderate size is to be thoroughly overlooked. He must be on the works when the men arrive in the morning, if only to check such practices as the using up of stale mortar, and he must be there almost constantly, watching every cartload of material as it is brought upon the site, inspecting it and rejecting it immediately, if unsuitable, and seeing in such a case that it is removed at once. He must watch the workmen throughout the day, seeing that everything is performed in a thoroughly sound manner; and he must occasionally visit the contractor's workshop, so as to supervise the joinery which is there being prepared long in advance of the time when it will be required to be put into position. Where deviations occur from the original intention as expressed in drawings and specification, he must make careful notes of these, taking measurements in all instances where the work is subsequently to be hidden. He must keep regular diaries and records of everything that occurs, and must report regularly (preferably on forms supplied for the purpose) as to what is happening, calling attention in good time to any probable difficulties which he may foresee. He must, moreover, have the power of insistence, to insure that defects really are remedied, and not merely hidden and forgotten.

It will be seen that this class of men suited for such work as this is somewhat exceptional. Above all things, a clerk-of-works must have a most intimate knowledge of building operations. He must be a practical man among practical men; but beyond this he should have studied sufficiently to know a good deal more than the majority of those placed under him. Too young a man has not sufficient authority for such a post, nor would he probably have sufficient knowledge. Absolute honesty is, of course, essential; but this, one is glad to say, is not difficult to find, and the clerk-of-works who will accept bribes from the builder or the manufacturer to induce him to pass imperfect work is decidedly the exception. Possibly the best fitted for such a post is the man who has been trained at one of the principal building trades, such as that of carpenter or mason, and who has attended good technical schools and kept his eyes open on the works, so as to obtain a good working knowledge of all the other trades connected with building operations. Such a man has probably, in a builder's employment, been raised to the position of foreman, first in his own trade, and subsequently over all the work connected with a building. Knowing in this capacity everything from the builder's standpoint, he is often perfectly fitted to supervise from the architect's standpoint. He needs to be self-contained, able to speak his mind, and also able to control himself, perfectly firm, sober and consistent; but perhaps his greatest qualification is that of method, so that he may have records of all that occurs available for production whenever they may be needed.

There can be few worse clerks-of-works than he who makes a

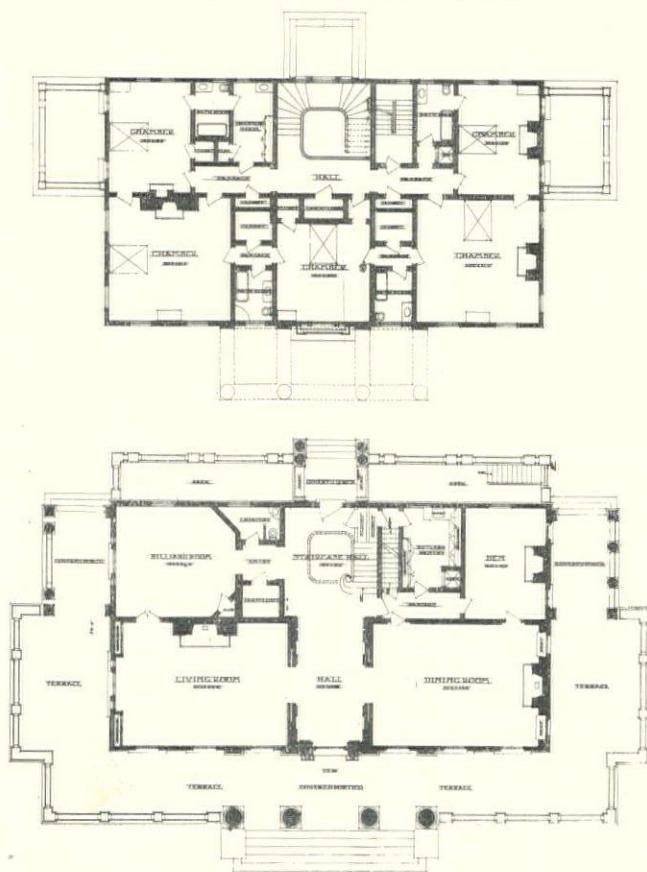
pal of the foreman, and while he who is always appealing to the architect upon every little question will soon be voted a nuisance, and is not likely to be employed twice in succession by the same man, it is almost as bad for him to take too much upon his shoulders, and, when confronted by a difficulty, to order it to be got over by some method which will alter the design or increase the cost, without consulting his superior first.

In his intercourse with the building owner reticence is especially necessary, else it is possible for him to cause a good deal of trouble. He must remember that it is the architect to whom his reports are primarily to be made, and whom he must consult in cases of difficulty, the employer having no power to order deviations or extras. A fidgety employer will give both the foreman and the clerk-of-works a good deal of trouble; but while he must be treated respectfully and with attention, it is always well to be careful as to what is said. It is not even advisable to let him know, in all cases, what it has been necessary to condemn, for much less friction arises if bad work is dealt with directly than if a third person is introduced.

A moderately good education is, of course, a necessity; but there are few men who are at all likely to be appointed to such a position who cannot at least write a readable report and make ordinary calculations. A good knowledge of solid geometry is also exceedingly valuable, if not essential, for the proper reading of the drawings which are supplied and for making additional ones if it be necessary; though this rarely comes within the actual scope of a clerk-of-works' duties. An acquaintance with ordinary surveying of a simple kind is useful in order to secure proper setting out and the placing of a building in its right position on a site, and he must be capable of using a dumpy level. A knowledge of materials, their method of mixing, and the tests to be applied to them, will have been obtained by practical experience to a large extent; but it is much better if this has been supplemented by a course at a good technical school or college, for it must inevitably happen that from time to time new materials are introduced, or those which are new to the individual man, and he must be able to discriminate at once between the good and the bad, whether he has seen them before or not, or, at any rate, he must be capable of placing his hand upon the necessary information without undue delay.

ILLUSTRATIONS.

HOUSE OF F. DE L. HYDE, ESQ., PLAINFIELD, N. J. MESSRS. WALKER & MORRIS, ARCHITECTS, NEW YORK, N. Y.



"EL CARMEN," THE CARMELITE CHURCH, S. LUIS POTOSI, MEXICO.

For description, see article elsewhere in this issue.

MAIN DOORWAY OF THE SAME.

DETAILS OF THE SAME.

HOUSE OF W. H. HOLBROOK, ESQ., NEWTON, MASS. MESSRS. CHAPMAN AND FRAZER, ARCHITECTS, BOSTON, MASS.

ENTRANCE FRONT: "BLANTYRE," HOUSE OF R. W. PATERSON, ESQ., LENOX, MASS. MESSRS. ROBERTSON & POTTER, ARCHITECTS, NEW YORK, N. Y.

GARDEN FRONT OF THE SAME.

TRINITY ENGLISH EVANGELICAL LUTHERAN CHURCH, SAN FRANCISCO, CAL. MR. AUGUST NORDIN, ARCHITECT, SAN FRANCISCO, CAL.

Additional Illustrations in the International Edition.

MAIN ENTRANCE: "BLANTYRE," HOUSE OF R. W. PATERSON, ESQ., LENOX, MASS. MESSRS. ROBERTSON & POTTER, ARCHITECTS, NEW YORK, N. Y.

PORT COCHÈRE: "BLANTYRE."

NOTES AND CLIPPINGS.

THE PRACTICABILITY OF COLORING CONCRETE.—How to affect the color of concrete without affecting the strength of the cement is the question. Coloring matters, not otherwise suitable for the aggregate, have an unsatisfactory effect upon the strength of the concrete, and perhaps it is as well they have. If every man could work his will on concrete in the way of color, the thought of what might be the result is not without its terrors. Colored aggregate would, no doubt, be sufficient if it could be seen through the bloom of cement that lies on the outside of castings. This being very thin, cannot endure for ever, but an old concrete building, like other old buildings, is likely to have a charm of age, and acquire greater interest as its natural color becomes more mellow, and its surface is acted on by the action of the weather in the course of years. If we do not want to wait for that, and must imitate something, the action of time can be imitated by scrubbing off the bloom with a wire brush; or in the case of blocks, by the use of machinery, so exposing the aggregate and obtaining a characteristic surface color. Concrete blocks of this kind will look even less like stone than those do which defy detection, but they will make a good solid concrete-block wall.—*The Stone Trades Journal.*

FRASCATI AND THE GERMAN ACADEMY OF FINE ARTS.—Frascati, outside Rome, was in old days, as it is at present, renowned for its villas. Of those which have survived the Falconieri is supposed to be the oldest, for it dates from 1548. Many archæologists suppose that Cicero had a villa which stood on the site. It was restored and decorated by Borromini in a florid style. There have been several owners and occupants. Among the latter was Count Richard Voss, one of whose novels is called after the villa. The Trappist monks of Tre Fontane used it as a summer residence in order to escape from the malaria of the plain. They carried out some additions, but have endeavored to preserve the character of the villa. It is now reported that a German banker has been able to obtain the property for the sum of £25,000. It has been offered to the Emperor, who has arranged to utilize it for the German Academy of Fine Arts. It will bear comparison with the Villa Medici, and it has "a hall of cypresses" in the grounds, which is unique.—*The Architect.*

SUCCESS OF AMERICAN ARTISTS ABROAD.—In a recent report from Consul-General Howe, of Antwerp, Belgium, an interesting account is furnished of the success of American artists at the fine arts exhibition at Liège this year, and some significant observations are added by Mr. Howe as to the European opinion of the American school of art. "The Countess of Flanders," writes Mr. Howe, "in congratulating the American Commissioner-General of Fine Arts, said the great proof of success in the American exhibit was the fact that the carpet was more worn before the pictures in this section than elsewhere—a graceful compliment indeed." This is a new test of success in art and, so far as popular favor is concerned, it would seem to be a fair index. Perhaps it would be just as well to remind the Countess of Flanders, however, that such testimony is neither permanent nor final, and that many a modest work which the crowd passes by, unseeing, may in the long run be recognized as the superior of the popular favorite of the hour. All the same, immediate popularity is not to be despised, and Uncle Sam should take off his hat—as he does in the official person of Mr. Howe—in acknowledgment of the nice things said to him by polite foreigners.

Mr. Howe regrets, and we regret with him, the fact that all the so-called American works of art shown at this Liège exhibition were European-born works. The one hundred paintings accepted all came from London, Munich, Vienna and Paris. It is natural enough that the Belgians should think that the United States cannot alone produce artists, that the American nation is incapable of creating a national school, and that they should refuse to consider these artists—Sargent, MacEwen, Carl Marr, Ridgway Knight, Bisbing, Bridgman, Harrison, Miller, Pearce, Vail and the rest—as really American. Are not the Belgians more than half right?—*Boston Transcript.*

THE SCULPTOR IN ORDINARY TO THE BEAR INDIANS.—A stone carving of a grizzly bear in the attitude of defending her cubs has been made by Andrew Chester Thompson, of Seattle, and will be immediately shipped to Alaska, to be placed over the grave of R. Shadesty, one of the most prominent Indians in the north when alive. He died on Dec. 17, 1903, leaving \$600 to defray the cost of the monument. The big piece of stone carving, weighing 3,000 pounds, will be shipped from Seattle to Wrangel, and from that point will be carried about 150 miles overland to the home of the Bear family Indians. The Indians themselves will transport the grizzly on its overland journey, according to their own primitive methods of transportation. Mr. Thompson has been carving stones for the Bear Indians for twenty-five years.—*N. Y. Tribune.*

ARCHITECTURE AND THE DUELLO.—Amusement was recently afforded to the readers of newspapers by the report that the Earl of Kimberley, who is county councilor in Norfolk, had challenged a fellow-councilor, Mr. Sapwell, to fight a duel with him in Paris. It was not, however, stated that the dispute arose out of a recent architectural competition. It was announced that premiums would be awarded for the best designs for a Shire Hall. The county surveyor advised the committee about the arrangements. At first it was suggested that anyone seeking particulars should have to deposit £10, afterwards the sum was reduced to £1. There were no less than 300 applications. The Royal Society of British Architects refused to appoint an assessor on the ground that it was unusual to require a deposit or to have the design accompanied by an offer from a responsible builder to carry out the work at the estimated amount. There was also no plan supplied of the site. The committee surrendered on two of the objections; but with regard to the plan, they said that inasmuch as the chief object of the competition was to ascertain how much of a difficult site could be safely utilized to provide the necessary accommodation, the committee could not undertake to furnish a plan of it, but stated that a plan of the ground as well as a plan and a section of the existing building might be seen at the shirehouse. An assessor was not, however, appointed. Instead of 300 sets of designs only twelve had been received, and the committee did not know what to do with them. Mr. Sapwell reviewed the proceedings of the committee, by which, he said, the Council had been placed in an undignified position. Lord Kimberley stated that the objections were not made before the committee, and in that way the dispute arose, which happily has been settled. Mr. Sapwell wished the committee to open the packages and to select designs which they considered deserving of the premiums, £100, £50 and £25, which had been promised. An amendment was adopted to the effect that the committee be reappointed, with instructions to appoint an eminent architect to advise them in the matter of the selection of plans, etc. But what will be the result remains unknown.—*The Architect.*

COLUMBIA COLLEGE AND THE NATIONAL ACADEMY OF DESIGN.—The affiliation between the art school and Columbia is of much earlier date than may be generally known. In 1825, in the rooms of the New York Historical Society, was formed the New York Drawing Association, succeeding the New York Academy of Fine Arts, chartered in 1808, the first art institution in New York. That association conducted classes, and its presiding officer was Mr. Samuel F. B. Morse. Later in the season fifteen artists selected the name of the National Academy of Arts and Design, and held its first exhibition in the second story of a house on the southwest corner of Broadway and Reade street, and at the end of the season the students of the association met in the chapel of Columbia College, on Church street, where Mr. Morse addressed them and awarded premiums. The association acquired the property of the first art society just referred to, and some of the first collections of casts ever brought to this country are restored and now in use in the present Academy schools, the descendant of the early art school.—*N. Y. Tribune.*

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, DECEMBER 2, 1905.

No. 1562.

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A CASE of very considerable importance is now before the New York courts, which we trust may be decided in consonance with the strictest interpretation that can be put on the existing laws. The case is that of the City of New York vs. the A. T. Stewart Realty Company who, it appears, are the owners of the new building on Broadway, New York, now nearly ready for the occupancy of the great department-store of John Wanamaker. The question turns on the interpretation that can legally be placed on the words "other interior finish" contained in that section of the building-code that requires, in fireproof buildings exceeding one hundred and fifty feet in height, that all doors, window-frames, sashes and "other interior finish" shall be "of wood covered with metal or of wood treated by some process approved by the Bureau of Buildings to render the same fireproof." The Superintendent of Buildings, believing that the clause empowered him to exact the fireproofing of the shelving, counters, office partitions and other finish used in fitting up a modern temple of trade, issued his orders accordingly and, when he was met with opposition, obtained an order of court forbidding the owners to install the untreated "interior finish" that the builders had all ready to put in place. When this order of injunction was made permanent, the owners carried the case to the Appellate Division of the Supreme Court.

IT is regrettable that the question cannot be decided by a simple reference to the "law of fixtures," since it is beyond question that the framers of the ordinance in question must have intended it to apply to the fireproofing of all wooden interior finish that was part and parcel of the building. Unfortunately, while a considerable part of store and office fittings are ordinarily so securely attached to buildings in which they are as to become legally fixtures, yet by convention and mutual agreement, we believe, it is the custom to hold that such shelving, partitions, etc., are not "fixtures" but belong to the tenant.

No one, in view of the lessons of the Baltimore fire and those of almost daily occurrence elsewhere can feel that the Superintendent of Buildings is unwise in attempting to prevent the installation of a vast amount of untreated "interior finish," with its oiled or varnished surfaces, in a largely-populated building, exposed to serious and ever-changing holiday risks and the hourly peril of electric fires. Moreover, it was the purpose of the law that these great fireproof buildings should play the part of fire-breaks in case of a conflagration, and it is folly to suppose that a building finished as this one was planned to be could play such a part with certainty, since the strength of a chain is but that of its weakest link. It is distinctly a hardship in this case that, as the woodwork is ready to put in place, its rejection will inflict a heavy loss on someone, while the delay in procuring fireproof finish of the approved kind in substitution will probably cause a still heavier loss in trade profits.

THE Grand Jury of Albany County has at length returned indictments, for manslaughter in the second degree, against the contractor, John Dyer, Jr., and his superintending architect, Clark L. Daggert, who were in charge of the alterations going on at the department-store of the John G. Myers Co., in Albany, N. Y., when that building collapsed, last August, causing the death of thirteen persons and the injury of thirty others.

THE New York Superintendent of Buildings, Mr. Hopper, was well advised in calling all his inspectors before him, last week, and cautioning them that they must take effective action to prevent the building accidents that so disgraced the city and his administration of the building-laws last winter. Because of the extra amount of vigilance thus incited, mason-builders directly and building owners indirectly will probably be vociferous in complaint against the manner in which their operations are held up during the coming cold weather; but the public, at least, will welcome these wails as an outward sign of their own greater safety. It is probable, too, that, knowing that they are to be more closely watched than usual, speculating builders of a certain type will display an unusual amount of determination and skill in disguising their improper practices, and, because of the relative paucity of the regular building-inspectors, unsafe building will inevitably go on unless an edict should be issued and enforced absolutely prohibiting masonry-work or plastering of any kind during certain fixed dates, a step which would be both inadvisable and unnecessary. Now, although the force of building-inspectors is small the police-force is actually large, and there is good reason for thinking it would be worth while to deputize the members of the police-force as building-inspectors, with limited powers, from December to March. After all, building-regulations are in their essence merely "police-laws," that is, they are enacted for the good of the public at large and not for the benefit of the owners or, necessarily, the tenants of buildings. This being so, there is reason why the police itself should be concerned in their en-

forcement. A few simple instructions and a little thermometer pinned inside the lapel of the uniform coat would enable even the stupidest of patrolmen to know when he could rightfully order a gang of masons or bricklayers to knock off work for the day—and it certainly would not greatly add to the labors of the patrolman to require him to keep an eye on the building operations under way on his own beat.

AMERICANS are so properly entitled to hold themselves as amongst the rightful heirs to English art and letters that no one will be disposed to take exception to the appeal which the Dean of Winchester Cathedral addresses to them, in the hope that amongst the many who have enjoyed, so to speak, the ecclesiastical and architectural hospitality of the diocese, some may be found who will be willing to contribute to the cost of making the repairs to the east end of the Cathedral which prove to be so greatly needed. For our own part we would prefer to know that American money was being spent in preserving for posterity an English fane rather than in profaning the sepulture of some Egyptian princess, whose dried remains Christians should leave slumbering where they were placed thousands of years ago and not be made to serve as the *clou* for the Sunday wit of 'Arry and 'Arriet. Contributions towards the one hundred thousand dollars which the essential repair of cracked east wall of the cathedral will require will be acknowledged by the Treasurer, Mr. Frederick Bowker, Southgate Street, Winchester, England.

OUTSIDERS in Memphis, in Indianapolis and elsewhere, who have dared to fight the trust established by the wholesalers and manufacturers of plumbing appliances, have won their cases, so far, at least, as the lower courts are concerned. We believe, however, that nothing that could disrupt the combination as being wholly illegal and in restraint of trade has yet been accomplished, although we have tried to help to bring this about by explaining how the "five (or more) per cent. for the plumb" was, with the aid of the roulette-wheel, made use of in underbidding competitors outside the combination. What looks like a very promising attack on this powerful organization has just begun in Toronto, Ont., where the Crown Attorney has filed an information charging some two hundred plumbers and plumbing-supply men with combining to defraud the public. As the men accused occupy every degree in the social scale, the proceeding has attracted wide attention and caused no little dismay, as the penalty in each case, if exacted, runs from one to ten thousand dollars, with or without a penitentiary term of two years.

MR. ROBERT W. VONNOH is very indignant because of certain criticisms by laymen directed against a portrait of the Revolutionary patriot Prescott, whom the artist, Mr. W. M. Chase, elected to represent in full Continental uniform, in place of the slouch hat and long-skirted riding-coat in which tradition has it he fought at Bunker Hill, and in which he is clad in the bronze statue by Story which now stands at the foot of Bunker Hill Monument in Charlestown. "It is nobody's business to criticize such details," cries Mr. Vonnoh,

"Let them confine criticism to the art or else say nothing"! The layman cannot but feel an honest glow of pride when he is assured by an artist of Mr. Vonnoh's standing that, when he desires to express an opinion on composition, chiaroscuro, foreshortening, modelling tones, technique, etc., he is bringing to the attention of the artistic fraternity just the most instructive kind of critical comment. But that, per contra, when he dares to suggest that the Continental uniform was not worn by Prescott, that a twelfth century man-at-arms did not have holsters at his saddle-bow, that a horsewoman's skirts hang on the near side of her mount and that double-topsails were not invented when the "*Chesapeake*" and "*Shannon*" fought, he is meddling with matters that only artists are competent to understand. Can any one think of a direction in which an artist will not break out?

THE light-minded are given to depicting the confusion that will follow the blowing of Gabriel's trumpet when the once-mortal remains of a stricken army, say, attempt to disentangle themselves, so as not to appear at the Judgment Seat with a pair of left-hands or a body supported on a pair of right-legs. Very much the same confusion has been brought upon the artistic and ecclesiastical world by an order just issued by Pius X, which requires the removal from Catholic churches of all statues and paintings which represent St. Expeditus, whose sainthood has just been denied, although his name is given in the Roman Martyrologium as that of an Armenian warrior who died a martyr to the faith. It seems as if this order might cause a very grievous iconoclastic outbreak, for it appears that, although we never knew of the existence of such a saint, St. Expeditus is one of the intercessors most often resorted to by Italians, because of the celerity with which, as his name indicates, he secures favorable action upon the petitions entrusted to him. If the sculptured effigies of saints with which Catholic churches are adorned were always easy of recognition, the Pope's order would occasion only a physical difficulty; but, what with the wear-and-tear of the ages, the loss of records and the original artistic license of the stone-carvers, it seems as if the difficulty of properly obeying the Pope's order might become at least metaphysical. To leave any image of the now disowned saint would, of course, be profanation, and to avoid this chances must be taken; so it may well happen that certain saints and martyrs whose halos are still rightfully worn may be insulted and wronged, a step which will occasion certain inevitable archæological and ecclesiastical discussions here below and equally unseemly wrangles above.

BEARING in mind the issue of a court order against the maintenance of the so-called "portico" which projects only four feet beyond the building-line of the New Amsterdam Theatre on Forty-second Street, New York, we are watching with interest to see what will be done to one of its aristocratic neighbors. Less than a block away, and on the same side of the street, a portico or porte cochère, in seven bays, that comes out frankly to the stoop-line, is now just showing above the hoarding that encloses the new Astor hotel, "The Knickerbocker."

JAVANESE CUSTOMS IN HOUSE-BUILDING.

HOUSES built of stone or brick are not common among the natives in the island of Java. Their economical condition is hardly such that they can indulge in the luxury of very substantial dwellings. Considering the tropical heat and the frequency of earthquakes, light material seems also more suitable from other points of view. Wood and bamboo, products of the soil, are, therefore, generally almost exclusively used.

The necessary timber can be taken from the woods, as far as not reserved for government purposes: woods with free access to all and everybody are getting scarce. In cutting the trees he wants for house-building, the native is very careful that, in their fall they come down to the ground at once, without leaning first against other trees (*kadjeng toendang oewit*) or resting on the stump (*kadjeng toendang pokoq*). If they do so, they are not fit for the carpenter's art, and he leaves them conscientiously alone, trying another and another till at last he strikes one that falls free. To attain this desideratum, consequently: to save superfluous work, the woodman throws a chip, freshly cut by his axe, in the direction he wishes the tree to topple over; if it does not help, it does not do any harm either and may be tried.

In cutting up the well-behaved trees, the timber to be used in a horizontal, perpendicular or oblique position, has to be taken from different trunks; the neglect of this detail means endless sickness to the inmates of the house that is to be. If one gets up as a convalescent (*tangi*, stands perpendicular), the other will have to go down with some other disease (*rebah*, lie horizontal). The builder has further to provide that, in construction, the top-end of the timber does not come nearer the ground than the lower end—i. e., the lower end when the tree was alive—and that no top-end in any way touches any lower end. The neglect of this detail makes a poor dwelling and means poverty for the inmates. Timber from trees which, when standing in the forest, were thickly overgrown with twining and climbing plants (*kadjeng koeroeng*) brings on the other hand a chance of good luck. Timber from trees, blown down by west monsoon storms, or struck by lightning, is not to be used on any account: it brings calamity in several forms.

Every house must contain, if possible, some pieces of *kajoe woengoe*, excellent building material of a reddish color, which possesses the virtue of conferring a joyful disposition. *Kajoe woengoe* is also much sought for the making of rice-spoons, rice-blocks (in which the rice is hulled), rice-sheds and everything connected with rice, that prime article of native food.

The choice of a suitable location for the house depends, of course, on a good many tokens. First stands the necessity of the ground sloping, more or less, to the southwest. The reason for this may be found in an old legend. A certain trader, Kjai Dampoe-awang, much blessed with money and merchandise, once, on nearing the coast with one of his ships, saw a peasant who stood guard over the rice on his fields, which, after the harvest, lay raked together in large, yellow heaps. Kjai Dampoe-awang, astonished at the fertility of the country, said: "Those rice-stacks look, indeed, like hills." The words had scarcely left his mouth, when, suddenly, the rice-stalks *did* change into hills, and the terrified peasant could not doubt that the ship of Kjai Dampoe-awang, nearing the coast, had something to do with that unpleasant incident. So he shouted: "Here is a marvel, which passes my understanding, that ship of Kjai Dampoe-awang bears such an extraordinary heavy cargo on its upper deck and yet it does not turn turtle!" The words had scarcely left his mouth, when, suddenly, the ship of Kjai Dampoe-awang *did* "turn turtle," rolling over with a splash and a crash in a southwesterly direction, changing into a mountain, ever since called the Prahoe (ship). But the stacks of rice, changed into hills by the black art of the master of the ship, became stacks of rice again, and from that time on a southwesterly slope is considered to bring luck.

Before building a house on a place where another house used to stand, a banana-tree is planted. If the banana dies, better leave that place alone; if it thrives and bears fruit, go ahead!

Next on the programme is the finding of a prosperous day to begin work, a matter of the utmost importance, which necessitates the consulting of old and wise men or women, who possess a thorough knowledge of the *petanggans*. While they are busy ciphering, another subject is taken up with due gravity by the builder and his friends: which quarter of heaven shall the new house be made to face? A general rule in this respect cannot be given, except in the negative sense that East and West are rather unpopular; otherwise the final decision is influenced by all sorts of circumstances, and for this reason the houses in a native vil-

lage often make such an awkward squad impression, straggling, turning their fronts to all points of the compass.

A younger brother may not build his house between the houses of older brothers, as least not if he wishes himself and relatives to reach old age in health and happiness. The forepart of the house, in the process of building, always has to be a little ahead of the back part for the sake of keeping old friends and making new ones. On the top-ends of the uprights, bearing the roof timber, pieces of red stuff (*bangoe toelak*), or white with black borders, are put, hanging down from the joints for one or two inches, and the uprights have to rest on copper coins, placed on the foundation tier, if the man who builds the house is wealthy enough to insure himself extra felicity by spending a few cents.

As soon as all the timber has been put in its proper place a sheaf of rice is hung in the frame of the roof, with two pieces of *katoepat* (rice cooked in a klapah-leaf) and two pieces of *lepet* (rice cooked in another fashion), while bunches of bananas with the stem cut without the leaves, or stalks of the sugar-cane are fastened to one or more of the uprights.

The bamboo, required for the roof and for the walls (*gedeg*), can only be cut from its stool on the market days, *Paing*, *Pong* and *Kliwon*; if cut on the market days, *Wageh* or *Legi*, the bamboo stools used will die very soon and the bamboo taken from them be spoiled by the *boeboeq*, an insect of great destroying capacity. It is even desirable to cut the bamboo, on the prescribed day, before dawn, both sun and moon being absent, to fool the *goeboeq*, who appears not to know what may be going on when nights are dark.

If the kitchen is built apart from the house, it has to stand to the left with the rice-shed, the stables, etc. Native experience teaches that their position to the right does not agree with perfect happiness and safety. Especially an arrangement of the house with the rice-shed to the left and the kitchen to the right, is *kawit sega djangan*, almost equal to inviting robbers and thieves to come and help themselves.

From all this it will be clear that the Javanese, in building himself a house with the assistance of friends, neighbors and acquaintances, has not such a very easy job, simple and artless as the native structures in the island appear to the uninitiated.

Difficulties arise on all sides, to be surmounted only by great skill in reading omens and signs, by strict adherence to the *hadat*. And when the difficulties prove themselves insurmountable as shown by trees, persisting in falling the wrong way, the *petanggans* remaining persistently unfavorable, etc., etc., he considers it far more discreet to leave his house unbuilt than to challenge fate, according to the golden rule: leave work rather undone than spoil it.

J. F. SCHELTEMA.

THE RUINED TEMPLES OF JAVA.

IF most people were asked to name those countries of the world in which are still to be found splendid architectural remains of bygone civilizations, the names of Egypt, India, Syria and Mexico would at once be forthcoming; but few would place the Island of Java on the list; yet not one of these could show ruins more numerous or more splendid, says the London *Globe*.

This may seem an exaggeration, but the same opinion has been universally expressed by the most eminent writers on the subject. As to the date and rise and fall of a civilization which has left behind it such splendid memorials, authorities are much at variance, but for the most part they are placed between the beginning and the eighth or ninth century of our era. Certain it is, however, that at one time the island must have been ruled by a Hindu or Buddhist people far advanced in the arts of architecture and sculpture.

Among the finest and best preserved of these ruins is the great temple known as the Tyandi Barabudur, situated near the centre of Java in the Sultanate of Djokjakarta. Originally designed probably as a dagaba, or resting-place, for a portion of the ashes of Buddha, this building rises in the form of a terraced pyramid, the part at present above the ground being about 350 feet square by about 120 feet high. The terraces at present visible are seven in number, the whole being surmounted by a dome 30 feet in height.

Each of these terraces is covered on the inner wall formed by the terrace above, and in the lower terraces also on outer walls running around them, by a series of bas-reliefs, which for extent, variety and artistic merit have probably not their equals in the world. Running in a double tier round the lower galleries and in a single tier round the upper ones, they are estimated to have a total length of over three miles, and represent by a continuous series of pictures not only the birth and life of the Lord Buddha

in his final incarnation, but also a large number of the "jatakas," or previous lives, of the Master in the gradually ascending forms of animals and of men in various positions in life, and record his good deeds in each of those lives.

Thus we have the story of the Bodhisatva when on earth in the form of a hare. Indra, the Lord of Heaven, in the form of a traveler, weary and hungry, comes down to test the virtues of the various beasts. He receives fish from an otter, a dish of curds from a jackal, and fruit from a monkey; but the poor hare, having nothing else to offer, presents his own body to the hungry traveler and throws himself onto a fire to be roasted. Interrupted now in many places by the work of a thousand years of earthquakes, tropical storms and fanatical Mohammedan destroyers, this wonderful picture-story runs up through gallery after gallery to where, in the central dome, entirely closed in and hidden, stood the final image of the Master, free from any ornament, crown, or aureole, the Buddha raised above all earthy desires or passions.

In the whole of the series at present above ground there were originally no fewer than 2,141 complete bas-relief pictures, of which 988 are still in a fair state of preservation. There were, in addition, in niches round the terrace walls, 441 statues of Buddha larger than life, besides smaller ones past counting. The whole of this work is done not in soft stone, easy to manipulate, but in the hardest and most intractable kinds of lava and trachyte. Alfred Russell Wallace in his classical work on the Malay Archipelago, remarks: "The amount of human labor and skill expended on the Great Pyramid of Egypt sinks into insignificance when compared with that required to complete this sculptured hill temple in the interior of Java."

There is, however, one peculiar point in the construction which tends to show that the builders were not as good engineers as they were sculptors and architects. Round the entire base there runs what looks like a broad pavement of cubes of stone laid but not cemented together. This broad pavement has been removed in sections, each section being replaced in turn, and underneath was found another terrace, larger than any of those now visible, and having its walls partly, but not entirely, covered with 160 more bas-relief pictures in fine preservation. These were photographed and covered in again. The total mass of square blocks of stone covering this hidden terrace amounts to 7,000 cubic yards.

The conclusion is inevitable that this hidden terrace was meant for the original lower terrace, but that with the building partly completed and the first set of sculptures still unfinished the builders found that their foundations were too weak for the huge structure, and were obliged to sacrifice one terrace to strengthen the others. Had not this been necessary, the building would have stood up even more colossal than it is. The temple of Barabudur is only one among many in Java. At the village of Prambanam, also near Djokjakarta, are the ruins known as "Chandi Sewa," or the "Thousand Temples," consisting of an outer parallelogram of 84 small temples, a second of 76, a third of 64, a fourth of 44 and a fifth, or inner one, of 28; in all 296 small temples in five concentric parallelograms. In the centre is a large and beautifully ornamented cruciform inner temple. Most of the smaller temples are in ruins, but some are still fairly perfect.

At Loro Jongran, close by, are fourteen small and six large temples to Hindu deities; Siva, Durga and Ganesh being still represented by finely carved statues. At Gumong Praw, an extensive plateau reached in former times by four flights of stone stairs, each of over a thousand steps, on the north, south, east and west, are remains of nearly four hundred temples, and, to quote Wallace again, "the whole country between here and Prambanam, a distance of sixty miles, abounds with ruins, so that fine sculptured images may be seen lying in ditches or built into the walls of enclosures."

The above buildings are all of a religious character, but others may have been used for lay purposes, such as the so-called "Water Castle" in the city of Djokjakarta itself, where may be seen the remains of high-walled enclosures with broad tanks, now overgrown with weeds, but still showing their stone terraces and the stone steps leading to the water, having probably originally formed the pleasure of some Hindu potentate, or possibly, from their very high walls, of his harem. In other parts are many ruins of forts, palaces, baths and aqueducts, and at Modjo-Agong, over a large stretch of country, every road and pathway shows a foundation of finely laid brickwork, the paved streets of some old city, of which only traces now remain.

One thing is noticeable in all this architecture—like the ancient Greeks, the builders knew nothing of the extreme utility of the arch in masonry, consequently few roofs remain; but in some

places, as at Mendoet, near Barabudur, complete roofs remain, made by horizontal courses of masonry, each overlapping the one below it till they meet at the apex. Of course, the roof for this has to be very high for the breadth spanned, but for small spans the system serves its purpose fairly well. From the above descriptions it will be seen that if some of the energy spent on Pompeii and Egypt could be spent on excavations in Java, discoveries of the greatest importance might be made.

UNION INTERFERENCE WITH EMPLOYMENT.¹

THIS action—Berry *v.* Donovan—was brought in the Massachusetts Supreme Court by one Berry, a shoe-worker, against Donovan, representative of the National Boot and Shoe Workers' Union, to recover damages for the wrongful procurement of Berry's discharge. The employing firm, Goodrich & Co., had entered into a contract with the Boot and Shoe Workers' Union, the second clause of which reads as follows:

"In consideration of the foregoing valuable privileges, the employer agrees to hire, as shoe-workers, only members of the Boot and Shoe Workers' Union in good standing, and further agrees not to retain any shoe-worker in his employment after receiving notice from the union that such shoe-worker is objectionable to the union, either on account of being in arrears for dues, or disobedience of union rules or laws, or from any other cause."

Berry was working for Goodrich & Co., under a contract terminable at will, and had been so employed for about four years prior to the making of the above agreement with the union. A few days after this agreement was made he was discharged at the instance of Donovan, and the evidence tended to show that it was solely on the ground that he was not a member of the union and had failed to join after repeated suggestions that he should do so. Damages were awarded him in the Supreme Judicial Court of Essex County, which action was affirmed on appeal to the Supreme Judicial Court of the State.

The basis of the appeal and the disposition made of the points of law raised appear in the following quotations from the opinion of the court as announced by Judge Knowlton:

At the close of the evidence the defendant (Donovan) asked for the following instructions, which the judge declined to give:

"(1) Upon all the evidence in the case the plaintiff is not entitled to recover.

"(2) Upon all the evidence in the case the defendant was acting as the legal representative of the Boot and Shoe Workers' Union, and not in his personal capacity, and therefore the plaintiff cannot recover.

"(3) The contract between the Boot and Shoe Workers' Union and Hazen B. Goodrich & Co. was a valid contract, and the defendant, as the legal representative of the Boot and Shoe Workers' Union, had a right to call the attention of Hazen B. Goodrich & Co., or any member of the firm, to the fact that they were violating the terms of the contract in keeping the plaintiff in their employment after the contract was signed, and insisting upon an observance of the terms of the contract, even if the defendant knew that the observance of the terms of the contract would result in the discharge of the plaintiff from their employment.

"(4) The contract referred to was a legal contract, and a justification of the acts of the defendant, as shown by the evidence in this case.

* * * * *

"(6) The defendant cannot be held responsible in this action unless it appears that the defendant used threats, or some act of intimidation, or some slanderous statements, or some unlawful coercion to or against the employers of the plaintiff, to thereby cause the plaintiff's discharge; and upon all the evidence in the case there is no such evidence, and the plaintiff cannot recover."

The defendant excepted to the refusal, and to the portions of the charge which were inconsistent with the instructions requested. The jury returned a verdict of \$1,500 for the plaintiff. These exceptions present the only questions which were argued before us by the defendant.

The primary right of the plaintiff to have the benefit of his contract and to remain undisturbed in the performance of it is universally recognized. The right to dispose of one's labor as he will, and to have the benefit of one's lawful contracts, is incident to the freedom of the individual, which lies at the

¹From the *Bulletin* of the Bureau of Labor for September, 1905.

foundation of the government in all countries that maintain the principles of civil liberty. Such a right can lawfully be interfered with only by one who is acting in the exercise of an equal or superior right which comes in conflict with the other. An intentional interference with such a right without lawful justification is malicious in law, even if it is from good motives and without express malice.¹ In the present case the judge submitted to the jury, first, the question whether the defendant interfered with the plaintiff's rights under his contract with Goodrich & Co.; and, secondly, the question whether, if he did, the interference was without justifiable cause. The jury were instructed that, unless the defendant's interference directly caused the termination of the plaintiff's employment, there could be no recovery. The substance of the defendant's contention was that if he acted under the contract between the Boot and Shoe Workers' Union and the employer in procuring the plaintiff's discharge, his interference was lawful.

This contention brings us to an examination of the contract. That part which relates to the persons to be employed contains, first, a provision that the employer will hire only members of the union. This has no application to the plaintiff's case, for it is an agreement only for the future, and the plaintiff had been hired a long time before. The next provision is that the employer will not retain in his employment a worker, after receiving notice that he is objectionable to the union, "either on account of being in arrears for dues, or disobedience of union rules or laws, or from any other cause." The first two possible causes for objection could not be applied to persons in the situation of the plaintiff, who were not members of the union or amenable to its laws. As to such persons the only provision applicable was that the firm would not retain a worker who was objectionable to the union from any cause, however arbitrary the objection or unreasonable the cause might be. This provision purported to authorize the union to interfere and deprive any workman of his employment for no reason whatever, in the arbitrary exercise of his power. Whatever the contracting parties may do if no one but themselves is concerned, it is evident that, as against the workman, a contract of this kind does not of itself justify interference with his employment by a third person who made the contract with his employer.² No one can legally interfere with the employment of another unless in the exercise of some right of his own, which the law respects. His will so to interfere for his own gratification is not such a right. The judge rightly left to the jury the question whether, in view of all the circumstances, the interference was or was not for a justifiable cause. If the plaintiff's habits or conduct or character had been such as to render him an unfit associate in the shop for ordinary workmen of good character, that would have been a sufficient reason for interference in behalf of his shopmates. We can conceive of other good reasons. But the evidence tended to show that the only reason for procuring his discharge was his refusal to join the union. The question, therefore, is whether the jury might find that such an interference was unlawful.

The only argument that we have heard in support of interference by labor unions in cases of this kind is that it is justifiable as a kind of competition. It is true that fair competition in business brings persons into rivalry, and often justifies action for one's self which interferes with proper action of another. Such action on both sides is the exercise by competing persons of equal conflicting rights. The principle appealed to would justify a member of the union, who was seeking employment for himself, in making an offer to serve on such terms as would result, and as he knew would result, in the discharge of the plaintiff by his employer, to make a place for the newcomer. Such an offer, for such a purpose, would be unobjectionable. It would be merely the exercise of a personal right, equal in importance to the plaintiff's right. But an interference by a combination of persons to obtain the discharge of a workman because he refuses to comply with their wishes, for their advantage, in some matter in which he has a right to act independently, is not competition. In such a case the action taken by the combination is not in the regular course of their business as employes, either in the service in which they are engaged or in an effort to obtain employment in other service.

The result which they seek to obtain cannot come directly from anything that they do within the regular line of their business as workers competing in the labor market. It can only come from action outside of the province of workingmen, intended directly to injure another, for the purpose of compelling him to submit to their dictation. It is difficult to see how the object to be gained can come within the field of fair competition. If we consider it in reference to the right of employes to compete with one another, inducing a person to join a union has no tendency to aid them in such competition. Indeed, the object of organizations of this kind is not to make competition of employes with one another more easy or successful. It is rather, by association, to prevent such competition, to bring all to equality and to make them act together in a common interest. Plainly, then, interference with one working under a contract, with a view to compel him to join a union, cannot be justified as a part of the competition of workmen with one another.

We understand that the attempted justification rests entirely upon another kind of so-called competition, namely, competition between employers and the employed, in the attempt of each class to obtain as large a share as possible of the income from their combined efforts in the industrial field. In a strict sense this is hardly competition. It is a struggle or contention of interests of different kinds, which are in opposition, so far as the division of profits is concerned. In a broad sense, perhaps, the contending forces may be called competitors. At all events, we may assume that, as between themselves, the principle which warrants competition permits also reasonable efforts, of a proper kind, which have a direct tendency to benefit one party in his business at the expense of the other. It is no legal objection to action whose direct effect is helpful to one of the parties in the struggle that it is also directly detrimental to the other. But when action is directed against the other primarily for the purpose of doing him harm, and thus compelling him to yield to the demand of the actor, and this action does not directly affect the property or business or status of the actor, the case is different, even if the actor expects to derive a remote or indirect benefit from the act. The gain which a labor union may expect to derive from inducing others to join it is not an improvement to be obtained directly in the conditions under which the men are working, but only added strength for such contests with employers as may arise in the future. An object of this kind is too remote to be considered a benefit in business, such as to justify the infliction of intentional injury upon a third person for the purpose of obtaining it. If such an object were treated as legitimate, and allowed to be pursued to its complete accomplishment, every employe would be forced into membership in a union, and the unions, by a combination of those in different trades and occupations, would have complete and absolute control of all the industries of the country. Employers would be forced to yield to all their demands or give up business. The attainment of such an object in the struggle with employers would not be competition, but monopoly. A monopoly, controlling anything which the world must have, is fatal to prosperity and progress. In matters of this kind the law does not tolerate monopolies. The attempt to force all laborers to combine in unions is against the policy of the law, because it aims at monopoly. It therefore does not justify causing the discharge, by his employer, of an individual laborer working under a contract. It is easy to see that, for different reasons, an act which might be done in legitimate competition by one or two or three persons, each proceeding independently, might take on an entirely different character, both in its nature and its purpose, if done by hundreds in combination.

We have no desire to put obstacles in the way of employes who are seeking by combination to obtain better conditions for themselves and their families. We have no doubt that laboring men have derived and may hereafter derive advantages from organization. We only say that under correct rules of law, and with a proper regard for the rights of individuals, labor unions cannot be permitted to drive men out of employment because they choose to work independently. If disagreements between those who furnish the capital and those who perform the labor employed in industrial enterprises are to be settled only by industrial wars, it would give a great advantage to combination of employes, if they could be permitted by force to obtain a monopoly of the labor market. But we are hopeful that this kind of warfare will soon give way to industrial peace, and that rational methods of settling such controversies will be adopted universally.

The fact that the plaintiff's contract was terminable at will,

¹Walker v. Cronin, 107 Mass. 555-562; Plant v. Woods, 176 Mass. 492-498, 57 N. E. 1011, 51 L. R. A. 339, 79 Am. St. Rep. 330 (see *Bulletin* No. 31, p. 1294); Allen v. Flood, 1898, A. C. 1-18; Mogul Steamship Company v. McGregor, 23 Q. B. D. 598-613; Read v. Friendly Society of Operative Stone Masons, 1902, 2 K. B. 88-96; Giblan v. National Amalgamated Union, 1903, 2 K. B. 600-617.

²Curran v. Galen, 152 N. Y. 33, 46 N. E. 297, 37 L. R. A. 802, 57 Am. St. Rep. 496. (See *Bulletin* No. 11, p. 529.)

instead of ending at a stated time, does not affect his right to recover.¹

The conclusion which we have reached is well supported by authority. The principle invoked is precisely the same as that which lies at the foundation of the decision in *Plant v. Woods* (*supra*). In that case, although the power that lies in combination and the methods often adopted by labor unions in the exercise of it were stated with great clearness and ability, the turning point of the decision is found in this statement:

"The necessity that the plaintiff should join this association is not so great, nor is its relation to the rights of the defendants, as compared with the right of the plaintiffs to be free from molestation, such as to bring the acts of the defendants under the shelter of the principles of trade competition."

Carew v. Rutherford, 106 Mass. 1, 8 Am. Rep. 287; *Walker v. Cronin*, 107 Mass. 555, and the other cases cited in *Plant v. Woods*, *ubi supra*, as well as the latter case of *Martell v. White*, 185 Mass. 255, 69 N. E. 1085, 64 L. R. A. 260 (see *Bulletin* No. 53, p. 958), all tend to support us in our decision.

We have long had a statute forbidding the coercion or compulsion by any person of any other "person into a written or verbal agreement not to join or become a member of a labor organization as a condition of his securing employment or continuing in the employment of such person." (Rev. Laws, ch. 106, sec. 12.) The same principle would justify a prohibition of the coercion or compulsion of a person into a written or verbal agreement to join such an organization as a condition of his securing employment, or continuing in the employment of another person.

The latest English cases, which explain and modify *Allen v. Flood* (1898), A. C. 1, seem in harmony with our conclusion.² In the first of these it was held that a labor union could not use its power to deprive one of employment, in order to compel him to pay a debt in which the union was interested. The case of *Curran v. Galen* (*supra*), in the decision of which the judges of the Court of Appeals were unanimous, fully covers the present case. The principle involved in each of the two cases is the same, and the language of the opinion in that case, in its application to this, is decisive. From the decision of National Protective Association v. Cumming, 170 N. Y. 315, 63 N. E. 369, 58 L. R. A. 135, 88 Am. St. Rep. 648 (see *Bulletin* No. 42, p. 1118), three of the seven judges dissented, and the result is to leave the law of New York in some uncertainty. The majority distinguished that case from *Curran v. Galen*, just referred to, and held that their decision was not inconsistent with it. They seem to have treated the arrangement to exclude persons not belonging to the union as entered into for legitimate purposes, having reference to actual or probable conditions in the employment; while the minority treated it as similar to the arrangement that appears in *Curran v. Galen*.³

The law of Illinois is in accord with our conclusion. In *London Guarantee Co. v. Horn* (*supra*), it was held that a refusal of a workman to accede to the request of another in a matter affecting the pecuniary interest of the other would not justify the procurement of his discharge from the employment in which he was engaged under a contract terminable at will.⁴ It will be seen that in the different courts there is considerable variety and some conflict of opinion.

¹*Moran v. Dunphy*, 177 Mass. 485, 487, 59 N. E. 125, 52 L. R. A. 115, 83 Am. St. Rep. 289 (see *Bulletin* No. 37, p. 1202); *Perkins v. Pendleton*, 90 Me. 166-176, 38 Atl. 96, 60 Am. St. Rep. 252 (see *Bulletin* No. 14, p. 115); *Lucke v. Clothing Cutters' Association*, 77 Md. 396, 26 Atl. 505, 19 L. R. A. 408, 39 Am. St. Rep. 421; *London Guarantee Company v. Horn*, 101 Ill. App. 355; *id.*, 206 Ill. 493, 69 N. E. 526, 99 Am. St. Rep. 185 (see *Bulletin* No. 55, p. 1674).

²*Giblan v. National Amalgamated Union*, 1903, 2 K. B. 600; *Quinn v. Leatham*, 1901, A. C. 495.

³See, also, *Jacobs v. Cohen*, Supp., 90 N. Y. Supp. 854; *Mills et al v. United States Printing Company*, Supp., Dec. 15, 1904, 91 N. Y. Supp. 184.

⁴See, also, for kindred doctrines, *Doremus v. Hennessey*, 176 Ill. 608, 52 N. E. 924, 54 N. E. 524, 43 L. R. A. 797, 802, 68 Am. St. Rep. 203 (see *Bulletin* No. 22, p. 463); *Christensen v. The People*, 114 Ill. App. 40 (see *Bulletin* No. 53, p. 961); *Matthews v. The People*, 202 Ill. 389, 67 N. E. 28, 63 L. R. A. 73, 95 Am. St. Rep. 241 (see *Bulletin* No. 50, p. 188); *Erdman v. Mitchell*, 207 Pa. 79, 56 Atl. 327, 63 L. R. A. 534, 99 Am. St. Rep. 783 (see *Bulletin* No. 51, p. 450); *Perkins v. Pendleton* (*supra*). Other cases bearing more or less directly upon the general subject are *Lucke v. Clothing Cutters' Association*, 77 Md. 396, 26 Atl. 505, 19 L. R. A. 408, 39 Am. St. Rep. 421; *Holder v. Cannon Manufacturing Company*, 135 N. C. 392, 47 S. E. 481, 65 L. R. A. 161 (see *Bulletin* No. 56, p. 313), but see also this case in 50 S. E. 681 (*Bulletin* No. 60, p. 709); *Chipley v. Atkinson*, 23 Fla. 206, 1 South. 934, 11 Am. St. Rep. 367; *Blumenthal v. Shaw*, 77 Fed. 954, 23 C. C. A. 590; *Barr v. The Essex Trades Council*, 53 N. J. Eq. 101, 30 Atl. 881; *Jersey City Printing Company v. Cassidy*, 63 N. J. Eq. 759, 53 Atl. 230 (see *Bulletin* No. 45, p. 383); *Crump v. Com.*, 84 Va. 927, 4 S. E. 721, 10 Am. St. Rep. 839; *Old Dominion Steamship Company v. McKenna* (C. C.), 30 Fed. 48; *Brown and Allen v. Jacobs Pharmacy Company*, 115 Ga. 429, 41 S. E. 553, 57 L. R. A. 547, 90 Am. St. Rep. 126; *Bailey v. Master Plumbers' Association*, 103 Tenn. 99, 52 S. W. 853, 46 L. R. A. 561 (see *Bulletin* No. 26, p. 194); *Deiz v. Winfree*, 80 Tex. 400, 16 S. W. 111, 26 Am. St. Rep. 755.

We hold that the defendant was not justified by the contract with Goodrich & Co., or by his relations to the plaintiff, in interfering with the plaintiff's employment under his contract. How far the principles which we adopt would apply, under different conceivable forms of contract, to an interference with a workman not engaged, but seeking employment, or to different methods of boycotting, we have no occasion in this case to decide.

The defendant contends that the judge erred in his instruction to the jury in response to the defendant's special request at the close of the charge. The judge said, in substance, that if the defendant caused the firm to discharge the plaintiff by giving the members to understand that, unless they discharged him, they "would be visited with some punishment, under the contract or otherwise, then that interference would not be justifiable." This instruction, taken literally and alone, would be erroneous. Some grounds of interference would be justifiable, while others would not. But considering the instruction in connection with that which immediately preceded it, and with other parts of the charge, it is evident that the judge was directing the attention of the jury to what would constitute an interference, not to what would justify an interference. He had just told them that, if all the defendant did was to call the attention of the firm to the provision of the contract, and the firm then, of their own motion, discharged the plaintiff, the defendant would not be liable. He then pursued the subject with some elaboration, and ended as stated above. Instead of saying, "then that interference would not be justifiable," he evidently meant to say, "then that would be interference which would create a liability, unless it was justifiable." Taking the charge as a whole, we think the jury were not misled by the inaccuracy of this statement.

Exceptions overruled.

WREN'S CHURCHES.¹

THE series of buildings which followed the Great Fire, and which were the work of Sir Christopher Wren, were different in every respect from those which had been erected at a previous period. Up to that date the church architecture of the city resembled in the style, the detail and general arrangement that which was usually to be found in the architecture of the country, but with the advent of Wren a new style was created, and one belonging solely to the city of London. There is no city which shows such a great variety in its towers and spires, or in its church architecture, and all of this may be said to be due to the genius of one man. As may be supposed, there is considerable generalness in the design of some of the examples; this, however, may not be the fault of the architect, but through circumstances over which he may have had no control. Yet even if we allow this to be the case, one cannot fail to be struck with the beauty of many of the designs and of their adaptability to surroundings. They show not only great power in design, but a marvelous grasp of constructive detail. Hardly any one of them is constructed in a similar manner to the others.

The present cathedral of St. Paul, the grandest of Sir Christopher Wren's works, is the third building which has been erected. The first cathedral is said to have been founded in 597, and destroyed in 1087 by fire. In this latter year a new cathedral was built in the Norman style. In the year 1240 the choir was rebuilt and enlarged by being extended over the site of the Church of St. Faith. The tower and steeple were completed in 1221, and the steeple was burnt in 1561, and never rebuilt. It is said that part of the stone intended for the rebuilding of St. Paul's steeple was given by Charles I. to the Duke of Buckingham to use in the building of Buckingham House. Some of the present water-gate is built out of this stone originally intended for St. Paul's. The cathedral was partly repaired by Inigo Jones, who added the Classic porch or narthex at the west end. Sir Christopher Wren was called in, and he proposed to take down the Gothic arches and substitute round ones of a neat Classic style and to erect a dome in place of the tower. These works were all stopped by the Great Fire, and various attempts made to patch the edifice, but, being futile, there came Wren's opportunity for the present building.

In the Harly MSS., 4941 (British Museum), there are three schemes for the rebuilding of the destroyed churches. The number first proposed was thirty-nine, but in the final arrangement this was altered to fifty churches, St. Paul's not being included, as it was considered at the time the matter was brought forward

¹Extract from a paper by Mr. Andrew Oliver, read before the Architecture Association.

that the cathedral could be made suitable for public worship. In addition to these there was another batch which were rebuilt in the eighteenth century, about a dozen in all, by Nicholas Hawksmoor, who rebuilt St. Mary Woolnoth; George Dance, All Hallows-on-the-Wall, and churches by James Gold, Cockerell and others. None of these, with the exception of St. Mary Woolnoth, are of much interest architecturally or otherwise, so it will not be necessary to refer to them more fully.

In describing the churches which were erected by Wren it will be impossible to give a detailed account of the buildings. All that can be done will be to enumerate a few of the leading examples.

In the churches which Sir Christopher Wren erected we find the following types:

The basilica—*i. e.*, a parallelogram divided by arches—at St. Michael, Cornhill.

A nave, and north and south aisles, St. Mary-le-Bow.

At All Hallows the Great (now destroyed) a nave with only a north aisle.

St. Nicholas Cole Abbey shows a nave only, and at St. Stephen, Walbrook, we find the dome the leading feature of the interior.

With regard to the planning of the churches which were rebuilt, in many examples they follow upon the old lines, and even occupy the original sites of the old foundations. In some instances the old walls have been reused, or refaced, and many of the towers still retain the work of an earlier period.

Although Sir Christopher Wren was, to a great extent, tied by the old boundaries, yet he departed in many instances from the original ground plan and arrangement, and erected practically a new building.

Before this period most churches had followed one particular plan—*i. e.*, a nave and aisles, separated by piers and columns.

A structural chancel was a rare feature in the London churches, most of which had been rebuilt in the fifteenth century without a chancel, the aisles being continued to the east end, and a screen being used to cut off the portion which was used as a chancel.

The towers and spires of Sir Christopher Wren may be placed in four divisions: (1) Towers; (2) towers and spires; (3) towers with lanterns; (4) towers surmounted by a dome.

The first division, towers, contains one-half of the fifty examples which were erected originally. In many instances it is possible that the original walls of the structure were left or repaired, and all that was done would be to add to the original structure. The additions chiefly consisted of a parapet wall, and sometimes we find stone vases, obelisks, or other architectural features at the angles, and in other cases round windows or openings inserted, and the walls refaced with stonework.

Of spires there are two kinds, namely, "stone spires" and "wooden structures covered with lead." Among the first was placed the destroyed spire of St. Antholin, which may be said to have been a true spire and constructed in the Gothic style; St. Bride, Fleet street; St. Mary-le-Bow; St. Dunstan's-in-the-East (leaden spire); St. Martin's, Ludgate; St. Edmund, Lombard street.

Towers with lanterns, as St. Stephen, Walbrook; St. James, Garlickhithe; St. Michael, Paternoster.

Towers with cupolas in lead—St. Magnus, London Bridge; St. Peter, Cornhill, and St. Peter, Benetfink, destroyed.

A stone cupola was at St. Mary Magdalene, Old Fish street, now destroyed.

During the discussion that followed the reading of the paper, Mr. J. Johnson said he had prepared a few notes from the very interesting series of drawings of the churches of Sir Christopher Wren made by Mr. J. Clayton in 1848. Of St. Paul's they could not but be impressed by its exterior design as a magnificent masterpiece, especially excellent when viewed from some little distance, though, unfortunately, only portions of the building were thus visible owing to height of surrounding buildings. The transepts were very pleasing, also the western towers when not too much foreshortened, when the upper portion seemed to be too small for the lower part. As to the other churches, he would deal with those on a domical plan first. St. Stephen's, Walbrook, had one of the most charming interiors he knew of, and the width of its dome was 43 feet; St. Swithin's Church, Cannon street, had an octagonal dome, 45 feet diameter; St. Mary, Abchurch, had a large dome for a comparatively small church. Its diameter was 54 feet, on five quinate arches from the square, and the effect was fine; St. Antholin's, Watling street (destroyed), had an elliptical dome, 45 feet by 33 feet, carried on columns, and it was made that shape on account of the street, which sloped off a little. Wren was always anxious to utilize

the site to the best advantage, he never wasted space in his plans; St. Mildred's, Bread street, had a 36-foot doome, on pendentives from cross vaulting. As to these churches with domical roofing, he should advise students to study them whenever they had a chance of doing so.

The next most interesting type of church were the galleried churches, and first of all must be mentioned the spacious St. James's, Piccadilly, which had no clerestory, which was the case with St. Andrew's, Holborn. These, with St. Bride's, Fleet street, and St. Anne's, Blackfriars, were all of one type, *i. e.*, nave and two aisles. St. Clement Danes was the only Wren church that he knew of that had an apsidal end; the old tower was encased and a spire added by a pupil of Wren's.

The next type of church were those of similar section, but without galleries, such as St. Peter's, Cornhill; St. Mary-le-Bow, Cheapside, and Christ Church, Newgate street, which had a clerestory. The remaining churches had one or two aisles or large spans with flat ceilings, with or without coves, but in several matters they varied owing to the peculiarities of site. There were hardly any of Wren's churches but what would repay examination, and even in the plainest of them externally there was most charming woodwork inside. St. Lawrence, Guildhall Yard, has splendid examples by Grinling Gibbons.

As to the towers and spires, he had compared them so as to try and find data for their arrangement. The towers were in height four to five times the width; the lanterns half the height of towers, and the spires were nearly the same height as the towers. St. Mary-le-Bow, the finest Classical tower and spire in London, had a 32-foot square tower; it was 111 feet 7 inches up to the cornice, and from cornice to top of spire 104 feet 6 inches; St. Bride's had a 30-foot square tower, a height of 123 feet up to cornice, and 104 feet above; Christ Church, Newgate street, had a 23-foot square tower, 98 feet to top of cornice, and 58 feet to top of spire; St. Magnus, London Bridge: tower, 27 feet square, 100 feet to parapet, and 80 feet above; St. Vedart, Foster lane: tower, 20 feet square, 80 feet high to cornice, and 70 feet above—the lower part of tower, therefore, being very little higher than the upper part. As to towers with stone lanterns, there were three of them which were particularly interesting; they were smaller than the others, but well designed. They were: St. James's, Garlick Hill, St. Michael's, College Hill, and St. Stephen's, Walbrook, all of which had 20-foot square towers. The height of St. James's was 87 feet to cornice, and 38 feet above; St. Michael's, College Hill, 94 feet to cornice, and 38 feet above, and St. Stephen's, 83 feet to cornice, and 44 feet above, from which it would be seen that the dimensions of each part were about half the total height, whereas in the towers with spires the upper part was nearly equal to the lower. Of stone spires, St. Antholin's (now destroyed) was the only example of a Wren church with a stone spire that he could recollect. It had a 20-foot square tower, was 74 feet to parapet and 70 feet to top. St. Margaret's Pattens, Eastcheap, had a 21-foot 6-inch tower, 106 feet to parapet, and 84 feet above, and St. Swithin's Church, which was very plain, had 18-foot 4-inch square tower, 89 feet to parapet and 57 feet above. The lead spires, though picturesquely treated, were inferior to the stone ones. St. Martin's, Ludgate Hill, was extremely pleasing, it had a 22-foot tower, was 88 feet to cornice and 72 feet to top of spire; while St. Mary Abchurch had a 20-foot square tower, was 80 feet high—giving four squares—and with a 60-foot spire. St. Dunstan's was a very graceful structure, founded upon the beautiful example at Newcastle-on-Tyne. It had a 20-foot square tower, was 93 feet high to parapet and 77 feet to top. St. Michael's, Cornhill, had one of the most impressive, sturdy towers in London. As to towers of simple character, St. Andrew's, Holborn, had a 23-foot square tower and was 122 feet to parapet; All Hallows, Lombard street, had a 21-foot 6-inch tower, and 105 feet 3 inches high; St. Clement's, Clement's lane, had 16-foot tower, and was 86 feet high; St. Mary Somerset, Thames street, was a peculiar church (now destroyed), because it had a range of obelisks at angles treated effectively. There were several examples of towers, leaded spires, etc., which were not particularly happy in design, but all the towers and spires when viewed from one of the bridges afforded a varied and magnificent spectacle not to be equalled by any city in the world.

THE CAMPAGNA UNDER WATER.—The floods throughout Italy are causing serious damage. Most of the Roman Campagna is under water, and even the neighborhood of Rome is inundated. The Tiber has risen 45 feet at one spot, and may break the embankment and inundate the city, as in 1900.

ILLUSTRATIONS.

UNITED STATES POST-OFFICE AND CUSTOM-HOUSE, CAMDEN, N. J.
MESSRS. RANKIN, KELLOGG & CRANE, ARCHITECTS, PHILA-
DELPHIA, PA.

HOUSE OF WM. G. CLARK, ESQ., WESTERLY, R. I. MR. WARRINGTON G.
LAWRENCE, ARCHITECT, NEW YORK, N. Y.

CUTS OF TWO PLANS.

DINING-ROOM IN THE SAME HOUSE.

ROOD AND CHAPEL SCREENS: PLATE I-9.

THERE is perhaps no portion of church architecture the derivation of which is less understood than Rood and Chapel screens.

Pugin, in his treatise on this subject, maintains that they originated "from a natural as well as symbolic intention. It is a natural principle to enclose any portion of a building or space which is set apart from public use and access—it teaches the faithful to reverence the rest of the holy mysteries."

"The choirs of the early Christian churches, which were frequented by the people, were enclosed by open screens, and this principle has descended through all the ages in churches destined for parochial worship," while in cathedral and conventual churches, which were intended for the use of ecclesiastics, "the solid screen was invariable, not only across the nave, but round the choir, so that the canons were completely enclosed."

The introduction of these close screens was coeval with the commencement of the long "offices," and they were positively necessary for those who were compelled to remain so many hours in the choir, and would have been unable to resist the cold or exposure and the free passage of the air. But like every object generated in necessity, the church soon turned these partitions to a most edifying account, and while the great screen was surmounted by the Rood the lateral walls were carved with scenes from sacred history, many of which still remain at Paris, Amiens, Chartres, Auch and Albi.

On the other hand an authority who has carried his researches into the Orient says:

"The earliest churches—those of the Orient—were largely influenced by Hebrew traditions, the Jewish Temple being the model on which their internal arrangement was based. The three main divisions devoted respectively to the people, the priesthood and the sacred mysteries were separated by the temple veils. In the Christian churches this triple arrangement was reflected, the narthex, nave and the sanctuary being partitioned off by veils in the earlier period, and later by constructional screen-work in addition.

"The inner screen, which divided the sanctuary from the nave, at first consisted of a row of pillars supporting a beam, from which the veils were suspended. This beam in its turn supported a row of images which, in the East, lead to a development that became practically an enclosing wall, retaining a central doorway and two small windows, and this type persists as a distinctive feature of the Greek and Eastern churches to-day."

The enclosing wall seems never to have taken root in Italy, but the necessary means of veiling the altar were provided by the baldachino.

After the ninth century the Italian churches ceased to construct anything in the nature of a screen to the sanctuary other than a low balustrade.

So, an exhaustive study of the history and origin of the Rood-screen would lead us deeper into archæological controversy and church history than would here be profitable. These designs have been selected from an architectural standpoint, with the hope that their composition and detail and the spirit of their design will afford inspiration to those who have similar problems in hand.

The scale of these examples is easily determined by the height of the balustrade.

Italy, although it might be called the fountain from whence architectural influence flowed, has few true examples of "jubés" or Rood-lofts, though it has many Rood-screens—the climate doubtless permitting the holding of long religious offices, as noted by Pugin, with less discomfort than in England or France.

The two ambones were in some instances raised, with the entire floor of the choir, as in the Church of Sta. Maria dei Miracoli at Venice, but that does not constitute a screen. At Torcello and S. Clemente, Rome, the pulpits are apart, those at Torcello, however, bearing some architectural relation to the screen behind. Old St. Peter's, Rome, possessed the earliest

Rood-screen. It was built of twelve twisted columns, doubtless antiques, decorated with flutings and vines.

This may have established a precedent for the twisted Cosmati columns of S. Clemente, Alba Fucense and elsewhere.

There are examples in Italy of ambones and pulpits connected by a low, solid railing with a central gate.

Additional Illustrations in the International Edition.

PORTICO: UNITED STATES POST-OFFICE AND CUSTOM-HOUSE, CAMDEN,
N. J.

NOTES AND CLIPPINGS.

SAN GIORGIO DEI GRECI, VENICE.—This Church of St. George of the Greeks is one of Venice's most wonderful places. One has the impression of a sanctuary which is at the same time a treasure-house; gold everywhere—furniture, ikons, lamps, embroideries—not gilding, but real, heavy gold. The vestments are stiff with it. The bearded golden priest goes backwards and forwards, the gold-embroidered curtains opening and shutting for him, revealing or hiding a nimbus of tapers and incense and shining encrusted walls; while the acolytes, in slender folded linen smocks, with gold stoles crossed over their backs, kneel before the rood-screen. There is a sense of the departed splendors of Judaism, of a Solomon's Temple behind those half-drawn curtains, and every time that pope came forth a name rose up in my mind—Melchisedek, he who was a priest and also a king. After that service at St. George of the Greeks, we walked home through St. Mark's, entering it by the sacristy. The hot air, smoke of incense and dust, the shuffle of human beings and snuffling of priests caught one by the throat after that fair empty splendor of the Greek Church. Caught me, at least, subduing, crushing, perhaps rumpling my imagination and feelings, but making them humaner. There is, in this magnificence, a share of shabbiness; in this venerable place the sense of the deciduous, the perishable, which, in a way, is also a sense of the eternal. There is room, in St. Mark's solmenity, for such as that consumptive girl who made bead garlands for cemeteries. And St. Mark's is the greater for her poor little presence.—*Vernon Lee in the Westminster Gazette.*

THE COST OF MODERN HOSPITALS.—S. S. Goldwater analyzes at length the conditions which cause the cost of the modern hospital building to be so much in excess of what was the case a generation ago. He estimates that a hospital of 1870, of 450 beds, with a space allowance of 6,000 cubic feet per patient, could be built to-day at a cost of \$1,200 a bed. A modern hospital with the same space allowance would cost double, or \$2,400 a bed, while actually in a hospital recently built, 11,000 cubic feet were allowed per patient, and the cost was, approximately, \$4,400 per bed. The author then analyzes at length the various features entering into the construction of the modern hospital which contribute to raise its cost to so great a degree, such as fireproof construction, electric light and power, laundry, kitchen, refrigeration, surgical facilities, disinfecting and sterilizing plants, accommodations for the staff, nurses and employes, laboratories, etc. He summarizes by saying that, aside from economic causes, which are beyond our reach, the high prevailing cost of construction is apparently due to new methods of disease classification and treatment, to more intense nursing, to the discovery of scientific methods of diagnosis, to an application of the principles of hygiene to wards, workrooms and living rooms, to the desire to release from the wards during part of the day convalescents to whom the atmosphere of the sick room is detrimental, and finally, to the evolution of the fireproof, and, to a certain degree, germ-proof, building. If we apply to all of these improvements the rigid tests of result, we shall find that the test is fairly met; but while we may grant that to build a general hospital embodying all of the features enumerated is to tread the path of wisdom, we may, nevertheless, question the propriety of investing all of our capital in the construction of such a plant. The author then proposes the plan of having the hospital maintain in the country a less expensive branch building for the reception of the convalescent patients, and shows that in this way a much larger number of patients can be provided for at the same expense. For example, the sum of \$1,000,000 will provide a city hospital for 250 patients, but invested in a city hospital with country annex it will furnish accommodation for 300 patients. The conditions of operating will also be such as to render this division of the plant the most economical system of managing the hospital, and he urges universal adoption of the plan.—*Medical Record.*

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, DECEMBER 9, 1905.

No. 1563.

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THE citizens of New York City, who just now, because of the recent disputed municipal election, are watching the moves that office-holders desirous of retaining their places are preparing to make, have placed before them an execrable example of what may happen, in the ousting, last week, by the Acting-Mayor of Boston, of the Board of School-house Commissioners. This chance occupant of the mayorial chair—wherein he finds himself through the death, a few weeks ago, of its regularly elected occupant—whether desirous of benefiting political friends or injuring political enemies is immaterial, first asked the members of the Commission to resign and then, when they denied his request, finding no good reason for complying with it, removed them summarily because of their "gross and unwarrantable extravagance in the expenditure of public moneys," a form of words about as dishonoring as could readily be devised. If it were not for this direct charge of misfeasance, the ousted officials could afford to shrug their shoulders and turn to other work; but, as things are, they propose to make the Acting-Mayor withdraw his charges, since he cannot substantiate them. They would be more than human if they had not at once pointed out that the architect now appointed to take the place of the architect-member and chairman of the deposed Commission was shown by the records to have been relatively more "extravagant" in the schoolhouses built by him for the city than any other architect who had worked under the Commission. This fact is pointed out not for the sake of discrediting the newly appointed member, but merely to draw attention to the patent insincerity of the Acting-Mayor.

THE method adopted by Boston in building school-houses since the time when Mr. E. M. Wheelwright succeeded in inducing the city to abolish the office of "city architect," which he himself had filled for several years in so exemplary a manner, is rather unusual as well as risky; and the fact that it has succeeded as well

as it has is due largely to the care and time the School-house Commissioners have given to the matter of selecting the several architects and then insisting that each such architect should not only prepare his work thoroughly but make that work the best he was capable of preparing. In a general way, the theory has been that there were many competent architects in the town, one as good a citizen as another, and so it was only reasonable that the designing of new schoolhouses should not be entrusted to one man or to a select few, but rather to the larger list of the entirely capable in some sort of selected rotation. That the result has been as satisfactory as it has is due largely to the skill and patience of Mr. Sturgis and his fellow Commissioners, whose own work would obviously have been lightened if they had chosen to think that the best method was that of dealing always with the same practitioner, who, through constant practice, would have become an expert at length in this particular class of work. The method actually followed has been of distinct educative value to those architects who have built the several school-houses and it has at the same time forced the Commissioners to become the experts themselves, and now the ill-advised Acting-Mayor deprives the city of the services of these experts!

THE hoary-headed and venerable demand for an "American style of architecture" has lately been dragged out from the retreats where it has been secluded for a longer period of years than usual. This ancient but undying aspiration is brought once more upon the stage by the coterie that, of all others, one would least expect to entertain it—the Society of Beaux-Arts Architects, whose members have not infrequently been believed to hold in scorn all things merely American. To be sure, the "American style" aspired to is not, after all, to be American, but French, and more than that the French of the *École des Beaux-Arts*. It is curious, this demand for an American style, when we already have one; it needs improving of course, but we have one just as truly as we have any national habit or custom. The matter can be tested readily by taking a miscellaneous lot of foreign and American photographs, subjects all unfamiliar, and sorting them rapidly into piles by nationality of style. It would certainly be found that no more mistakes had been made in the American pile than in the German, Italian or French, although it is more than likely that photographs of work designed by members of the Society of Beaux-Arts Architects would be found in the pile of French photographs rather than in the American one. Should this prove to be the case, it would be natural to doubt whether this particular body of designers can profitably charge themselves with the fostering of an "American style."

FOR the members of this society we have as warm regard as we have great respect for the fundamental principles and theories upon which the *École des Beaux-Arts* is founded, but we would prefer to see these principles and theories applied to American needs in American clothing, as it were, rather than have the American needs clad in garments seemingly fashioned by

French tailors. Of all the men we have known who have studied at the French school, it has always seemed to us that no foreigner so truly profited by the training there to be obtained as John James Burnet, of Glasgow, now one of the noted British architects of what is getting to be the elder line. We have never seen any work of his that was not unmistakably British, and generally of that particular type to be found only north of the Tweed, and just as unmistakably it was patent that the designer had studied in Paris and studied well. We did not have the pleasure of seeing the drawings of his that were exhibited at one of the T-Square Club's exhibitions a few years ago, but we never see one of his buildings illustrated in an English periodical that we do not regret that our American students in Paris do not perceive, as he did, that more can be accomplished by budding and grafting good scions onto hardy native stock than by uprooting and replacing it with transplanted growths, which are only too likely to prove sickly and unsuited to their new conditions and environments.

WE are glad to learn, through a communication published in another column, that the matter of communal recreation-buildings for the children of this city has already engaged the attention of others than ourselves. Dr. Gulick is fortunate in occupying a position which not only gives him an unusual chance for observation, but assures for his recommendations a degree of respect which would not be granted to the fads that an ordinary layman might seek to promote. We further gather from a large illustration of a twenty-story recreation-building, shown as if erected on the river-front, that was published in one of the daily papers a few days ago, that Dr. Gulick has already reduced his ideas to fairly concrete working shape and intends to bend his energies untiringly to induce the authorities to build at least one such recreation-building that the beneficial effect of such an institution may have practical demonstration. If the public authorities are unwilling to take the matter up, there are, surely, enough moneyed philanthropists in the city to build and endow such a *crèche* for children of all ages.

“NONE of the buildings occupied by the Department [of Justice],” says the Attorney-General of the United States in his annual report, “is fireproof, and not one of them contains a vault,” a condition of things which exists partly because the Department has outgrown its former quarters and has now to distribute its working-force between seven buildings rented from private parties. It is a condition which he lays particular stress upon in making his plea for the erection of the long-delayed building for the Department of Justice, and speaks of it as being “inconvenient, uneconomical and humiliating.” The inconvenience we do not mind and people are more than wonted to every form of Governmental extravagance, but it is unspeakably “humiliating” to learn that this particular bureau of the executive branch of the Government is so flaccid and viscous as not to have found ways and means of using enough of its regular appropriation to build at least one fireproof vault in which the valuable papers and records, both public and private,

it handles in the way of its business, might be stored with some reasonable chance of safety, even if it must be done at the cost of improving private property and presenting the landlord with a fixture by way of a “transmittendum.” If the Department abstains from vault-building for the sake of using its unprotected condition as a cogent argument for granting the new building it needs, then those who so risk the property of others for such a purpose seem to show themselves possessed of qualities of morality and conscience that make them unfitted for positions in this particular Department, of all others.

IT is far from being an unheard of occurrence that, in cases of an architectural competition, the disappointed competitors should be found nodding their heads sagely and whispering to one another that the competition had been decided not upon its merits but because the winner had not hesitated to bolster up the good points of his design with promises and pledges convertible into negotiable funds. It is distinctly a novelty, on the other hand, to find one of the *unsuccessful* competitors actually arrested on a warrant, legally procured, charging him with having attempted to corrupt the morals of certain county commissioners in a Western State by offering them a substantial bribe to decide in favor of his design a competition for the county court-house. As the accused architect not only denies the charge, but is a man of good standing in the profession and an old practitioner in the State in question, we naturally do not care, through mentioning his name, to add to the depth of the cloud that is momentarily hovering over his reputation. We mention the matter, because the example set in this case would be an excellent one to follow—for a while—in all cases where bribery and corruption are alleged by either competitors or authorities. Since, unfortunately, competition is and must be one of the conditions under which architects have to strive for their living, they should take every opportunity to make plain to the public and to one another that there is nothing more despicable, in one who assumes to practice a free art, than the procuring of “a job” by the corrupt use of money.

THE public and the officers of the law hardly do justice to the considerateness and self-restraint that are often exercised by those who, in the watches of the night, give themselves the trouble of examining and appraising the portable valuables of others. Burglars must frequently be subjected to really cruel disappointments, and the fact that they so rarely give vent to their petulance should be counted to the credit of the profession—or art, as everything is an art nowadays. An incident that transpired recently in Brescia shows, however, that all burglars are not gently bred, and should teach collectors that an insurance-policy against loss by burglary is no less a good thing than a time-lock safe. Certain burglars, not finding in the palace of Count Salvadago the expected amount of portable loot, allowed their wounded feelings to so affect their spleen that it could only be relieved by making a bonfire of the pictures, tapestries, furniture, etc., which in large amount the Count and his forefathers had collected. Their deed is about as precocious and unusual an act of vandalism as has ever been recorded.

MODERN THEATRE PLANS.

A RECENTLY published German brochure, entitled "The Modern Theatre," by Herr J. Zasche, architect in Prague, Bohemia, deals in particular with the provision of better and safer auditoriums for the audience. The illustrations

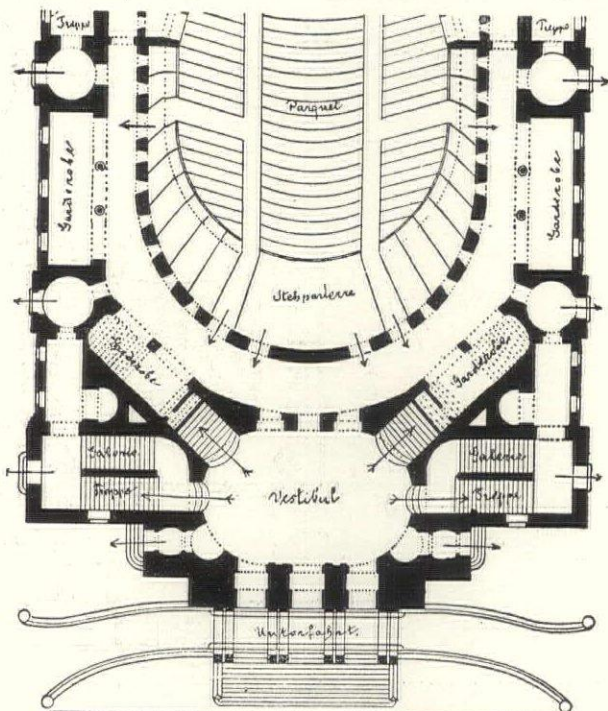


FIG. 1.—NEUES DEUTSCHES THEATER, PRAGUE.
Fellner & Helmer, Architects.

published by the author are the outcome of his studies during a competition held in 1903 for plans for a smallish theatre, of a capacity of 800 persons. As this approximates the size of the

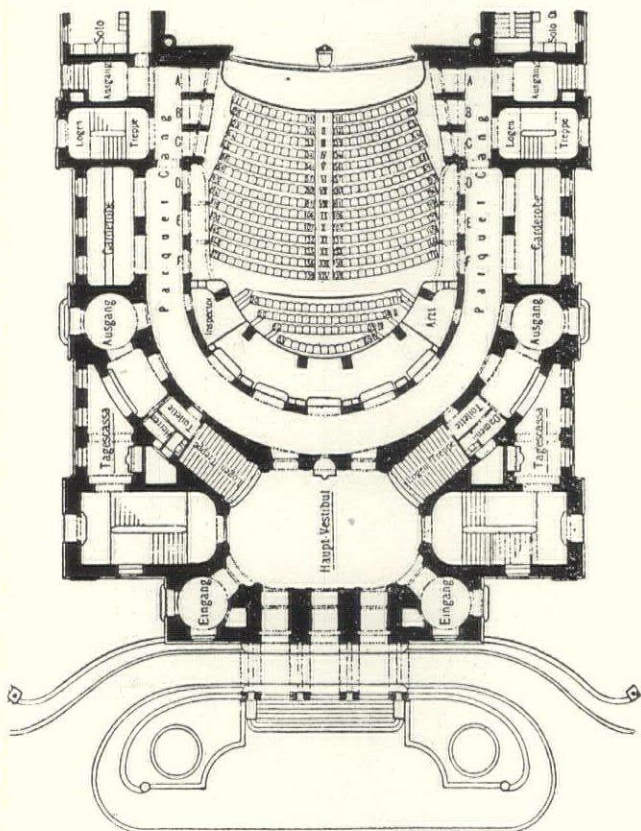


FIG. 2.—NEUES STADTTHEATER, ZURICH.
Fellner & Helmer, Architects.

majority of auditoriums in American theatres, a brief résumé of the contents of the pamphlet will prove of interest.

In his introduction, the author points out that two standard types of theatre plans have been developed in recent years, largely owing to the enforcement of municipal rules and regulations,

but also as the result of enforced economy in building. One standard type is represented by the works of the Vienna architects, Fellner and Helmer, the other by those of the theatre architect, H. Seeling, of Berlin.

The principal point in which these two types differ is the arrangement of the lobbies, entrances and staircases. Type I. is shown in Figs. 1, 2 and 3, representing floor plans of the New German Theatre in Prague, of the Municipal Theatre, of Zurich, and that of the theatre at Salzburg. Type II. is represented by floor plans, Figs. 4, 5 and 6, of the New Theatres in Berlin, in Bromberg and in Frankfort-on-Main.

In theatres of type I, the central location of the entrance vestibule is noteworthy. From it all the staircases to the various tiers start radially, those to the first balcony, Iter. Rang, being located diagonally. These latter stairs, which also form a communication between the parquet (parterre) and the balcony foyer, are straight-line stairs.

In theatres of type II, the stairs leading to the balcony do not start from the vestibule, but from the rear aisle surrounding the parquet.

Other prominent German architects are said to have closely adhered to these types, examples of which may be seen at Meran, Dortmund and Munich. But the author contends that neither of the two types of plans is free from objections, because the plans do not fulfil the following two essential requirements, viz.:

- (1) To lead the public before the performance through a common lobby, past the ticket-office, to the various stairs leading separately to the upper tiers.
- (2) To lead the occupants of the different tiers after the performance by means of separate stairs directly to outdoors.

In the second type of theatres the first balcony stairs are not visible from the lobby and ticket-office. On the other hand, persons from the first balcony and those from the parquet must pass out the same way, which as the two streams meet, may become dangerous in case of a panic. The same objection applies

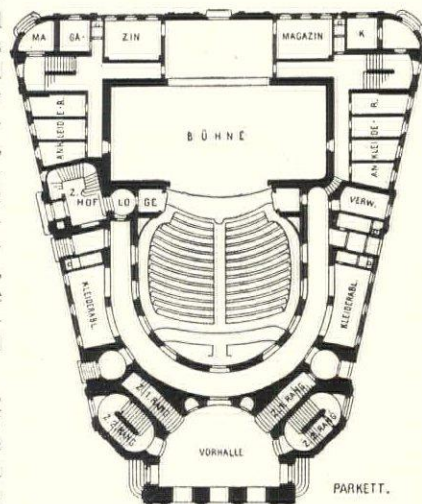


FIG. 3.—NEUES THEATER, SALZBURG.
Fellner & Helmer, Architects.

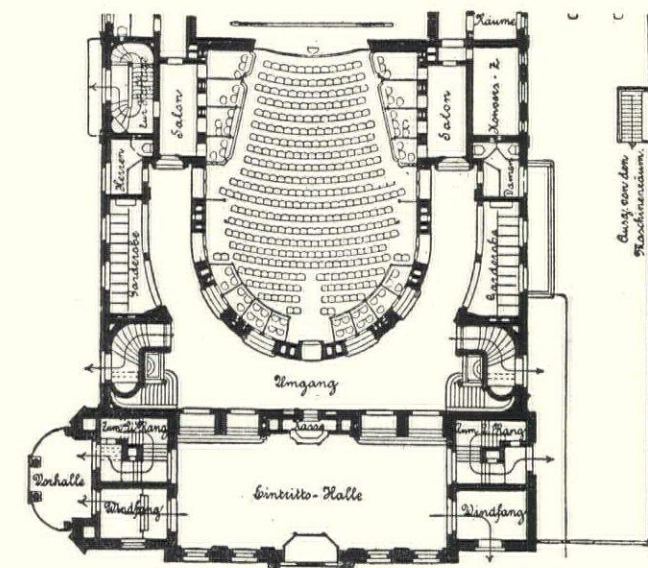


FIG. 4.—NEUES THEATER, BERLIN.
H. Seeling, Architect.

to theatres of type I, in which persons from the parquet meet and cross in the main vestibule those from the first balcony.

In the one case we have the advantage of an easy finding of the various stairs, in the other the advantage of easy communication between the parquet and the balcony foyer, but in both

cases the architects fail to provide direct exits to the street. It occurred to the author that the merits of both types might be combined, at the same time avoiding the faults of both plans. The result of his studies is shown in Figs. 7, 8 and 9, which are briefly explained hereafter.

Persons coming in carriages reach the vestibule through

lobby A, Fig. 7, which has storm-doors at the vestibule and at the lobby in the rear of the parquet. Before the beginning of the performance the storm-door at the main vestibule remains open. Persons in the parquet can use the other storm-door to go up to the balcony and to the foyer, without passing through the entrance vestibule, where they might be exposed to draughts.

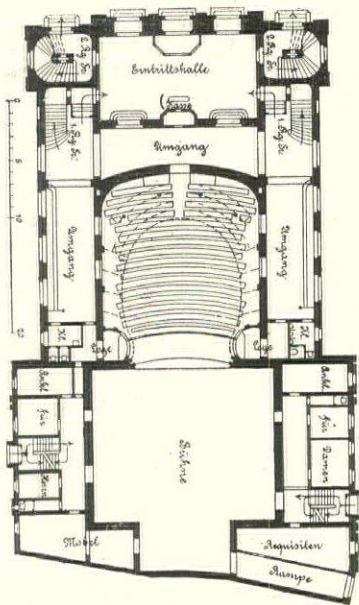


FIG. 5.—NEUES STADTTHEATER, BROMBERG. H. Seeling, Architect.

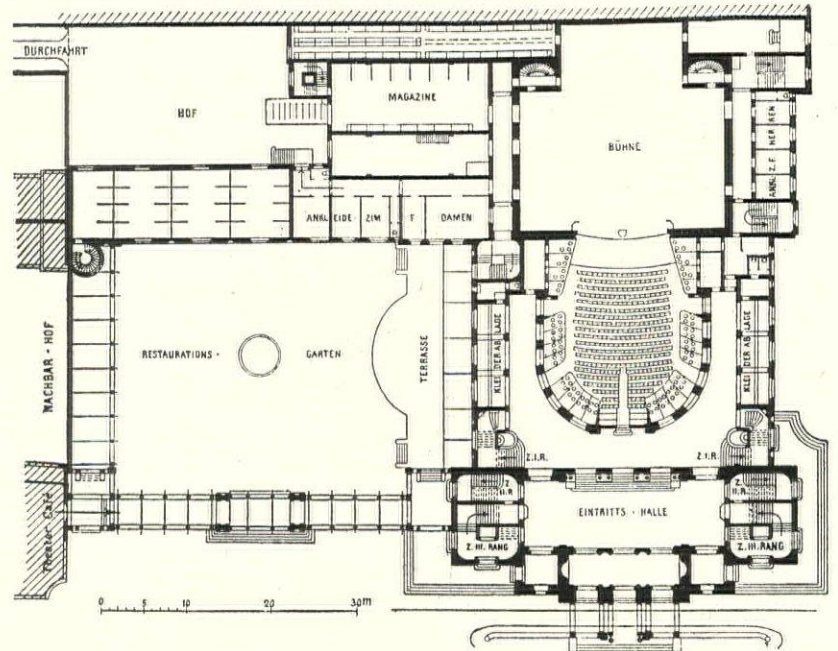
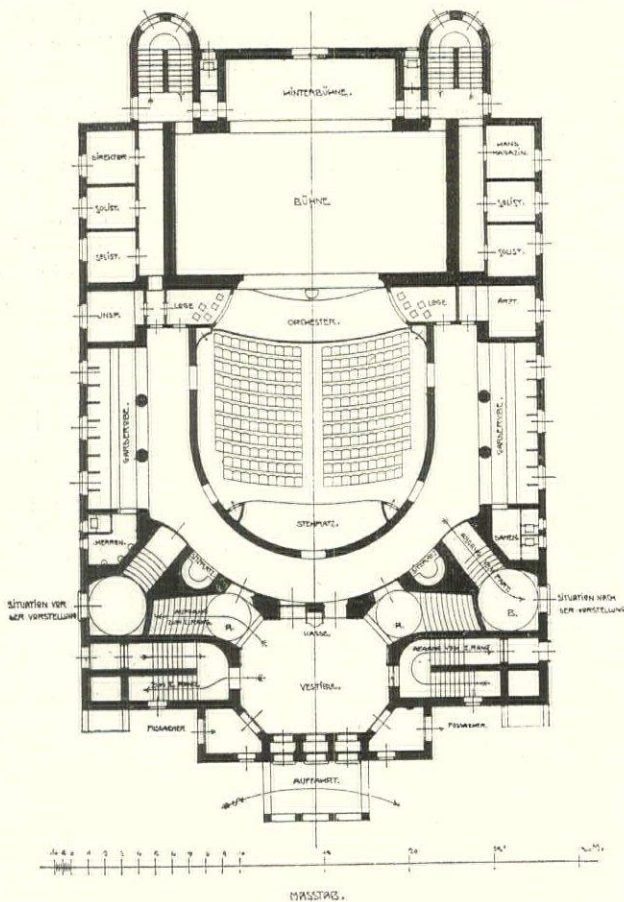


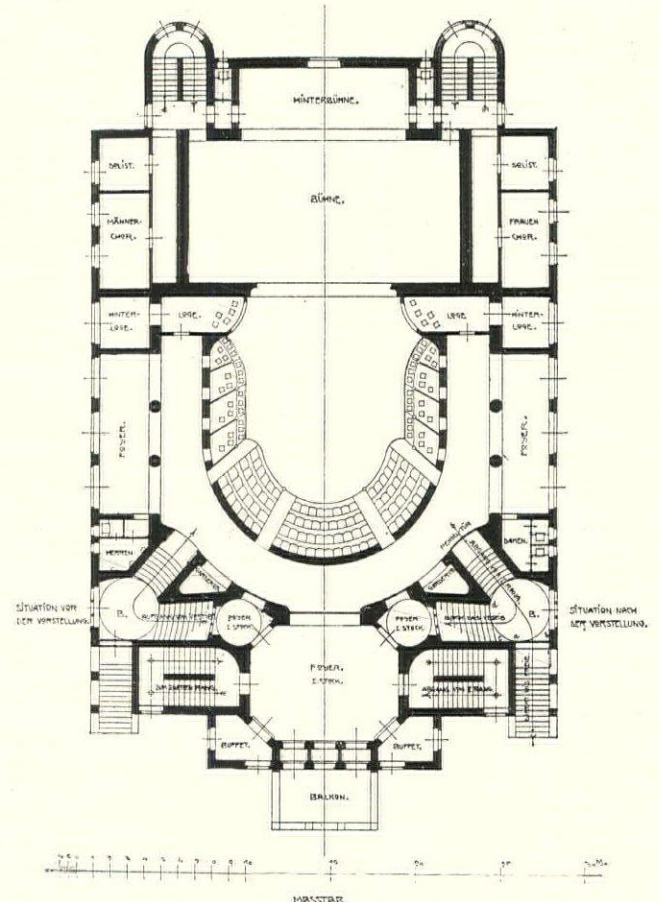
FIG. 6.—NEUES STADTTHEATER, FRANKFURT-AM-MAIN. H. Seeling, Architect.

three doors at the front entrance, and pedestrians enter through two side entrances provided with storm-doors. The ticket-office is located in the center of the octagonal vestibule, and to the right and left of the office are two doors leading into the parquet. In

Half-way up the stairs leading to the first balcony is a landing B, Fig. 9. On leaving the theatre, persons in the balcony reach the street directly from landing B by the door "a-b," shown in Fig. 9. This mode of travel is enforced at the close of the



FIGS. 7, 9.—PLANS FOR A THEATRE SUGGESTED BY J. ZASCHE, ARCHITECT.



the next sides of the octagon are located the entrances to the first balcony. To the right and left of the vestibule are the two stairways leading to the second balcony or gallery. Thus all stairs are directly accessible from the main vestibule.

In front of the stairs leading to the first balcony is a small

performance by closing the communication between A and the stairs by means of a light railing at "c-d."

The seats in the parquet are readily reached from the wide lobby surrounding it. Exits are provided from the parquet under the balcony stairs, which lead directly to outdoors.

The balcony contains ten boxes, five on each side of the stage, also two large foyers. The total floor area of the foyers, amounting to 210 square metres, is so calculated as to provide for each person 0.8 square metre of floor space. This provides standing-room for about one-third of the entire audience.

Persons having tickets for the gallery reach their seats by the two separate stairs, each of which has a width of 1.5 metres.

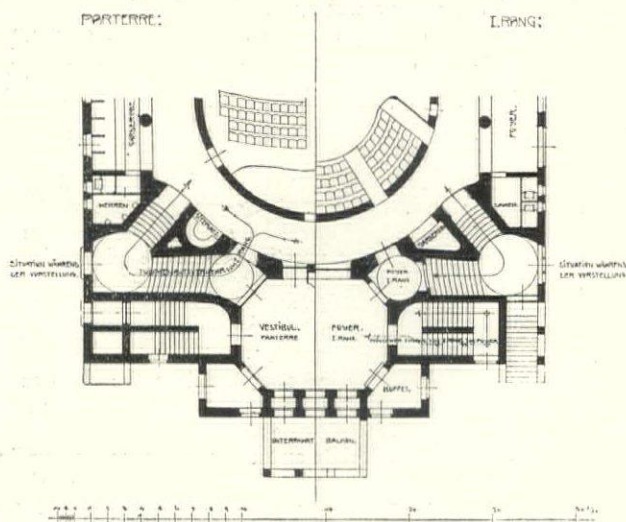


FIG. 8.

The audience in the parquet reaches the street either through the five entrances at the main vestibule, or else through the two diagonal exits leading to the side streets, courts or alleys.

For the greater safety of persons in the gallery there are on both sides large open terraces with stairs leading to the side streets or the courts or alleys. These are not shown in the illustrations.

WM. PAUL GERHARD, C.E.

THE GUILDS AND LIVERY COMPANIES.¹

IN the eleventh and twelfth centuries England was almost entirely an agricultural country. The Manor system of those times contained the germs of our modern social and industrial life and organization, and from it may be traced the gradual evolution of agriculture, industry and trade, to their existing proportions. Painfully but surely, on the decay of villenage, came the growth of free laborers and the commutation of labor rents for money payments, which ultimately made the free flow of labor and capital to different parts of the country possible. The Black Death of 1348 put a check on the rising prosperity of the country, and the Statute of Laborers of 1350 was the first of successive attempts to regulate wages by means of Acts of Parliament, and the popular discontent consequent thereon found expression in the revolutionary preaching of John Ball and the "Vision of Piers the Plowman." In course of time the serfs became copyholders, and the nucleus of a free tenantry and a "bold peasantry" was insensibly formed. Meanwhile new influences had arisen which had become important elements in moulding economic conditions in towns which also painfully but surely forced themselves into comparative independence and freedom. The reign of the Guilds had begun. The trade Guilds of the Middle Ages were undoubtedly the most important factors and features in urban economic life, and owing to the circumstance of my long personal connection—of nearly 40 years—with not the least progressive of the great Livery Companies of the City of London, I may be pardoned perhaps for dilating somewhat on their influence on the rise of trades and manufactures, and I will also touch, later, on the services which many of them have rendered to the cause of industrial education in these latter days.

The designation of "Livery" Companies recalls the days when each trade, profession, calling, and degree in life wore its distinctive costume. Possessing a close analogy to the "collegia opificum" which existed under the Roman Empire, they more probably took their origin out of the religious and social Guilds which existed in London and other towns in Saxon and early Norman times. A vast number of these Guilds and fraternities existed in early times throughout Europe, and in this country every village and hamlet had a Guild of some kind or other.

¹Extract from an address delivered before the Society of Arts by Sir Owen Roberts, and printed in the *Journal of the Society*.

Guilds have in fact played an important part in the history of civilization. They have fostered our arts and sciences, developed and extended our commerce, and in many cases cherished and preserved our liberties. They have likewise in many respects moulded our national character and institutions. In the archives of the "Guildhall," the name of which suggests their original connection with the Municipality of London, may be found notices of a "Frith Guild" and a "Knigheten Guild," the main objects whereof were the relief of poverty and the performance of masses for the dead. The following are the ordinances of one of these associations, framed in the thirteenth century:

"All the bretheren and susteren shall go in procession on the feast of Corpus Christi. . . . If any one of the Guild falls into poverty, which God forbid, and has not the means of support, he shall every week have sevenpence out of the goods of the Guild. . . . If any one dies in the city without the means of burial, the Guild shall find the means according to the rank of him who is dead. . . . If any one wishes to make a pilgrimage to Jerusalem each brother or sister shall give him a penny, if to Rome a halfpenny; and they shall go with him outside the gates of the city, and on his return they shall meet him and go with him to his mother church. . . . If a brother or sister dies outside the city on pilgrimage or elsewhere, they shall do for his soul what would have been done if he had died in his own parish. . . . When one of the Guild dies he shall, according to his means, bequeath five shillings or what he will to the Guild. . . . On feast days the bretheren and susteren shall have three flagons and six tankards with prayers, and the ale in the flagons shall be given to the poor who most need it. After the feast a mass shall be said and offerings made for the souls of those who are dead."

Most of these rules became obsolete as a consequence of the Reformation, but the legacies of "five shillings or what he will"—and that was often something very substantial—invested in house property in the city, which has vastly increased in value, are the origin of the Livery Companies' present estates. Each industry had its own quarter of the city. Thus Paternoster-row, contained the sellers of beads for prayers, the Poultry poulterers, Ironmonger-lane ironmongers, the Vintry wine-sellers, Cordwainer-street shoemakers, and so on. But, as membership was hereditary and transmissible to females, the Guilds always contained members apart from their titular trades.

These guilds, or new societies formed by the grouping of some of them together, received Charters of Incorporation in the reigns of Edward III., Richard II., and Edward IV., and, as the twelve "great" and the many "minor" Livery Companies of London, have had their charters renewed by succeeding sovereigns down to the accession of the House of Hanover. The terms of the charters often refer to the relief of poor members as one of the objects of the incorporation. Their principal effect, however, was to organize the trade and manufactures of mediæval London, by giving the companies power (1) to compel all engaged in the trades then incorporated to join; and (2) to search for and destroy defective wares within a radius of three miles or so from St. Paul's.

For two or three centuries the Livery Companies of London thus organized, acting in concert with the merchants of "the Staple" in the provincial towns, and on the Continent—in towns such as Calais, the Germanic Hanse Towns, Bordeaux, and other seaboard towns and ports of the Continent—and giving advice to and receiving directions from the Privy Council as to mercantile policy, controlled and developed the nascent trade and manufactures of England. The Baltic ports northwards, Bordeaux southwards, were the farthest points to which English ships then sailed. The principal products of the country at that time were wool in an unmanufactured state, and woolen goods. The "wools of England"—called by the King, in the "Ordinance of the Staple," "the sovereign merchandise and jewel of our realm," were to England then what wine is now to France, what gold has been to California, Australia and South Africa. Sheep farming was found to be lucrative by the Cistercian monasteries of Yorkshire, and by many of the landed aristocracy and gentry; and the art of weaving was taught by the fugitive Walloons, who had found an asylum from religious persecution in London and the eastern counties.

In addition to "clothworking," the smelting of iron (of which the wealds of Kent, Sussex, and Surrey furnished an abundant supply), the making of armor and bows, the latter from the wood of the forests which surrounded London; the working of silk and leather, and the manufacture of the precious metals, were all practised with much success in London. The English

capital became at once a great manufacturing town and the chief port of Northern Europe.

The monopolies of the companies, however, and their powers of search were always of doubtful legality, and their constitution being only suited to a limited area, the spread of London beyond its walls and the growth of the great suburbs, particularly those of Southwark and Westminster, seriously interfered with their efficiency as superintendents of production. The disappearance of villenage too, and with it that of the mediæval theory of *status* as the basis of the relations of master and servant and of employer and employed, of which the companies were a part and an embodiment, tended to weaken their authority. The spread of the doctrines of Wycliffe also strongly tended to bring their religious observance into desuetude.

The Livery Companies never at any period of their history expended other than a trifling proportion of their revenues on any purely trade purposes even in the time when the trades organization was in a more or less vigorous activity. Little or nothing was ever left or given for purposes connected with trade. Moreover, even such expenses out of the corporate funds as may be said to be connected with the trades, were petty disbursements on account of searches for "evil wares," including the cost of a dinner at a tavern or the corporate hall after the day's inspection.

The many trade Acts of Parliament of Queen Elizabeth's reign indicate the decay of the Guilds trade organization, as is well explained and illustrated in a famous passage in the first volume of Froude's "*History of England*," written at a time when the Livery Companies had sunk into a lethargy from which they have long ago recovered.

In addition to the exercise of a generous hospitality, and the appropriation of a considerable proportion of the wealth which has accrued to them mainly during the last thirty years, but which is no longer increasing, the Livery Companies now devote large sums not only in furtherance of technical or trade education, but also to purposes of acknowledged public utility, including substantial contributions to the numerous Mansion-house funds set on foot in all cases calling for national and international compassion and sympathy, and they are in no way behind their ancestors in their recognition of the maxim that property—and especially Corporate property—has duties and responsibilities to the public which allows and acknowledges its privileges.

There are Guilds still extant—although not so rich and important as those of London—at Coventry, Chester, Newcastle, York, Norwich, and Exeter, and the Merchant Venturers' Society of Bristol, the Cutlers' of Sheffield and the Merchant Company of Edinburgh are not inferior in wealth and importance to the great companies of London. On the Continent few are left, Those of France were dissolved during the Revolution, and in almost all other Continental countries the Guilds have disappeared. Traces of their former existence are still to be met with in the "merceries" of Augsburg and Venice, but Berne is, I believe, the only European capital besides London in which these stately corporations, with their mediæval tradition of charity and hospitality, survive.

The citizens of London and the Guilds thereof were always fond of public pageants and processions, in which each Guild vied with the others in the splendor of its livery and other emblems of the dignity of labor. So Chaucer writes:

"An haberdasher and a carpenter,
A weaver, a dyer, and a tapiser
Were all yclothed in a liverie
Of a solemne and great fraternitie."

The Lord Mayor's Show may be considered a survival of the pageants and processions which are comparatively frequent in the Middle Ages when London streets were picturesque, if narrow, and by no means congested with traffic and pedestrians as nowadays.

In these early days, however, the trade Guilds unquestionably did a great deal to foster the rising industry of the country, more especially in London and the provincial capitals. Modern conditions of trade were then non-existent and industrial problems were very different from those of to-day. The Guilds lost their influence as supervisors and directors of industry when the economic activities of the country outran their capacities to deal with them. Laborers grew up outside their jurisdiction and sphere. The main principles underlying the trade Guilds organization are, however, capable of application to modern condi-

tions, and it cannot be denied that England owes a great debt to the London Livery Companies in the gradual evolution of British industry, culminating in due time in its being relieved of regulations and restrictions no longer wholesome or necessary. The most potent influence in trade or craft education organized by the Guilds was the system of Apprenticeship. The apprentice was received into his master's house as a member of the family, and the master was responsible for his apprentice's good behavior. The system, therefore, ensured not only good technical training, but also formation of character, and its influence in this latter respect, as has been truly said, cannot be over-rated. Under the regulations of the Livery Companies, when an "industrious apprentice" had passed through the "seven long years" of his apprenticeship, he had to undergo at the close thereof what we should now call a Technological Examination, before the Master and Wardens of his Company, in the particular trade or "mystery" to which he had served. On coming out of his time he was subjected to a practical test of efficiency in his craft. He was required to execute a "masterpiece," and on his executing that masterpiece satisfactorily he was admitted to the Freedom of his Company as a master-craftsman. The ceremonies attendant on the binding and freedom of an apprentice were very solemn, and no one was admitted to the practice of a trade unless the Guild authorities were satisfied as to his moral character, as well as his efficiency as a workman.

Turning away from the Guilds and their influence on our infant industries, and passing over monopolies granted to private individuals and other reactionary economic measures of the Stuarts, we come to the transformation of industry which began in the latter half of the eighteenth century as a consequence of the application of machinery to manufactures, commonly known as the Industrial Revolution, which coincides approximately with the date of the foundation of the Society of Arts—1754.

THE SOCIETY OF ARCHITECTS AND REGISTRATION.

IN his annual address before the Society, Mr. A. E. Pridmore referred briefly to the cause that led to its formation, as follows:

Now that we have reached our majority, may I ask you to bear with me while I briefly recall what has happened in our history during that period. As you are aware, the Society was founded in 1884 and incorporated by the Board of Trade in 1893. A representative body of architects met in London in 1886, when it was determined that it would be in the best interests of the profession to make it compulsory for all architects to hold a Government diploma and that a committee should be formed to consider the best means to obtain an Act of Parliament for that purpose. A circular was then issued to some 2,500 architects practising in the United Kingdom, with a request to sign, if they thought fit, a declaration in favor of obtaining legislative powers making it obligatory that all persons hereafter entering the profession should be duly qualified by examination and that a committee should be formed to promote the objects in view and to obtain, if possible, the necessary Act of Parliament. Some 1,300 favorable replies having been received the "Architects' Registration Bill Committee" was formed, by whom a bill was introduced into Parliament in 1887, which included architects, civil engineers and surveyors. The two latter professions raised certain objections, and a fresh bill was introduced, dealing only with architects. The Society has always been in favor of statutory registration, to enforce, in the interests of our own profession as in the interests of the general public, that only men of proved competence and ability should be permitted to practise. At the present time, unlike many other professions, any one may style himself an architect, however incompetent, and as the members are aware, we frequently find ourselves supplanted by a builder, decorator, estate agent or undertaker, calling himself an architect. This applies more particularly to the provinces. The Society has been most persistent and energetic in its attempts to secure the passage of a bill to compel registration, and bills have been introduced from time to time, and the last was set down for second reading in last session, but owing to pressure of public business, unfortunately was not reached. In December, 1902, the Architects' Registration Bill Committee was amalgamated with the Council of the Society of Architects as a general registration committee under the chairmanship of the president of the Society for the time being. It has since been ascertained that about two-thirds of the members of the profession have declared themselves in sympathy with the movement for obtaining the statutory examination and registra-

tion of all persons entering the profession. The Society has taken much interest in the measure, and is determined to do all in its power to place it on the statute-book. We believe that the whole of the architectural societies of the country will assist in securing the passage of this desirable measure, which we should hope would have the attention of the next session of Parliament. I think it only fair to say that the initial movement emanated from our Society. In July of next year the International Congress of Architects will be held in London, and the Society should be represented by delegates, and one of the questions for discussion should be "registration."

ANOTHER MONUMENT TO SERVETUS.

AN instructive commentary on the present attempt to deny the Unitarians the Christian name, and to refuse them church fellowship, is to be found in a recent movement in France to erect still another monument to Michael Servetus, one of the earliest martyrs of the Unitarian belief.

As is well known, the French-speaking Protestants, under the leadership of Professor Doumergue, the eminent biographer of John Calvin and editor of his works, in the year 1903, erected on the scene of the martyrdom of Servetus in Geneva an "expiatory monument." This memorial stone bears an inscription stating that it was placed by "reverent and appreciative descendants of Calvin, our great reformer," who yet "condemn an error, which was, however, that of his age."

The sentiment which inspired this action on the part of the neo-Calvinists of to-day has been universally commended, but vigorous protests were made in certain quarters against the statement contained in the last line of the inscription which we have quoted. It was declared to be altogether too lenient to the memory of Calvin. It was in effect an attempt to relieve him from the odium which his connivance in, if not actual instigation of the crime against Servetus had so justly brought upon him. It was shown conclusively that this display of intolerance was not only contrary to the genius of Protestantism and the gospel of Christ, but had been earnestly protested against by a number of Calvin's fellow-reformers at the time of its commission. Calvin therefore sinned against his own better knowledge and the humaner spirit of his age.

This controversy is still being carried on in theological circles in France and Germany, and has even led to a demand for a revised inscription or another monument.

The latter alternative has now been complied with from an unexpected source. It is probable that a second monument, in the form of a statue, with suitable inscription, will soon be erected in the city of Vienne, in the Department of Isere, France.

Vienne is situated on the left bank of the Rhone, some twenty miles south of Lyons, on the site of an ancient Roman city, whose imposing ruins are to be seen in every part of the town. Hardly less impressive are the churches and other memorials of the Mediaeval era, and the interesting historical traditions associated with the important part it played in the Huguenot movement.

Vienne became in the middle of the sixteenth century the adopted home of the Spanish physician and theologian, Michael Servetus. During a pestilence in that city he rendered invaluable service to his fellow citizens. Despite this debt of gratitude, Roman Catholic ecclesiastics, led by Cardinal de Tournon and Matthew Ory, grand inquisitor of the faith in Gaul, had him seized and thrown into prison on the charge of heresy. Servetus was condemned to be burned alive, together with his writings. Through the connivance of friends, he escaped from his prison and departed from the city. But on the appointed day, the 17th of June, 1553, he was burned in effigy, together with nearly the whole edition of his book, "*Christianity Restored*," in the Place St. Martin, at Vienne. All the world knows his subsequent tragic fate. A few months later, during a temporary stay at Geneva, the Protestant stronghold, he was again arrested, this time at John Calvin's instigation, and on the 27th of October burned to death on the hill Champel, in Geneva, where now stands his memorial stone. But the world does not know that the precedent for this cruel deed was set by the Mother Church in France, and only by an accident was it prevented from carrying out its purpose. The shame of this intolerant act must therefore be divided by both the Roman and the Protestant churches. It is quite probable that it was the example given by the ecclesiastical authorities of Vienne which suggested Calvin's inhuman deed.—*Rev. C. W. Wendte, in the Boston Transcript.*

"THE ITALIAN CENTURY."

NEWARK, N. J., Nov. 29, 1905.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs—There is no difference in the nomenclature of *centuries* between the Italians and other Europeans. When they speak of "tercento," "quattrocento," "cinquecento"—abbreviations for *dièci et ter*; *dièci et quattro*; *dièci et cinque cento*; they mean, as you say, in the thirteen hundreds, in the fourteen hundreds, respectively—as we say in the forties, in the fifties, etc.

Michelangelo, Raffael, Correggio, Tizian, Leonardo da Vinci, Benvenuto Cellini, the poets Ariosto and Tasso, etc., are frequently called the "Cinquecenti." Still, when they speak of the *century* in which these Masters and Poets flourished it is: "nel secolo sedicesimo"—in the 16th century. The old Italian manner of designating a period of a hundred of years is undoubtedly far clearer and simpler than our *century* for the same time—at least to me. When reading of the 13th or 14th century I am invariably obliged to go through a mental operation of subtraction to find that the author is writing of the twelve hundreds, the thirteen hundreds, respectively. Were this old manner generally adopted there could be no dispute as to whether the year 1900, *per ex.*, was the last year of the 19th century, or the first year of the 20th century—or, in other words, whether the 20th century begins with the first moment of the year 1901 or with the first moment of the last year of the last century, viz., 1900, as Kaiser Wilhelm II. decreed. Respectfully yours,

GUSTAVUS STAEHLIN.

THE SEVENTH INTERNATIONAL CONGRESS OF ARCHITECTS.

WASHINGTON, Nov. 29, 1905.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs—I thought it might be of interest to you, in connection with the circular which Mr. Glenn Brown just sent you of the subjects for discussion at the International Congress of Architects to be held in London next summer, to receive a list of the names of the American Committee of Patronage.

His Excellency Ambassador Reid and Messrs. Frick and Mowbray have also been invited to serve on the committee, but answers have not yet been received from them.

The General Permanent Committee of the Congress consists of eighty-six members with eleven from England, fifteen from France, seven from Germany, six from Austria, four from Belgium, two from Canada, three from Denmark, six from Spain, five from the United States, seven from Italy, three from Mexico, three from the Netherlands, four from Portugal, four from Russia, three from Sweden, three from Switzerland and one from Turkey.

A meeting of the Permanent Committee will be held in Paris on Dec. 15 in connection with work for the next congress.

Very truly yours,

GEORGE O. TOTTEN, JR., Secretary.

AMERICAN COMMITTEE OF PATRONAGE.

The Honorable the Secretary of State, the Honorable the Secretary of War, His Excellency the American Ambassador to Great Britain, Honorable Francis G. Newlands, U. S. Senator, John M. Carrère, Honorable Joseph H. Choate, Frank Miles Day, Daniel C. French, Henry C. Frick, Cass Gilbert, John La Farge, Charles F. McKim, Francis D. Millet, J. Pierpont Morgan, Henry Siddons Mowbray, Robert S. Peabody, George B. Post, Augustus Saint-Gaudens, James Stillman, J. Knox Taylor, Henry Walters, Prof. W. R. Ware.

The presidents of the following societies: American Institute of Architects, Architectural League of America, National Academy of Design, National Sculpture Society, Society of American Artists.

Members *ex-officio*: Francis R. Allen, Glenn Brown, William S. Eames, William Le Baron Jenney, George O. Totten, Jr.

COMMUNAL RECREATION BUILDINGS.

DEPARTMENT OF EDUCATION, THE CITY OF NEW YORK,
THE CITY SUPERINTENDENT OF SCHOOLS, 500 PARK AVENUE,
NOVEMBER 23, 1905.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs—I have just received from some source, possibly from yourselves a copy of *The American Architect* for September 23, 1905, in which is an editorial on "Communal Recreation-Buildings." I have been advocating similar buildings for a long time, and am greatly pleased to find that you state the same thing,

but from another source. I am now endeavoring to secure money with which to get such a building erected in the congested district below Fourteenth Street.

Sincerely yours,
LUTHUR H. GULICK,
Director of Physical Training.

ILLUSTRATIONS.

MEMORIAL TO THE REV. WM. FERDINAND MORGAN, D.D., IN ST. THOMAS'S CHURCH, NEW YORK, N. Y.—MR. CHARLES R. LAMB, ARCHITECT, NEW YORK, N. Y.

This view is interesting not only because it shows the altar which was destroyed during the recent fire that consumed the building, but also because it gives a glimpse of the reredos modeled by Augustus St. Gaudens and the wall-paintings by John La Farge.

STORE OF RICHARD BRIGGS, BOYLSTON ST., BOSTON, MASS. MESSRS. WINSLOW & BIGELOW, ARCHITECTS, BOSTON, MASS.
STAIRCASE IN SAME STORE.

HOUSE OF HENRY FORBES BIGELOW, ARCHITECT, READEVILLE, MASS. MESSRS. WINSLOW & BIGELOW, ARCHITECTS, BOSTON, MASS.

THE LEAMY HOME, MOUNT AIRY, PHILADELPHIA, PA. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.
THE TERRACE: LEAMY HOME.

HOUSE OF E. H. ROLLINS, ESQ., DOVER, N. H. MESSRS. CHAPMAN & FRAZER, ARCHITECTS, BOSTON, MASS.

HOUSE OF ROLLIN H. ALLEN, ESQ., 240 COMMONWEALTH AVE., BOSTON, MASS. MESSRS. CHAPMAN & FRAZER, ARCHITECTS, BOSTON, MASS.

Additional Illustrations in the International Edition.

VIEW OF CHANCEL: ST. THOMAS'S CHURCH, FIFTH AVE. AND FIFTY-THIRD ST., NEW YORK, N. Y. RICHARD UPJOHN, ARCHITECT.

For this excellent view of a vanished chancel, once enriched with some of the most successful products of American ecclesiastical art, we are indebted to the designers and builders of the organ therein shown, the Hutchings-Votey Organ Co.

NOTES AND CLIPPINGS.

FADING DAGUERREOTYPES.—What is sometimes spoken of as the "fading" of daguerreotypes is, in reality, a tarnishing of their silver surfaces similar to that which may be observed on any silverware; but, whereas, the latter is amenable to the discipline of plate-powder and brush, the daguerreotype can be easily ruined by a touch of the finger, and its restoration when tarnished is best intrusted to skilled hands. Few professional portrait photographers have now any practical acquaintance with the process by which such pictures are produced; but some of the larger photographic dealers, such as those in the Charing Cross Road and High Holborn, would doubtless undertake the renovation, which needs only a little dexterity. The tarnish is removed by treating the daguerreotype with a solution of about ten grains of cyanide of potassium to the ounce of distilled water, and a detailed description of the method may be found in, *e. g.*, *The British Journal of Photography*, July, 1902, page 585, the best way of resealing (with Canada balsam) being also described therein on page 263. This latter operation, by the way, is of the utmost importance, for the daguerreotype is strictly anaerobic, and flourishes in hermetic seclusion.—*Notes and Queries*.

NONSUCH.—Although few persons have heard of Nonsuch Palace, it was a wonderful place in its day, and the scene of many incidents of historical importance. Nonsuch Park, with its castellated mansion, built about a hundred years ago, is all that remains to commemorate the ancient glories of the place, whose history begins in 1538. In that year the place was acquired by Henry VIII. in exchange for another palace. The old mansion was pulled down and on its site was built the most wonderful palace of the time. Henry died before the structure was completed, but there is evidence that he resided there for a time with Anne. Nonsuch was not a favorite with his immediate successors, and soon after was purchased by the Earl of Arundel, one of the numerous suitors for Elizabeth's hand, and by him completed according to the original designs. Queen Elizabeth paid many visits to Nonsuch prior to Arundel's death, in 1580, and in 1591 she acquired the place by barter, and it became her favorite residence.

During this period the palace witnessed many brilliant scenes. During the revolution Nonsuch was seized by the Parliamentarians and occupied by General Lambert, but was handed back at the Restoration. Eventually it became the property of the Duchess of Cleveland, who, in order to realize what she could from it, pulled down the building and sold the materials. Specimens of wood-carving and stone-work can still be found in Epsom which, according to tradition, once formed part of Nonsuch Palace.—*London Chronicle*.

PLAGIARISM.—A phase of "plagiarism," that venerable theme, is glanced at with engaging freshness by Mr. Brander Matthews in *Scribner's*. In a brief essay, "Old Friends with New Faces," he shows how the same idea has served the purposes of more than one writer. Thus he finds a precedent for the last words of Colonel Newcome in a word which Cooper put into the mouth of Natty Bumppo, and points out that Cooper, or Thackeray, has been echoed by the late Sir Walter Besant and by Mr. Kipling. But with these and other illustrations he easily proves that it would take a silly critic to cry plagiarism when an artist of the first rank repeats an old idea, whether consciously or unconsciously. He quotes Goethe's saying on Scott's appropriation of a scene from "Egmont" for one of the Waverley novels—"He had a right to do so; and because he did it well he deserves praise." The point is clear. Genius may borrow or repeat, for genius always does the trick after a fashion of its own. Mr. Matthews amusingly speculates as to what might have been made of the central motive of "Romeo and Juliet," by Defoe, say, or Richardson, or Fielding, or Sterne. He admits that such speculation is idle, but at least it leads to the clinching reflection that any novelist of individuality who had chosen Shakespeare's theme "would have made it his own, and would have sent it forth stamped with his own image and superscription."—*N. Y. Tribune*.

THE GOOD MANNERS OF A GOOD NEIGHBORHOOD.—In connection with our remarks recently on the Denver, Colo., judge's ruling that the "good manners of a good neighborhood" deserved to be protected, the following case, as reported in *The Architect*, is interesting:

"Unseemly" is a word which is not usually applied to buildings. It is commonly employed to indicate acts. The equivalents given by Johnson are indecent, uncomely, unbecoming. But the word was enough to convince the Scottish courts that certain buildings were not fitted to be erected contiguous to a convent in Edinburgh. The nuns held under a deed which was made in 1863. It was guaranteed that on the adjoining land unseemly buildings were not to be erected. Application was recently made to erect two tenements of houses near the convent grounds. Permission was granted in the Dean of Guild Court, and the occupants of the convent applied to the courts for an interdict to prevent the erection of the buildings. It was argued on the other side that the buildings would be of a superior character. Lord Ardwall said the question he had to decide was whether the proposed buildings were unseemly within the meaning of the deed. His Lordship considered the phrase "unseemly building" must be construed with reference to the position and surroundings of the building, and (in a question of servitude) in view of the effect of its erection upon the dominant tenement. Now, the plaintiffs' house was a large and ornamental villa. It stood nearly in the centre of a garden, shrubbery and policies considerably larger than were generally found in connection with a villa. It had a bowling-green attached to it, and altogether might be described as a small *rus in urbe*. It appeared to him that to erect tenements such as proposed up to within ten yards or thirty feet of the pursuers' boundary-wall would have the effect of completely destroying the amenity of the plaintiffs' house and grounds. He was of opinion that having regard to the locality where they were to be erected, namely, a villa locality, and their proximity to the pursuers' handsome villa residence and grounds, they must be regarded as unseemly buildings within the meaning of the bond. Even if his Lordship had any serious doubt on the question as to the meaning and application of the word "unseemly" in the circumstances under consideration, he should hold *in dubio* that the word and the clause in which it occurred must be so interpreted as best to carry out the intention and meaning of the parties in entering into the agreement and the deeds following thereon. That intention undoubtedly was to preserve the amenity of the pursuers' residence, and that intention would be frustrated, were the tenements in question to be erected on the site proposed. Judgment was therefore given in favor of the nuns.

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, DECEMBER 16, 1905.

No. 1564.

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ACTING-MAYOR WHELTON, of Boston, professes great surprise that his dismissal of the School-house Commissioners should have caused unfavorable comment, and is particularly displeased with the Boston Society of Architects because it passed resolutions condemning his action and declaring its belief that his charges of ill-doing are foundationless. In his formal statement—he evidently intends to issue several, as this first one is incomplete—he explains to the public that the reason why the Society took such action is that, out of the twenty school-houses undertaken by the Commissioners, seventeen were assigned to members of the Society (of which Mr. Sturgis was an official) whose commissions upon these buildings will amount to \$143,336.19, rather more than half of it having already been collected. Further than this, Mr. Sturgis himself has had \$14,333.33 of the city's money, which is a politician's way of saying that Mr. Sturgis has a salary of \$5,000 per year which is, by the Acting-Mayor's way of putting things, here paraded as so much extra "graft" secured by members of the Society. He further, always for the instruction of the gullible public, points out that "this small favored group of members of this large Society" were by Mr. Sturgis's favoring selection enabled to secure ninety per cent. of the money paid by the city for architectural service; but he quite fails to make it clear how a very much greater number of members of the Society could have shared in the twenty jobs the Commission had to dispense.

THE Boston Society of Architects does not contain all the honest and capable architects in the city, but it includes 154 of the 332 individual architects who practise there, and of the non-members there is a considerable number who will enter the Society just as soon as they have completed the term of practice required by the Society's by-laws. Meanwhile their names swell the list of architects in Boston. If to these young men are added the men who never have handled, and know they are incompetent to handle, large work, it will be found that there are left outside the pale not many competent performers, and that, on a fair analysis, the three school-

houses that have been assigned to non-Society architects is as fair a ratio as the seventeen is to the Society membership. Mr. Whelton is playing very small "politics," and it seems, from an inspection of the law governing the privileges of an acting-mayor, very much as if he had exceeded his powers.

JUST as Pitt and Gladstone were called the "great Commoners" so there is really good reason for calling Edward Atkinson, who died on Monday, a "great Liberal," for, in every sense of the word, his life was marked with free thinking, free giving and untiring devotion to the best good—as he saw it—of his fellow-men, with never a thought to his own worldly welfare, though with very many to the effect of his words and acts upon his own name and fame. His liberalism and liberality were at once instanced by his constant willingness to practise what he preached. If he advocated plain living for others, he was willing to live plainly himself. If he held that protection was a wrong done upon the many for the sake of a favored few, he declined in his own case to benefit by protection and, in lieu of placing patents upon the many devices he invented, gave them freely to the public. If he had patented his "Aladdin cooker," his elevator safety-gate, his self-closing fire-door, his workman's dinner-pail, his mill-window glass, his system of mill-building, his peat-fuel and mud-fuel and many other devices, he might have died wealthy instead of, as we believe, a poor man.

THE public knew Edward Atkinson as an "Anti-Imperialist" who had the United States mails closed to one of his pamphlets and whose challenge to be tried for high treason was not taken up, and; further, as an economist, a statistician and pamphleteer, writing upon, apparently, every subject that was open to a man who had not pursued a classical education. Manufacturers knew him as the head of one of the most powerful and intelligent mutual fire-insurance companies the world has ever known. Architects, on the other hand, knew him as the ever-ready wielder of the chastening rod of correction and rebuke. He did not spare the rod and the entire building fraternity does better work to-day because of the unsparing vigor with which he wielded it. He had so positive, not to say so arrogant, a way of advancing his opinion that he was sure to draw out a reply from someone, to whom he was always glad to make rejoinder and in this way many questions were usefully discussed in public, to the real promotion of the general welfare. Before the Boston Manufacturers' Mutual Fire Insurance Company established its practice of an orderly publication of its own valuable reports and investigations, not a few of Mr. Atkinson's discussions of the faulty methods followed by builders through sheer thoughtless force of habit were carried on in our own columns. The greater part of his large amount of controversial writing, all tending to promote the common good, he did without seeking or desiring compensation from editors and publishers, a further instance of the man's liberality.

MR. ATKINSON, who was born in 1827, was educated in private schools and began his working life at the age of fifteen, and these two facts, when contrasted with his large accomplishment in the field of intellectual effort, afford in themselves an impressive lesson. Besides being a member of many societies, he was one of the founders, and up to the time of his death one of the directors, of the Massachusetts Institute of Technology, and had no mean share in advancing the welfare of that notable institution. The work he did there; that which he did in bringing about a reformation in mill-building through his gradual development of a consistent system of "slow-burning construction"; the invaluable investigations which, as a fire underwriter, he caused to be carried out and which ultimately led to his establishing the Fire Insurance Experiment Station, over which Professor Norton presides, all go to prove that amongst those who sincerely mourn his death and appreciate his well-spent life should be ranked the architects of the United States.

ARCHITECTS who submitted designs in the competition for the New Orleans Court-house, last June, have been up to the present time the victims not of unfair dealing but of unkind chance. Ten days before the date of receiving the drawings, the Supreme Court of Louisiana, sitting on a taxpayer's suit, decided that the legislative act under which the Court-house Commissioners were proceeding was unconstitutional. The competitive designs therefore as they came to hand were placed unopened in the vaults of the Hibernia Bank and Trust Company, pending a rehearing of the suit which the Commissioners at once took steps to assure. This rehearing has just been had, and, as the Court reverses its position and affirms the constitutionality of the Commissioners' appointment and their subsequent acts, competitors may hope therefore to learn very shortly that a decision has been reached and may surely congratulate themselves that they have fallen into the hands of a group of fair-dealing and intelligent gentlemen.

EVIDENTLY we must await the arrival of the English architectural journals before we can know what were the probable causes of the sensational collapse of a portion of the roof of the train-shed of Charing Cross station, London, on December 5. The roof, of which ninety feet at the outer end collapsed, killing two persons and injuring thirty others, was under repair, and it is said that the brick walling fell outward, thus depriving the trusses of their support. It is also suggested that the walls fell because of a subsidence caused by tunnelling operations for one of the underground railroads. Should this prove to be the case, the incident cannot but lead to increased anxiety in Chicago, where the freight-tunnel is giving such evidence of being a mischief-maker.

ABOUT as unhandy an article as a derrick-man is ever called on to handle is a heavy piece of statuary, and it is not surprising that at last a statue, while being raised to position on a building, should have come to irreparable grief. Last week, when the four-ton granite statue of the late ex-Mayor Abram S. Hewitt, was within

a few inches of its final position on the balustrade of the new Hall of Records, in New York, a cable snapped, the jar breaking the derrick boom and letting the statue fall to the sidewalk, seven stories below. The sculptor, Mr. Philip Martiny, will hardly relish once more setting to work on, or even merely overseeing once more the execution of, his ill-omened task. He has had extreme difficulty in securing acceptance for this statue, having made, we believe, four different models before he could satisfy the members of Mr. Hewitt's family on the one hand or the Art Commission on the other.

EUROPEANS have always been such disbelievers in the tales of American achievement in the way of moving bodily all sorts and kinds and sizes of buildings that they would be little likely to give more credence to the brief account of the really remarkable instance of moving a block of brick-and-stone buildings in Brooklyn which we gave a few weeks ago while their journey and semi-revolution were still in process. The delicate task was finally accomplished without the slightest mishap occurring during the operation. Europeans, or rather Parisians, may possibly be witness to the beginning, at least, of a large if not precisely difficult piece of moving which has a certain international interest, if Mr. James A. Bailey, of circus fame, succeeds in purchasing the great Machinery Gallery, now on the Champ de Mars, for this enterprising showman would like to take it down, ship it across the Atlantic and set it up again in New York, in the neighborhood of One Hundred and Sixtieth street. We have often wondered how it was that this building, which has already served for two international expositions, had been allowed so much longer a life than usually falls to the lot of exhibition buildings. The Eiffel Tower, as is generally known, was erected under a concession that covered a considerable term of years, but we had forgotten that the Machinery Gallery was guaranteed a twenty-year lease of life.

THE competition for the Paterson High-school decided this week was, apparently, one of those disagreeable affairs wherein, if "home talent" could not win on its merits, the committee in charge were pledged, to one another and to local feeling, to arrange that no outsider should receive "the plum." As Mr. C. B. J. Snyder was known to be the expert-adviser to the committee, competitors felt they were entitled to believe that the affair was to be properly conducted, but the result shows that all committees really intending fair-play should make it known in advance what influence—if any—their expert's advice is to have on their final action. Mr. Snyder assigned the first place to Mr. J. V. Van Pelt, of New York, and the fourth place to Mr. W. T. Fanning, of Paterson. The high-minded committee gives Mr. Fanning the job and to Mr. Van Pelt \$300 as "first prize," evidently finding they could not retain that also for consumption in the local market. The fact that on "points" Mr. Snyder ranked the first four designs as deserving 277, 248, 241 and 237 points respectively, Mr. Fanning's being awarded the last-named, is enough to disclose the rank unfairness of the competition.

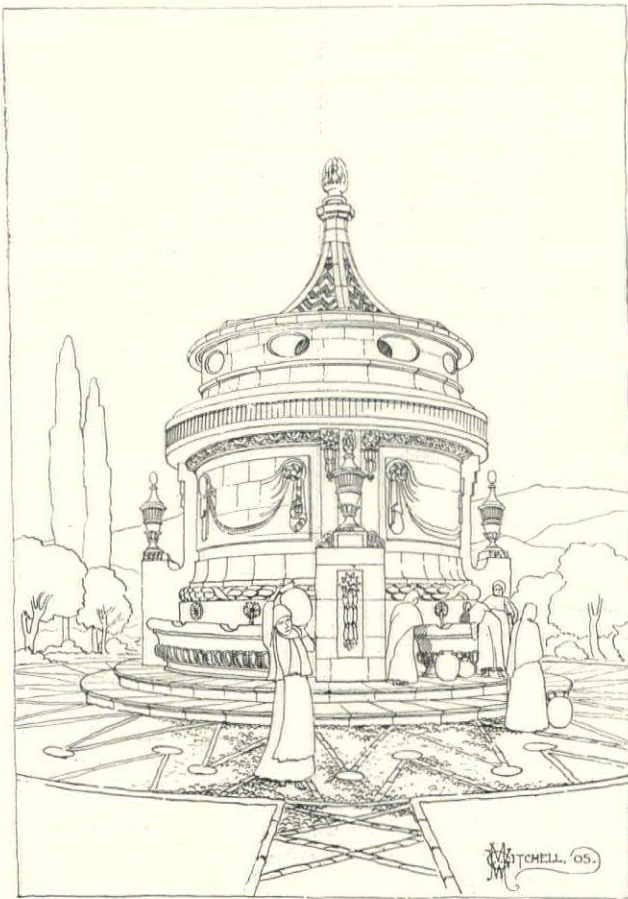
SAN LUIS POTOSI, MEXICO.

OF the twenty churches that give interest to the city of San Luis Potosi, the Sagrario is one of the oldest and most interesting, a certain primitive simplicity in conjunction with some good detail endowing it with a charm that the more dry and correct styles fail to afford. The doorway shown in the illustration is of pink stone, as also are the large buttresses on either side, together with the windows, niche and circular coping above. The plain surfaces, including the tower, are of stucco, and this in most part is colored a very pale cobalt blue, shading off to lime-white. The pilasters and certain mouldings of the tower are colored rose and madder-pink. The color of these Spanish-American buildings is almost invariably pleasing.

In the sheet of details of this building it is interesting to note that the relief of the ornament is high, about 1 1/4 inches, more or less.

Balconies, without brackets and with large projections, are quite a feature of Mexican houses. The method of fixing and the draperies of the awnings are also interesting and much more artistic than those commonly found in our northern republic.

The method here is by means of a bar just under the cornice of the window, the bar being hinged at one end and hooked at the other, so that the rings of the awning can be slipped on and off the bar at pleasure. Supported by brackets from the top of



CAJA DEL AGUA, SAN LUIS POTOSI.

the balcony is another bar, and over this the awning is thrown and falls in long graceful lines to about the level of the underside of the stone corbeling. The drapery can be tied to the latter bar to prevent the wind displacing it. This style of awning is much more artistic than the box-like design generally in use in the United States and many parts of Europe. True, it has no side pieces, but it is much cheaper to make and is easily detachable. When the sun is no longer objectionable, the awning is lifted off the lower bar and switched along the upper bar to one side, when again it is much less of a disfigurement to the building than the type that folds back against the window in a more or less shapeless heap.

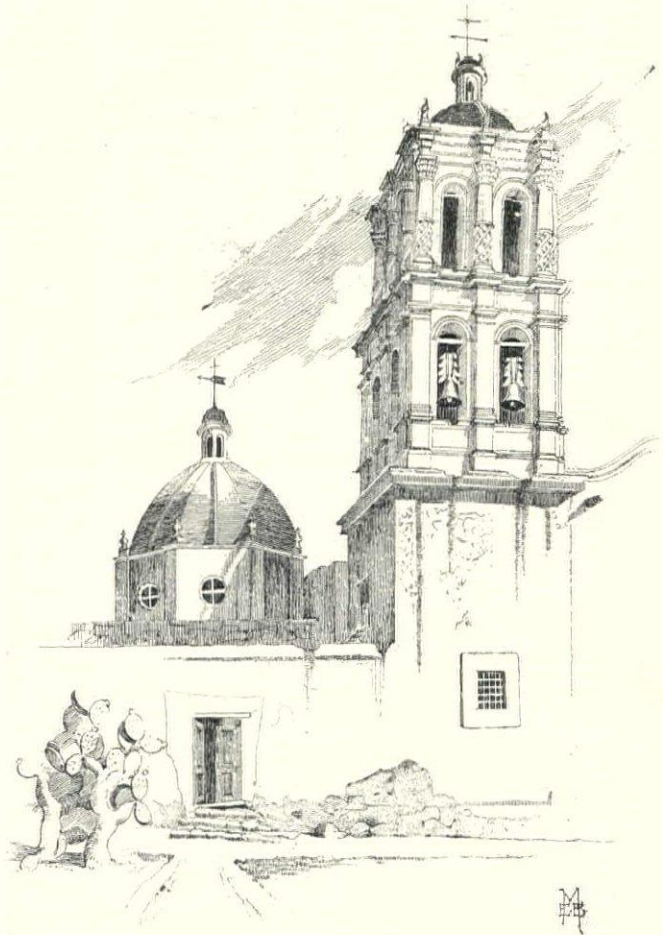
The country churches, or churches built while yet these cities were but villages, though poorer in material and simpler in design, are not without interest. The Church of Tlaxcala, of which I give an illustration, is such a building.

It is built within a few hundred yards of the Rio de Santiago, a river generally without water, often for long periods quite dry. Thirty feet below the surface, however, there is plenty to be had,

and endless wells worked either by hand or by asses supply all requirements.

This church is plastered externally with stucco and the color is most pleasing. Broadly speaking, it is of pale yellow, but at the bands under cornices, about the upper part of the tower generally, there are many parts colored in reds, from pale lake to terra-cotta, with panels of sienna, and at the lower part of the tower a border of cobalt on a straw-colored field forms the decoration. The dome, as is usual in Mexico, is of masonry, the ribs are of pink stone, and the stucco-covered space between is green with vegetable growths and weather stains. The walls of the dome are of dark red brick, greyed by time and hot suns. The color is very pleasing and it would be well if architects in the States could manage to introduce, especially in such simple structures, something of the good coloring so frequently found here.

Fountains and wells, useful and ornamental, form an important feature in the life and landscape of Mexico. The iron pipe and the brass faucet are in most cities quite unknown, and the ways familiar to men and maidens who lived in the days of the patriarchs are still practised here. From such wells as may be found in this city the woman of Samaria came forth to draw, so also to such a well and with similar pottery jar came Re-



THE CHURCH OF TLAXCALA, SAN LUIS POTOSI.

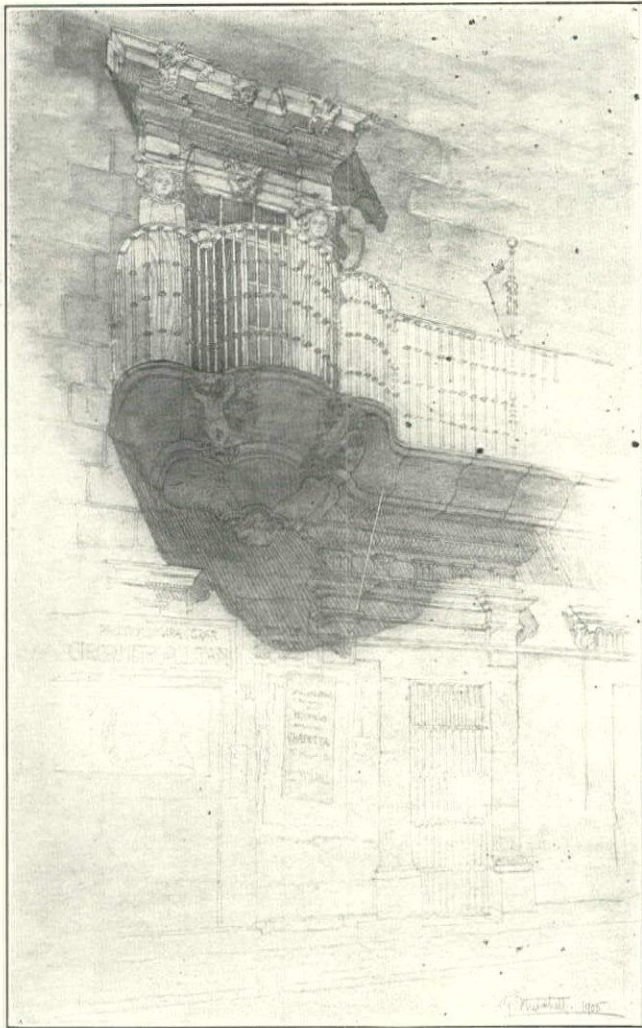
becca. Farther back than history extends the women of all times have drawn water and told the news of the day around such fountains: even so at this hour in Mexico, and in like manner, the upward and downward plunge of the human heart is related, while the big pottery jar is filled and the water flows.

Only the rich and comfortably off are exempt from this water-carrying: the burden is generally placed on the shoulder or, in some cases, on the head, and then away they go. Ornamental water-basins are also familiar features of Mexican cities, as shown in my illustration; they are frequently surrounded by a circular open space or walk, around which are placed long circular benches.

The benches in this illustration are built of masonry and stuccoed. The coping, seat and arms only are of stone, the color of the latter is pink, while the stucco is painted a bright Pompeian red. In contrast with the bright green foliage of trees and shrubs, these benches, with their spacious extent and fine color, form a most decorative feature in garden or public place.

The most important fountain of this city is the Caja del Agua. It is about thirty feet in diameter at the base, the material is pink stone, and only at the panels of the roof, which are filled with tiles (green and pale yellow), does the color change.

The side door of the cathedral is interesting, more particularly on account of its octagonally shaped top. This form is not uncommon in Mexico and is very effective. In the new post-office in the city of Mexico, the architect has used such a form.



BALCONY, ABOUT 300 YEARS OLD, SAN LUIS POTOSI.

The door is monumental in scale and is quite one of the finest parts of a very unique building. The woodwork of these doors is also interesting. The door at the back is framed up with timber, 7 in. x 3 in. and 5 in. x 3 in., mortised and tenoned together, on this is placed boarding with sunk and raised panels, with mouldings forming about 3-inch projection. These doors have nothing of the dryness so common to mill-made joinery. In fact, from the cathedral doors to the simple flat doors without mouldings of the poorest houses, the doors here are generally better, one reason being that they are never cramped in width, even in the poorest "casas."

W. G. MITCHELL.

REINFORCED CONCRETE.¹

THE justification of the use of reinforced concrete is usually based on some one or all of three conditions. First, under some circumstances it is actually more economical than any other rational method of construction. Secondly, there are cases where it is almost the only practicable method of construction. Thirdly, there are cases where it is simply preferable. It is not very easy to demonstrate the economy of this method except by comparative cost in individual cases, but an approach to a systematic comparison may be made as follows: A cubic foot of steel weighs 490 pounds. Assume as an average price that it can be bought and placed for 4.5 cents per pound. The steel will therefore cost \$22.05 per cubic foot. On the basis that concrete may be placed for \$6 per cubic yard, the concrete

will cost 22 cents per cubic foot, which is 1 per cent. of the cost of the steel. Therefore, on this basis, if it is necessary to use as reinforcement an amount of steel whose volume is in excess of 1 per cent. of the additional concrete which would do the same work, there is no economy in the reinforcement, even though the reinforcement is justified on account of the other considerations. Assuming 500 pounds per square inch as the working compressive strength of concrete, and 16,000 pounds as the permissible stress in steel, it requires 3.125 per cent. of steel to furnish the same compressive stress as concrete. On the above basis of cost, the compression is evidently obtained much more cheaply in concrete than in steel—in fact, at less than one-third of the cost. On the other hand, even if we allow 50 pounds per square inch tension in the concrete and 16,000 pounds in the steel, it only requires 0.31 per cent. of steel to furnish the same strength as the concrete, which shows that, no matter what may be the variation in the comparative price of concrete and steel, steel always furnishes tension at a far cheaper price than concrete—on the above basis, at less than one-third of the cost. The practical meaning of this is, on the one hand, that a beam composed wholly of concrete is usually inadvisable, since its low tensile strength, makes it uneconomical, if not actually impracticable, for it may be readily shown that, beyond a comparatively short span, a concrete beam will not support its own weight. On the other hand, on account of the cheaper compressive stress furnished by concrete, an all-steel beam is not so economical as a beam in which the concrete furnishes the compressive stress and the steel furnishes the tensile stress. This statement has been very frequently verified when comparing the cost of the construction of floors designed by using steel I-beams supporting a fireproof concrete floor, and that of a concrete floor having a similar floor slab, but making the beams as T-beams of reinforced concrete.

Another instance of the actual economy of this method of construction is furnished by a recent design for a retaining-wall. The wall was to be 14 feet in height and the design was for a skeleton reinforced-concrete construction. It has a base-plate of the requisite width, so that the centre of pressure of the base will be properly located. Buttresses which run back into the embankment at proper intervals are connected with the base-plate, while the face of the wall between the buttresses has only such thickness as is required to withstand the bursting pressure developed between each pair of buttresses. The whole structure is reinforced with steel so as to take up all the tensile stress which may be developed in any part of the wall. The cross-section of this wall has an average value of 25.44 square feet, which is the equivalent of 25.44 cubic feet per linear foot of wall. A wall of rubble masonry was designed by well-known railroad engineers for this same location. This wall had a cross-section of 80.45 square feet. On the basis of 25 cents per cubic foot, or \$6.75 per cubic yard, each linear foot of the rubble wall would cost \$20.12. Of course, the unit price of the concrete wall is considerably higher, but its volume is but little over 30 per cent. of the volume of the stone wall. In this particular case an estimate for this wall at the rate of 40 cents per cubic foot as measured in place was obtained from a reliable contractor, the estimate including the steel and all other items of construction except mere excavation, which was not included in the first estimate. The concrete wall would therefore cost \$10.16 per linear foot, which is practically *one-half* of that of the stone wall. Many other illustrations could be given where reinforced-concrete construction is the cheapest that gives a permanent structure.

As an instance of the second class of structures, viz., those in which reinforced concrete is almost the only practicable method of construction, the following case is given. It was required to construct a retaining-wall with a height of 36 feet above the rails of a sunken track where the right-of-way was absolutely limited to a width that gave 10 feet from the right-of-way line to the clearance line for the tracks. The wall was designed to have its base 42 feet below the top. Of course, 10 feet is too small a base for a 42-foot retaining-wall. The only possible solution appeared to be some provision by which the toe of the wall could extend underneath the track. Of course, such a construction in stone masonry or even in plain concrete would be an utter impossibility, since it would inevitably break at the angle at the base. A structure of concrete and steel in which the transverse stress at the lower angle of the wall is resisted by the horizontal steel bars in the base, with the very considerable pressure of the earth on the base-plate behind the face-wall, accomplished all that is desired. The resultant line of pressure

¹A paper by Mr. Walter Loring Webb, read before the Engineers' Club of Philadelphia, and published in its *Proceedings*.

is within the middle third of the base, while the maximum intensity of pressure on the subsoil was computed to be about 6,400 pounds per square foot. As the subsoil is a very firm gravel, this pressure is a perfectly safe one, but if it had been found that the soil was less reliable it would have been a comparatively simple matter to enlarge the foundation as much as necessary. Of course, the conditions of this problem were very peculiar and unusual, and it illustrates what can be done under such circumstances.

The third class of structures, viz., those in which reinforced concrete is simply preferable, may be illustrated by the very simple case of fireproof floors. One of the compensations of the Baltimore fire was its demonstration of the fact that a concrete floor, when properly made, approaches the ideal by being more nearly absolutely fireproof than any other flooring material. It has been frequently stated that since concrete is formed by the crystallization of a compound containing water, it only requires heat to drive off the water and render the whole structure worthless from a structural standpoint. In one sense this is true, provided the heat is sufficient; but the Baltimore fire proved that even with the very excessive degree of heat which was developed during that fire, the effect of such heat on a concrete floor was merely to calcine the lower layer of concrete to a depth varying from $\frac{1}{2}$ inch to 1 inch. After such calcination occurred, this layer of heat-resisting material proved to be such a thorough protection that the concrete above it was uninjured, and considering that the concrete that lies above the axis of the reinforcement is the only portion which is considered in calculating the strength, and also considering that an inch or two of concrete is always placed below the steel reinforcement, even the destruction of an inch of concrete on the lower side of a concrete slab will not impair its structural strength. After such a fire, the injured material may be scraped off, so far as it is loose, and another protecting layer, which is only put on for protection and not for structural strength, can be added.

Another very satisfactory use of reinforced concrete is in the construction of roof-slabs for fireproof buildings. The author has recently constructed a factory and boiler-house entirely of concrete. Even the side walls were built of hollow concrete blocks. The floors are of concrete, the roof-slab of concrete, and even the stairs are made of concrete. The boiler-house has a roof with a clear span of 30 feet formed by placing a 4-inch slab on concrete beams stretching across the span of 30 feet. The beams have a depth of $13\frac{1}{2}$ inches under the slab and a width of $7\frac{3}{8}$ inches. They are spaced 6 feet $2\frac{1}{2}$ inches apart. The slab is reinforced by $\frac{1}{2}$ -inch bars spaced 16 inches apart. Only a few weeks after the roof was in place and before the concrete had attained anything like its full strength a very unexpected and unintentional test of the roof occurred. A steel stack was being erected, the stack being put into place by means of a derrick. The derrick broke, a large gin-pole was broken in three pieces, the stack crumpled up, and the whole mass of wreckage fell on this roof. No injury whatsoever was done to the roof.

PLAIN OR "FORMED" BARS.

The term "formed" bar is here used as a generic term to denote any style of bar which is not prismatic. A prismatic bar depends on adhesion or friction for the union of the concrete and the steel. A "formed" bar has shoulders, lugs, twists, swellings, or irregularities which not only more or less effectively prevent the loosening of the adhesion by varying the planes of adhesion and thus varying the direction of the forces which will most probably loosen the adhesion, but they even call into play the shearing strength of the concrete before the rod can be pulled through it, even if the adhesion be destroyed.

Much experimenting has been done to determine the adhesion of concrete to steel. It has been found that when the steel is clean concrete will adhere to it with an adhesion which is equal to the strength of the bar when the length is approximately 12 to 20 diameters. Unfortunately the adhesion, as determined by such tests made shortly after the specimens were formed, has been shown to lack permanency. This may be due to one of three causes. First, the adhesion may be loosened by vibration in the structure—such a vibration as will occur in a railroad-bridge or in a factory employing very heavy machinery. Second, some cases in which the concrete was found to have loosened were explained on the ground that water which had soaked through the concrete had made some chemical change in the concrete immediately adjoining the steel which was sufficient to loosen the adhesion. Third, it is reasonable to say that when the structure is stressed to its full load (and especially if it should

accidentally be stressed beyond its designed load) the stretching of the bar must be accompanied by a proportionate reduction in its cross-section. Evidently the concrete will be unable to contract so as to retain its contact with the steel, and therefore the steel must separate from the concrete. Probably the number of applications of a given load will have a marked effect on this, and it would be found, after applying a load a very great number of times (say, 1,000,000), that loosening might take place even though no evidence of such loosening would occur by the application of that same load a few times. An instance of this sort occurred in a building erected in St. Louis about ten years ago. A 6-inch concrete slab carrying a heavy floor-load was supported by steel I-beams spaced about 8 feet apart. The concrete was reinforced by $1\frac{1}{4}$ -inch by $\frac{1}{4}$ -inch bars or straps which were hooked over the I-beams and dropped down on a curve toward the bottom of the concrete slab in the middle of the span. The floor safely carried a heavy floor-load for about eight years. Then several panels began to yield. The floor sagged $1\frac{1}{2}$ inches in the middle, which on an 8-foot span gave a very unsightly and unsafe appearance to the floor. One or two panels caused so much anxiety that they were knocked out entirely. It was at once observed that the concrete peeled off the bars, and it was plainly evident that the adhesion between the bars and the concrete had been destroyed, the load then being carried by the hog-chain action of the straps. It should be noted in this case that for about eight years the floor did its work and carried a very heavy load, thus proving that the ultimate failure was not due merely to poor workmanship, but was due to the fact that the adhesion of the bars was not permanent. This fact has been recognized by the city of Philadelphia in recent specifications for reinforced-concrete bridges, in which it is required that "the steel rods embedded in the concrete shall be of some approved shape, especially formed for reinforcing concrete so as to secure an interlocking bond between the steel and the concrete."

It has, however, been very definitely demonstrated that a mechanical bond furnishes a far stronger union between the steel and the concrete than can possibly be furnished by plain bars. About two years ago Professor Spofford made a series of tests in the laboratories of the Massachusetts Institute of Technology to determine this very point. A large number of specimens, of which forty-five were reported in the published tests, were made by moulding prisms of concrete. The prisms varied in cross-section from 6 inches by 6 inches to 10 inches by 10 inches, and in length from 12 inches to 50 inches. The rods included plain round, plain square and plain straps, also Ransome, Thacher and Johnson bars of sizes varying from $\frac{1}{2}$ inch to $1\frac{1}{4}$ inches and with a length somewhat greater than the length of the prisms. They were placed in the axes of the prisms during moulding. The load upon the bearing end of the concrete block was distributed by the interposition of a sheet of $\frac{1}{2}$ -inch felt between the concrete and an annular steel ring resting upon the platform of the machine. In all cases the rod projected a short distance at the upper end of the block, the pull being downward at the lower end, and this projecting end was carefully watched in order to detect the first evidence of slipping. Although it was intended that the size of the prism should be sufficient in all cases to develop the full strength of the bar, it was found that the largest bars were too large even for the 10-inch by 10-inch prisms in which they were inserted. It was invariably found that the formed bars required a far greater stress in the rod in pounds per square inch of net section than the plain bars. Incidentally it may be mentioned that the Johnson corrugated-bar invariably required a pull from two to three times as great per square inch of net section as a plain bar. These results therefore show: first, that if the stress in a reinforced concrete structure for any reason exceeds very greatly the designed loading and approaches the elastic limit of the steel, a formed bar is far safer than a plain bar, even though the adhesion has not been destroyed. Secondly, experience has proved that the adhesion may be destroyed by any one of three causes, and that it is unreliable for any great length of time, no matter what its tested strength may prove to be on new specimens. Thirdly, that a Johnson corrugated-bar will have as great a hold in the concrete as a plain bar at its best, even though the adhesion of the Johnson bar had been utterly destroyed by vibration or any other cause. Incidentally it may be added that the writer has been told of some tests which were made on this line in which the bars were deliberately oiled in order to determine their hold in the concrete under such a condition. It was found that there was practically no adhesion and

that the bars could be drawn out of the concrete with an insignificant force. This practically means that if the reinforcing steel should be accidentally smeared with oil or grease the adhesion would be vitiated to some extent, and since the mutual action of the concrete and the steel is absolutely dependent on the intimate union of the concrete and steel at all points, the strength of the structure might be vitiated to perhaps a dangerous extent by some such carelessness during construction. In the tests made at the Massachusetts Institute of Technology all the bars were sand-blasted, which, of course, made the conditions the most favorable for the plain bars. Of course, it likewise made it most favorable for all kinds of bars. But oil on a formed bar would merely reduce its adhesion and not destroy the union between the concrete and the steel. On the other hand, oil on a plain bar will render it utterly useless and endanger the strength of the structure. It is also true that if the bars have been allowed to get rusty to any great extent the adhesion is affected.

There is still much controversy over the effect of the elastic limit on the mechanics of reinforced-concrete structures. The writer has no intention of entering into a theoretical argument on this point, but will merely point out the fact that there are some phases of this detail which are beyond discussion. It may readily be seen that when the steel is strained beyond its elastic limit the union between the concrete and the steel is unquestionably destroyed. If that union depends on mere adhesion, it is certainly destroyed absolutely. If the bars are specially formed, there will still remain a very great resistance, although the structure is unquestionably very seriously weakened, if not actually unsafe. Therefore if we can safely raise the elastic limit, we raise by just that amount the safety of the structure. A great deal of work has been designed using steel which has an ultimate strength of, say, 64,000 pounds per square inch and using a working-stress of 16,000 pounds, and the designer thinks that he has a factor-of-safety of 4. If the ultimate strength is 64,000 pounds, the elastic limit is probably about one-half of this, or 32,000 pounds. Therefore the real factor-of-safety is only 2. In other words, if the loading should ever by any mischance be increased to more than double the normal loading, the structure would actually fail, since the elastic limit would have been passed, and, as above shown, the union between the concrete and steel would have been destroyed.

There is a radical distinction between a steel-concrete structure and an all-steel bridge, for example. If a steel bridge be overloaded to such an extent that the unit stress is raised to a little beyond the elastic limit, the structure will not necessarily fail. When the stress is removed, the bridge will not entirely recover its former position, the cross-section of some tension-pieces will be slightly reduced, but the unit strength is possibly greater, and the bridge can still do its normal work, although the factor-of-safety may have been slightly reduced. But when the steel in a steel-concrete structure has been stretched beyond the elastic limit, the steel and concrete cannot return to the same relative positions they previously had. The union is unquestionably destroyed. Under such a condition the formed bar is certainly safer than a plain bar, but a combination of formed bar and a high elastic limit is far better. Several years ago bridge-engineers thought they could effect economy by employing high carbon steel in the construction of bridges. Then they found that, owing largely to punching and the irregular stresses produced in plates and structural shapes, the high carbon steel was unreliable, and now a return has been made to the softer steel. But when it is considered that there is no question of punching the steel used for steel reinforcement, and that the stresses in the steel are almost exclusively tensile, the ability of the high carbon steel to safely withstand them cannot be successfully attacked, provided the steel is not actually brittle. The shearing stresses which may occur in the steel bars are always so far within the shearing strength of the steel that they need not be considered. The Johnson corrugated-bars are usually rolled from the same grade of steel as is employed in making railroad rails. There are few metal structures which are subjected to such excessive and irregular stresses as railroad rails. From the standpoint of impact and change of stress there are few metal structures which are so tried. Nevertheless a broken rail is exceedingly rare, considering the hundreds of thousands of miles which are in use. Therefore it would seem like an over-refinement and a needless sacrifice of strength to limit one's self to a grade of steel which has a virtual limit of 30,000 or 32,000 pounds per square inch when it is so easily possible to obtain a material which is thoroughly reliable for its purpose, against which no failure can be reported, and which has a virtual

mate (by which I mean the elastic limit) of 55,000 to 65,000 pounds per square inch. Such a bar can be as safely used with twice the working strain as would be used with soft steel, or, if it is used with the same working strain, the factor-of-safety against a possible overloading is practically doubled. Of course, I would not advocate for a moment using a working stress of 25,000 to 30,000 pounds per square inch with the higher grade steel. In fact, Mr. Johnson usually employs 12,500 pounds per square inch working stress with his bars, in spite of the elastic limit of 55,000 to 65,000 pounds and an ultimate strength of 95,000 pounds. But I do wish to express very strongly the opinion that using a working stress of 16,000 pounds for soft steel in steel-concrete work is not only bad designing—it is recklessness.

It will not do to say that overloads will never occur. A cyclone may produce wind stresses in a building which are several times the stresses provided for, and it is a common experience to see a warehouse floor loaded up with a floor-load which is four or five times that for which it was designed.

It is natural that some engineers should have considerable scepticism regarding the accuracy of theoretical computations of the strength of reinforced-concrete structures. The theory is excessively complex, and, secondly, concrete is by some considered a very unreliable material. There is therefore considerable value in the tests which were made recently by Professor Howe at the Rose Polytechnic Institute, at Terre Haute, Ind. These were tests of full-size concrete beams which were purposely made so as to represent commercial practice as closely as possible. Atlas cement, bank sand, crushed rock and corrugated steel bars were purchased in the open market. The mixing was done by a local contractor of experience with his own gang of men in the manner he ordinarily employed. Instead of using "standard quartz sand," which is so frequently used in test work and which gives results which cannot be compared with commercial practice, he used a sand which, "while containing some 'dirt' in the form of yellow clay, was a fair representation of bank sand used in Terre Haute." The beams varied in length from 12 feet to 19 feet 6 inches. They had a uniform width of 12 inches, but their depth varied from 5 inches to 21 inches. It is difficult to apply a uniformly distributed load to a full-size beam and avoid a tendency to arching action of the load itself, which vitiates the results obtained. A concentrated load in the centre also tends to produce a crushing of the beam, which may vitiate the calculations of its transverse strength. The method employed in these tests was to apply two equal concentrated loads, which are symmetrical with respect to the centre of the beam, through knife-edges in rolling seats, which thereby produced a constant bending moment between the points of application of the load (excepting the variable moment produced by the weight of the beam). Usually the maximum moment actually developed was somewhat in excess of the theoretical moment as determined by the Johnson formula, probably on account of the fact that the Johnson formula uses 2,000 pounds per square inch as the ultimate strength of that grade of concrete, and 50,000 pounds per square inch as the elastic limit of the steel (which is in reality the point of failure in steel-concrete work), whereas the strength of the concrete was probably somewhat in excess of this, and the steel used actually showed an elastic limit of about 60,000 pounds per square inch. The vertical deflections were read directly from a scale on the side of the beam at the centre by means of a silk thread fastened opposite the knife-edges of the end stirrup. Measurements were made to determine the position of the neutral axis for various loadings and the variation of its position for partial loadings. It was very definitely shown that at the commencement of the loading the neutral axis was below the centre of the beam. Theory would indicate that for a light loading the neutral axis would be at the centre of gravity of an inverted T-shaped section, the sides of the T being formed by extending the concrete at the base of the beam by an amount proportional to the relative moduli of elasticity of steel and concrete, but it is found that, as the loads increase in magnitude, the axis moves upward very rapidly until cracks commence to appear on the bottom of the beam; then the axis remains approximately in the same position as long as the concrete does not show signs of failure in compression, as indicated by the drop of the scale beam. The special point to which I wish to call your attention in these tests is that in all the eighteen tests there were but six cases in which the actual maximum moment was less than the theoretical moment. Ordinarily the variation did not exceed 3 per cent. Such an agreement between theoretical formulas and the actual breaking loads of full-sized commercially made beams

is not only very gratifying, but is sufficiently close to inspire confidence in the method of the calculations. The method of calculating the strength of simple beams reinforced with steel is practically much simplified by the use of tables and diagrams.

Another very important feature of this method of construction is the solution which it gives to the problem of expansion-joints. It does so by cutting the Gordian knot and omitting expansion-joints altogether. This may be safely done on the same general principle as is involved in the practice of street-railway companies in using perfectly tight rail-joints. In the case of the rails the changes of temperature do take place, and they result in severe tensile stress in cold weather and compressive stress in warm weather, but it is easily demonstrable that for such ranges of temperature as will occur the stresses are not unsafe and that the rails can safely endure them. Precisely the same principle is involved in reinforced-concrete walls. It is demonstrable that if 1/300 of the cross-section of the wall consists of steel *properly distributed*, all tendency to contract during cold weather will be resisted by the steel, and it is thus made possible to make concrete structures a mile long, if desired, without using any expansion-joints. Experience in these structures has demonstrated that masses of concrete so long that they would inevitably have been badly ruptured by temperature contraction if they had been made of plain concrete, have successfully withstood all ranges of temperature without any cracking. In fact, the insertion of steel in structures merely for the purpose of withstanding this temperature cracking is not only justifiable, but a wise plan, even though the steel was not depended on to resist any other structural stress. This may explain an element of the design of some of these structures where bars are inserted in places where they are apparently unnecessary for withstanding structural stress. They are inserted as binders to prevent any possibility of the concrete cracking on account of temperature stresses.

In order to have some more definite figures regarding this, I wrote to the engineer of the St. Louis Expanded Metal Fire-proofing Company for some explicit examples. An extract from his letter is as follows:

"The rear wall of the Harvard stadium is 1,400 feet long, built in the form of a U, and the same contains but one crack at one of the points of tangency, which may have been due to some improper workmanship at this point perhaps. This job has passed through two severe winters, and my report on the condition of same comes direct from Prof. L. J. Johnson, the man who had the work in charge.

"There is a retaining wall illustrated in our new catalogue which has passed through one winter and contains no crack. We built a wall in the city here, exposed on both sides to the weather, which is also 300 feet long and contains no crack. It is not that the metal absolutely prevents cracks, but if the metal does not slip in the concrete, the cracks will be very fine and close together, and these will be so small that in the case of the corrugated bar, at any rate, they would not be able to penetrate to the bar."

This is another illustration of the value of a "formed" bar over a plain bar. It is quite possible that temperature changes are one of the most potent causes of the loosening of the adhesion. Corrugations, and especially those which present a square shoulder against any tendency of the bar to move in the concrete, make such an intimate union between the concrete and the steel that temperature changes cannot affect them provided the cross-section of the steel is sufficient to resist the temperature stresses.

Unprotected steel rusts quite rapidly, especially when it is exposed in damp places, and since concrete is more or less porous, so that water may penetrate throughout a concrete structure, it is frequently assumed that even the embedded steel will rust out. Although it is true that the modern system of reinforced concrete is a matter of the last few years, and therefore there has not been time to determine many of the results which will only appear after many years, there have fortunately been many occasions when the power of concrete to protect iron from rusting has been amply demonstrated. Wm. Sooy-Smith, M. Am. Soc. C. E., reports a small piece of iron set in mortar taken from the base of the obelisk now in New York City which was bright and free from rust after 2,300 years. He also tells of the moving of a bed of concrete at a lighthouse in the Straits of Mackinac, twenty years after it was laid 10 feet below the water surface. In this case drift-bolts embedded in the concrete were found to be free from rust. Many tests have been made in which it has been attempted to substitute for long periods of time a corresponding intensity of corrosive action, and although

the results of such tests are not conclusive proof, yet they all point to the same conclusion, viz., that if concrete is mixed very wet so as to make it very dense, and if the steel is covered to a depth of an inch or more, there is absolutely no evidence of rusting, unless the steel is exceptionally foul when it is placed in the concrete. There has been considerable controversy over the possible effect of the fine hair cracks which frequently appear in the bottom of a concrete beam even when it is loaded within its designed loading, but the eminent chemist and cement expert, Spencer B. Newberry, has declared unequivocally that there is no danger that such cracks would result in corrosion of the steel under them. He points out the fact that the immediate effect, even when such a crack began to open, would be a slight chemical change and the formation of a carbonate at the bottom of the crack which would effectively protect the steel from any corrosion.

THE PERGAMON MUSEUM OF BERLIN.

WHEN, in 1873, the German savant, Carl Humann, sent the first pieces from the Pergamon citadel to Berlin, no one would have thought that they might some day give impulse to the construction of the museum which is now standing on the Museum Island in Berlin.

The discovery and the excavation of the Pergamon antiquities has been, for men of art and science, an event of extraordinary importance. It is true that before the German discoveries were made, Pergamon, now Bergama, and its citadel had been visited several times by savants, especially of France, who after their visit reported that, in all probability, antiquities of undreamt-of importance might be hidden beneath the debris and rubbish of the acropolis. But the credit for having discovered these antiquities is due, in the first place, to Carl Humann, and then to Alexander Couze, at that time director of the collection of antique sculpture in the Royal Museum, who, when seeing the first pieces of the great frieze, recognized them as parts of the "Gigantomachia," mentioned by Ampelius in the words: *Ara marmorea magna, alta pedes quadraginta, cum maximis sculpturis—continet autem gigantomachiam.*

Excavations conducted by Humann under the direction of the Royal Museum were made from 1878 to 1886. Later they were again and again prosecuted, and recently the German Institute of Archæology has continued and extended them over the entire site of the old capital. They have revealed a complete picture of the old royal citadel of the Attalides and of its aspect in the time of Roman kings and, above all, they have restored a unique work of art—the reconstructed great altar with its frieze. It was not before the Pergamon antiquities were discovered that the connection of Greek and Roman art was established. It is also for this reason that the Pergamon discoveries have been an event of extraordinary importance.

These relics are now preserved in the Pergamon Museum of Berlin. On the walls and stands of the vestibule pictures and plans are exhibited to make clear the environs and the relations of the Pergamon monuments to one another. Within the museum itself, undoubtedly the most striking object is the Great Altar. In all probability this altar, which stood in the middle of the older town on the acropolis of Pergamon, was built by Eumenes II. (197 to 159 B. C.) and dedicated to Zeus and Athena.

The sacrificial altar proper stood on the platform of a quadrangular substructure about thirty metres square, through which the broad stairway led to the sacred level. The frieze or high relief of the great altar ran around this substructure and along the wings of the stairway at a comparatively low altitude (the base is 2.5 metres high). At the top of the frieze a bold cornice with wide mouldings projected from the platform. Above this quadrangular structure ran a colonnade of delicate Ionic columns, open like a portico on the outside and closed at the back. The court, or room, formed by its inclosing wall, contained the sacrificial altar, and was ornamented on the inside by a smaller frieze. The extant fragments of this second frieze representing scenes from the life of Telephos, the mythical founder of Pergamon, are set up in the museum opposite the west side of the Great Altar.

The colonnade which encircled the platform is represented on the west side only, but the base, the frieze, and the cornice are given by reconstruction and restoration all the way around. Parts of the original base and colonnade are built into the altar, to the left of the stairs. The great frieze, as a whole, represented the battle of the gods and the giants; the incised names aided in understanding the individual figures.—Chas. A. Brassler in the *Scientific American*.

ILLUSTRATIONS.

FREE PUBLIC BATHS, EAST 76TH STREET AND JOHN JAY PARK, NEW YORK, N. Y. MESSRS. STOUGHTON & STOUGHTON, ARCHITECTS, NEW YORK, N. Y.

SECTIONS AND ELEVATIONS OF THE SAME.

DETAILS OF THE SAME.

CHURCH OF THE SAGRARIO, SAN LUIS POTOSI, MEXICO.

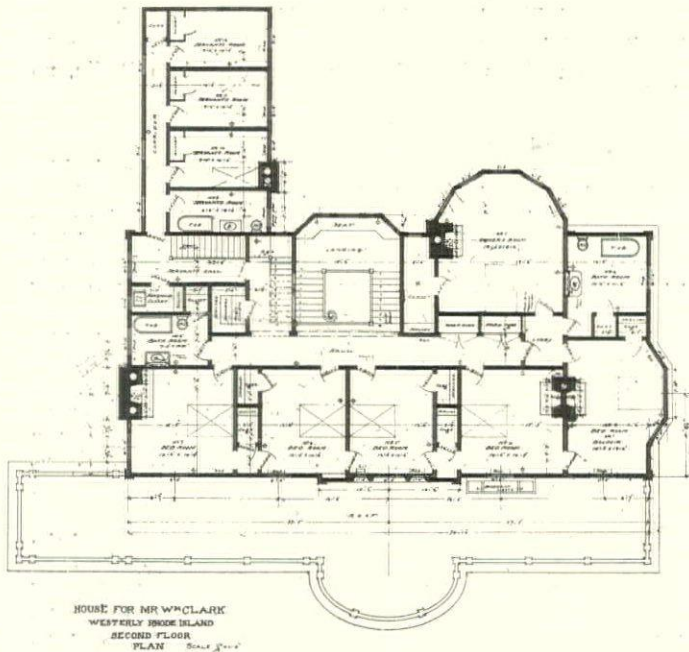
See article elsewhere in this issue.

SKETCHES IN SAN LUIS POTOSI, MEXICO.

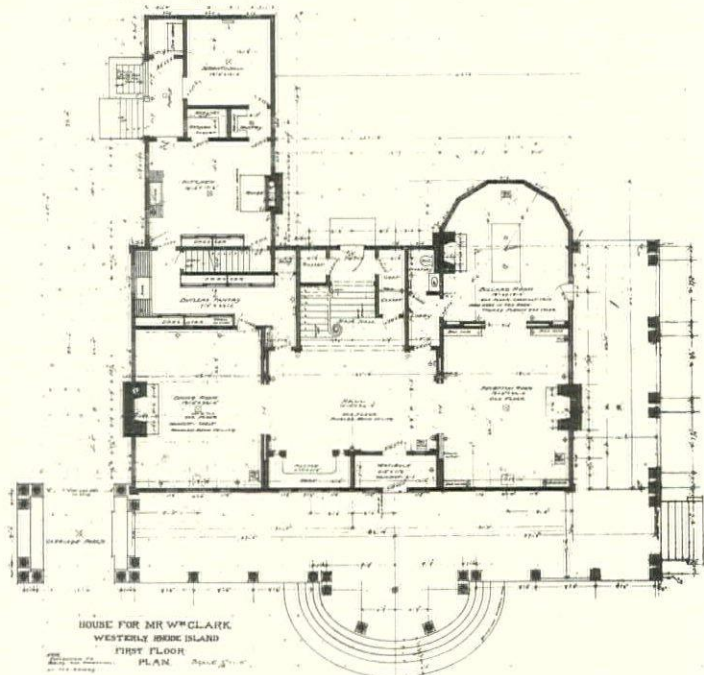
FOUNTAINS IN THE CITY OF SAN LUIS POTOSI, MEXICO.

PLANS OF HOUSE FOR W. G. CLARK, ESQ., WESTERLY, R. I. MR. WARRINGTON G. LAWRENCE, ARCHITECT.

The dilatoriness of the plate-makers prevented the publication



HOUSE FOR MR W^G CLARK
WESTERLY RHODE ISLAND
SECOND FLOOR
PLAN



HOUSE FOR MR W^G CLARK
WESTERLY RHODE ISLAND
FIRST FLOOR
PLAN

of these plans in our issue for December 2, where they belonged with the photographic view of the house in question.

Additional Illustrations in the International Edition.

Note.—Those who have had experience will know that it is not difficult to be deceived in the quality of print a given negative will yield. Because of being so deceived, we are obliged to reject the subject intended for this week's issue International Edition and delay its appearance until next week.

NOTES AND CLIPPINGS.

PROTECTING WRECKERS.—"Poor building," says Mr. F. W. Fitzpatrick, "has become a habit, a national perversion, nurtured (though unintentionally) by insurance. To build better costs a little more money. The individual thinks that is a hardship and protests. We have strange notions, we Americans who deem ourselves so eminently sensible. The immediate dollar cuts so important a figure in our code of ethics that we perform very peculiar moral antics in our scurrying after it. For instance, not long ago the tugboat men of New York harbor protested against United States vessels rendering assistance to vessels in distress, because, forsooth, such purely humanitarian actions on the part of the Government competed with an 'established private business.' When the Government placed lighthouses around Key West, Fla., a protest went up from that city against the injury such protection would work to the 'wrecking industry!' Not one whit saner or more moral is the protest that is usually made when a city proposes more stringent building laws. Such laws mean that the individual has to put \$3,300 into a home, if well built, whereas it will cost him but \$3,000, let us say, if he can make it gingerbreadly and highly combustible. The individual exercises considerable influence in the community, and, in consequence, few cities have really adequate building regulations."

A WESTMINSTER CAMPO SANTO.—In a letter to the *Times*, recently, Mr. Bodley suggests that the space in Dean's Yard, now surrounded by iron railings, might be treated in some such manner as the Campo Santo at Pisa. "Externally, there could be four walls, which might be made handsome and dignified, and within them a wide, cloister-like building, the inner walls would afford much space for the monuments of many coming years. There could be four arches into the cloister with bronze gates and a cross walk. Its height need not be at all great, nor incommode the houses in Dean's Yard. The memorial services would be held in the Abbey, and the ancient cloister would afford a beautiful path to the final resting-place. It might all be made very beautiful. It would be intimately connected with the Abbey. I know that there is the difficulty of the ground now being used as an occasional extra playground for the boys of Westminster school. It is but an inconvenient place for such a purpose—exposed to the view of all passers-by as it is. I should hope that this difficulty could be got over, and that a great public want could be thus so suitably met."

MOBS AND PARLIAMENT-HALLS.—Modern history tells of moments in our own story almost as exciting as those now being witnessed in Russia. Wellington once declared that the most exciting moment of his life was not in any of his great battles, but that in which he had to forbid William the Fourth to attend a public banquet in the city during a time of great national excitement. Of the millions of people who every year see our Houses of Parliament, how many imagine that their position was determined by strategic considerations? No one nowadays can think of the Palace of Westminster in any other position than that which it occupies. But when the old Houses were burned down, and the task of rebuilding faced, there was a proposition to establish them on or near the site of St. James's Palace. Wellington resolutely put down his foot on the proposal.

The site suggested, its advocates pointed out, would be better as regards centrality and convenience than any other. But to the argument of the Duke there could then be no answer. "With a vast and growing population, such as yours in London," he said, "you must never make it possible that you can be surrounded. You must build your Houses of Parliament upon the river, so that the means of ingress and egress are safe, and that the populace cannot exact their demands by sitting down around you." Sir William Fraser, in whose memoirs the story is mentioned, mentioned it to Napoleon the Third just before the death of the latter. "What wisdom!" he said—"what wisdom!" and it set him musing upon the different turn which the history of France might have taken if, in other ways, as great precautions had been observed in his own case.—*St. James's Gazette*.

MONASTERY ON MOUNT ATHOS WRECKED BY EARTHQUAKE.—An earthquake, having its centre in the Peninsula of Athos, destroyed the great church of the Russian monastery on Mount Athos on November 11. The damage was \$125,000. Mount Athos has been since the Middle Ages the seat of a monastic republic, numbering now about 6,000 monks. Some of the religious houses are dated, by legend, as far back as the days of Constantine. In recent times they have, through three centuries of Moslem rule, preserved their independence and privileges.—*N. Y. Tribune*.

The American Architect and Building News

Vol. LXXXVIII.

SATURDAY, DECEMBER 23, 1905.

No. 1565.

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A VERY lively dispute is going on just now as to whether the new central library for Brooklyn shall or shall not stand on a certain site on the Plaza at the entrance to Prospect Park, a large circular area in which stands the memorial arch to the Soldiers and Sailors of the Civil War. Professor Hamlin, who was invited by the Library Trustees to express an opinion, favors the Plaza site, and so, too, does Mr. Carrère, whose advice, as one of the architects of the New York Library, Mayor McClellan has sought. Apart from the abstract matter of the architectural or landscape suitability of the proposed site, there is involved the serious question whether this now somewhat remote position is to be sufficiently the future centre of the city to justify placing there a public library which should be equally and conveniently accessible to all. Further than this, there is to be determined whether a large circular plaza of this kind, which particularly invites the pedestrian to "cut across lots" to save time and steps, is the proper place for a library which must be visited by so many women and children who would here be more exposed to injury by recklessly driven vehicles than if the building were erected on a more secluded street.

A PART from the conditions which affect this particular building, a consideration of the matter has suggested to us whether it were not about time to enact a mandatory law, of general application, which should govern the selection, establishment and maintenance of sites for important public buildings. At present the system, or rather custom, is simply to procure at some fairly desirable spot the best site that existing conditions provide. Upon this site the architect erects his building, generally having in mind merely these existing conditions and hardly ever with a thought for how his work may be affected by surroundings that may have become altered in the lapse of years: his building, that is, is erected and

blindly left to chance. This, of course, has to be the case with private buildings, but it should not and need not be so with buildings erected with public money, for the use certainly and inferentially for the pleasuring of the æsthetic sensibilities of those whose money is expended upon them. Public monuments ought not to be allowed to suffer depreciation at the hand of private whim or mercenary interest. The birthright of a public monument should be safeguarded by a general mandatory law, so that, for instance, the dignity of the New York Public Library could never be crucified by the erection on the opposite side of Fifth Avenue of such a creation as Senator Clark's house.

WHAT is, it seems to us, desirable is a general law, with provisions graded so as to have application to cities of varying rank, which should make compulsory, on the selection of a site for an important municipal building, the immediate bonding by the municipality of all property facing upon such site or surrounding it within a radius varying with the rank of the city and the cost of the proposed public building. The purpose and effect of such bonding, no matter how much it might add to the current expenses of the city nor how much it might increase the annual incomes of the owners of the properties so bonded, would be to make certain that, whenever the existing condition of such properties might be altered, they should be changed only so as to benefit and not prejudicially to affect the public monument whose neighbor they are: that is, that they should not be allowed to transgress and offend the "good manners of the neighborhood." Existing conditions would probably have to be accepted and these conditions, whether favorable or unfavorable, might prove to be permanent, but the public surely has a right to secure itself from the possibility that these conditions might become worse.

UNDER the ægis of such a law, of which the execution would properly be charged upon the Art Commission of the city in question, an architect called upon to design a public building would more than ever strive to make his design dignified and worthy a permanent place in a city where the humanities and the amenities of civilized life are properly esteemed. He would feel that, even if momentarily his work was but an item of a mongrel group, it might, nevertheless, ultimately be found to be one of, and perhaps the bright particular star of, a noble companionship. As it is impossible for an observer to examine and feel the influence of more than one square, or place or plaza at a given time, it is quite immaterial whether or no the site of the public building in question might have been selected with reference to some general scheme for the architectural embellishment of the city as a whole.

AT this distance, and because those who know the history of the trouble have sedulously kept that knowledge to themselves, it is not easy to conceive what good end the Trustees of the Boston Museum of Fine Arts have

hoped to lead the public to believe they are accomplishing in accepting the resignation of the Director, Mr. Edward Robinson. We believe they have seriously misjudged the value to the Museum's real interests of those in opposition to a Director whom, in the resolution adopted by the Corporation on accepting his resignation, they characterize as one who "has done more to promote its [the Museum's] growth, better its condition, and increase its reputation, than any other man now living." In view of this and other equally gratifying expressions of esteem, in the propriety and truthfulness of which we heartily believe, the acceptance of Mr. Robinson's resignation seems more than uncommonly stultifying. New York, however, has instantly taken up what Boston has rejected, and it is some consolation to Mr. Robinson's friends to learn that he has accepted the position of Assistant-Director of the Metropolitan Museum of Art.

IF President Roosevelt is really sincere in his declaration in favor of the "square deal," he can find ready to his hand in Washington a first-rate opportunity to prove that his words are more than mere mouthings. Rarely did any one stand in greater need of a square deal than Mr. John L. Smithmeyer, the rightfulness of whose claim for unpaid commission as one of the architects of the Library of Congress is understood by the entire profession and has been thrice essentially acknowledged by the United States Senate and once by the House. It is shameful that this already aged gentleman should be longer defrauded of his just claim, simply because that claim involves the payment of a considerable sum of money. However considerable it may be to the Government, it is still more so to the claimant and his sense of injury and the need of a powerful and square-dealing friend are but the more poignant.

IT is impossible not to appreciate and applaud instances of astuteness, even when they are displayed in fostering improper or unlawful ends. A recent instance of wide-awakeness and mental activity has been shown by those conducting the strike of the Housesmiths' Union against Messrs. Post & McCord, of New York. These contractors, in order to get in contact with non-union iron-workers, opened temporarily a bureau under the style of the "Allied Iron Trades" and advertised that iron-workers in search of work could there find employment. As soon as the strike leaders learned of this move they complained that, as the bureau was an "employment-agency" it could only conduct its business after being duly licensed, and called on the License Commissioner to close the place, privately reminding him that should a license now be applied for he would not be obliged to issue it before the lapse of thirty days, and that in thirty days the strike might easily be won by such methods as this particular union usually employs.

THE unusual amount of violence that in the past has marked the strikes organized by the Housesmiths' Union is accounted for ingeniously by a correspondent of a New York newspaper. The explanation suggested is that, when first the skeleton-frame was introduced as a factor in urban building, it was found that the only

mechanics competent to do the work required in handling these heavy weights at great heights were men who had already been trained to similar work as bridge-builders. Now, the greater part of steel bridges are built by railroads and the gangs who build them are, if not always in the van of civilization, at least forced to dwell where the fringe of civilized life is very thin and ragged, where the strong hand and the quick eye do more to win respect and preserve life than all the laws on the statute-book. When men such as these, trained to believe that might is right, organized as a Union, it was but natural that their methods of discipline—for themselves as well as for their foes—should be somewhat more violent than those that prevail in other unions normally operating amid more civilized surroundings.

ONE of the curious things in connection with building strikes is the discovering what villainous, yet self-sacrificing and generous, friends outside the pale of Unionism the noble-minded union-man has. These unenrolled friends of Labor, if we may believe the words of union-men and their leaders, have the obliging habit of springing unasked, from no one knows just where, and in the most thoroughly expert way doing the utmost injury either to the building that is "struck" or to the bodies of the free men who presume to take up the jobs the union-men reject. The latest exploit of these obliging free-lances is the cutting of the steel guy ropes, that maintained the costly derricks on two of the buildings being erected in New York by the Post & McCord Company, against whom the Housesmiths' Union is now maintaining an unsuccessful strike.

THE Province of Quebec Association of Architects has lost its first president, through the death last week in Montreal of Mr. John W. Hopkins, who, during nearly fifty years, practised his profession in that city, to its manifest advantage. Mr. Hopkins, who died in his eighty-first year, came to this continent from England in 1825, and during his long career built a large number of the important public and private buildings in Montreal, amongst them being the Custom-house, the Bank of Canada, the Life Association of Scotland, the Harbor Commission Building and many others. Besides being a member of many clubs and associations, Mr. Hopkins was a Royal Canadian Academician.

THE *Philadelphia Public Ledger*, a paper generally discreet in its outgivings, says that three hundred copies of the report of a certain expert have "disappeared" because the Department of Public Works of the city of Pittsburgh "feared that a panic would ensue," if the public learned what the report contained. It seems that Mr. E. E. Brownell, an engineer, was employed by the Whitney and Rockefeller interests to study and report on the effects of electrolysis in Pittsburgh, and he is alleged to have discovered that not only gas and water mains but also the frames and foundations of buildings had been seriously attacked by wandering electric currents. The success that New York has had in controlling this vagrom fluid shows that intelligent care can foresee and prevent the greater part of the injury it is capable of doing.

"THE GLAMOR OF CROOKED BUILDING."

SIR:—Under the above title *The Builder* of Sept. 23 has reviewed my Catalogue of the Exhibition by the Edinburgh Architectural Association of Photographs and Surveys of Mediæval Buildings lent by the Brooklyn Museum of Arts and Sciences an article which you reprinted in your issue for Oct. 7 last.

The position of the editor of *The Builder* is that though he notices "*The Catalogue*," he does not care to examine the Exhibition itself and that he considers it unnecessary for his readers to examine it, for reasons stated in his review. He mentions among these reasons his familiarity with my previous publications and his convictions based upon this alleged familiarity that I have constructed "a laborious and fanciful twisting of facts to fit a theory which is itself improbable and which, if accepted, would only go to prove that the architects of the buildings concerned were elaborate blunderers who made calculated distortions in their buildings on no principle and which could serve no intelligible purpose."

Personally I have no great anxiety to change the convictions of Mr. Statham, but the question to be considered in the interest of architectural history is whether he has a judicial frame of mind, a logical faculty, an equipment of learning and a comprehension of architectural and optical effects, which make his opinion of importance or weight on the matter under consideration. Another question is, admitting for the sake of argument that this opinion has importance and weight, are there any other opinions not less weighty and important which are favorable to the results of the investigation illustrated by the Edinburgh Exhibition, and may these be balanced against Mr. Statham's view in such a manner as to influence the judgment of an intelligent public?

As to the judicial frame of mind, we may first consider the title of the review, "The Glamor of Crooked Building." Under the title of "Crooked Building" is included the delicate and beautiful vertical curvature of the piers at Amiens, Laon, Noyon, Châlons (Notre Dame), Strassburg, Rheims, Vicenza and Pisa and the suave and graceful vertical bends of the naves of St. Mark's and of many other buildings photographed by the Brooklyn Museum surveys in such a manner as to show these subtle lines.

Even if we concede for the moment that the argument for intention may be worthless and mistaken, it surely betrays considerable mental obliquity to stigmatize the curves at Amiens as "crooked building." Accidental these curves might be, let it be conceded for the sake of argument, beautiful they certainly are. Mr. Statham's title therefore hardly covers the ground of an investigation which suggests that the entasis of Classic architecture has survived and developed into the vertical curves first quoted and found in buildings so universally admired.

Passing by the question as to the fairness or good taste of the title, we turn to the matter of the review with this preamble. Since Mr. Statham believes that he is familiar with my publications, it is obviously unnecessary to rehearse their arguments for his benefit. But for the enlightenment of the architectural public we will ask the question: Is he familiar with these publications? And in reply we shall prove that Mr. Statham must choose between admitting that his claim to familiarity is unfounded, or that he stands convicted as an evader and perverter of facts.

The review under consideration is illustrated by a large plan of St. Mark's at Venice borrowed and reduced from the still larger plan of the Edinburgh Catalogue.

The Builder says: "This plan is the result of Mr. Goodyear's measurements" and shows "the vagaries in plan which are included in Mr. Goodyear's illustrations as having some special architectural intention."

The Catalogue, p. 92, says: "The ground plan itself is an accurate reproduction, by permission of Commendatore Saccardo, of the plan prepared under his direction for the Opera of the Basilica."

Could there be any plainer statement that this is the official plan of St. Mark's and not mine? It was borrowed, by permission, for the convenience of inserting plumb measurements dealing with vertical lines. Only in Mr. Statham's imagination is this plan "included in Mr. Goodyear's illustrations as having some special architectural intention." Whatever may be my own opinion on the matter, no word in the Catalogue, or in any other publication of mine, indicates the view that the plan is significant or deliberate in its irregularities.

It is a matter for regret that any one in the influential position of the editor of *The Builder* should profess to criticize what he obviously has not read; but that this is the way in which the Edinburgh Catalogue has been reviewed I propose to drive home by point after point. I have shown that Mr.

Statham cannot have looked at the description of the illustration he has selected as his special ground of attack and I shall shortly pillory an even more flagrant omission on his part with regard to this plan. If it be objected that it seems a waste of time to deal at length with a review based merely on blind prejudice and careless of the facts on which it pretends to pass judgment, it must be remembered that the circulation of *The Builder* is a wide one—which is indeed the only reason for troubling at all about the matter.

Mr. Statham's professed familiarity with my publications is voiced as follows: "We have, in fact, followed all Mr. Goodyear's illustrated publications on this subject, from time to time, in American magazines, and therefore know pretty well what his position is." Now it should be noted that the plan of St. Mark's under discussion was originally published in "*Memoirs of Art and Archaeology*," Vol. I., No. 2, "The Architectural Refinements of St. Mark's at Venice." This Memoir of 111 pages, with fourteen plans and forty-four illustrations, devotes forty pages to the discussion of the vertical lines as figured on the plan we have been dealing with, which was there published entire and also in thirteen sections. There is no suggestion in these forty pages that the obliquities of this plan are constructive refinements.

In the Edinburgh Catalogue, as in some few pages of the "*Memoirs*," I have explained that these obliquities in plan are frequently translated by photographs into an appearance of obliquities in elevation, and that the spectator in the church may also be misled by similar effects into presuming that settlements have occurred which are shown, by levels taken in the galleries, not to have happened. The "Commentary on the Obliquities in Plan" in the Catalogue is closed by the following passage, "The above remarks will bear on the confusing optical effects of the oblique plans previously described, *without debating the point whether the oblique plan of St. Mark's be intentional or no.*" For the second time Mr. Statham stands convicted of not having read the Catalogue, and it also begins to appear that his familiarity with my other publications is of a doubtful kind.

The contention of Mr. Statham is that the obliquities in plan of St. Mark's are of such a character as to affect an argument relating to vertical lines. He says, "The figures all over Mr. Goodyear's plan represent in decimals of feet the vertical leanings of walls or piers over these points; all of which he maintains to be intentional and for optical purposes. Now just consider the contrast between this assumption and the character of the plan." To the average critic it would probably appear that a debate regarding deflections of plan in St. Mark's would turn on the local surroundings, on the possible limits and form of the building plot, and on the locations of the walls of the older church which originally occupied a part of the same site. Considerations of this character might have affected the plan of St. Mark's and would not necessarily prove that the builders were incapable of subtlety or of deliberate refinements. On the other hand, a debate regarding vertical lines would turn on matters relating to the foundations and to the problem of thrust or subsidence. It is surely a novel and rather amusing contention, that the character of a plan can determine a question which relates to vertical lines.

But worse is to come. Mr. Statham has had the imprudence to borrow the plan and suppress the title.

The Builder says: "The figures all over Mr. Goodyear's plan represent in decimals of feet the vertical leanings of walls or piers over these points."

The Title says: "Measurements in decimals of a foot for plumbs from the pavement with a line of 17 ft. in the nave, 15 ft. in the transepts, and of 11.70 ft. in the north vestibule."

The plan as published by *The Builder* without these limitations as to the length of the line naturally and inevitably appears to every reader to represent a series of plumbs for the entire height of the church.²

The Builder continues: "All of which he maintains to be intentional and for optical purpose."

The Catalogue, p. 93, says: "The value and importance of this record vary for different parts of the church, as subsequently indicated."

"The record is supplanted in several instances by plumbs from the parapets with a line of 33 feet in length, and these plumbs will be separately quoted. The record is supplemented in other instances by such measurements as have already been quoted for the entire height of the nave and these are naturally the most important of all."

¹Published by the Macmillan Company for the Brooklyn Museum of Arts and Sciences, 1902.

²The republication in the "*American Architect*" follows the title in giving the length of the plumb-lines and, in so far, departs from the original.

For example, the measurements on the plan give an extreme divergence in the nave of $5\frac{1}{2}$ inches and the inevitable conclusion of every reader of *The Builder* would be that this is the divergence for the height of the church, whereas "*The Catalogue*" says of these sizes, "They are all of small amount, so much so as to be inconsiderable, excepting for one consideration, and that consideration is that they belong to a system which continues above the capitals, as described in the measurements already quoted for the entire height of the nave." These plumbs give a total divergence in the nave of 33 inches; and this fact is suppressed by *The Builder*. The fact is also suppressed that the director of repairs of the church, in charge for seventeen years and employed in making these repairs for forty years (Commendatore Pietro Saccardo, recently deceased), gave a certificate in 1901 verifying this divergence as constructive, which certificate is published in the Catalogue.

"*The Catalogue*" says of the north and south transept gallery walls: "But the wall measurements, as entered on the plan, are taken with a line of 15 feet, whereas the surfaces to the top of the parapet have a height of 33 feet. The measurements must therefore be doubled on the presumption that the leans are continuous and uniform, and this presumption is not only visibly correct, but is verified by plumbs from the gallery as now described." The next Catalogue number shows a photograph representing a plumb measurement of $15\frac{1}{2}$ inches inclination to the top of the gallery parapet, whereas the plan measurement, owing to the short length of line, gives only 0.60 at this point.

As the entire argument is to the effect that the inclinations are of such amount as to have involved the immediate collapse and downfall of the church, if they had been accidental, the suppression of such facts is an inexcusable misrepresentation of the argument. It is Mr. Statham's privilege to reject the argument, but it is not his privilege to misrepresent the case to his readers.

We return once more to the quotation already given.

The Builder says: "The figures all over Mr. Goodyear's plan represent in decimals of feet the vertical leanings of walls or piers over these points; all of which he maintains to be intentional and for optical purposes."

The Catalogue says: "The evident buckling of the casing on the north wall (of the nave) makes the measurement in the wall itself of small value and those of the south wall (of the nave), as distinct from the engaged columns, have consequently the lack of interest which attaches to any set of measures without definitely known correspondences" (p. 98).

And of the west wall of the nave: "The measurements from the pavement vary in direction, and not being continuous (higher up) appear to have no significance. They have been entered as part of the record" (p. 106).

A commentary on "The Margin of Builder's Error in the Verticals of St. Mark's" is equally destructive of claims to knowledge of the subject or impartiality on Mr. Statham's part.

After such looseness of thought, carelessness of fact and recklessness of statement as have above been proved to the hilt, it is not surprising to find an alleged quotation which is actually a direct contradiction of the words used. Of the survey of the south wall at Troja, after quoting some of the measurements:

The Builder says: "And this is called 'A Symmetric Scheme in Arcades.'" *The Catalogue* says: "It is 'An Asymmetric Scheme in Arcades.'" (p. 106).

For the second time within a few months Mr. Statham seeks to buttress his position by references to the Peterborough façade. On Aug. 13, 1904, a review in *The Builder* of an *Architectural Record* article contained the following sentence: "At Peterborough, as we all know, the piers have moved more than 2 feet out of perpendicular, but the vault did not actually fall in, although it was in a very precarious state before the recent restoration." Mr. Statham considered this statement a proof that a vaulting may spread 2 feet without collapsing, and I answered him, as follows, in the December number of the *Architectural Record* with an extract from Mr. G. L. Pearson's Report on the West Front of Peterborough Cathedral, which that eminent architect repaired. This report was copied by the *American Architect* of June 29, 1895, and it says: "Careful plumbing has determined that the detached clustered columns (of the west front) with the part up to the string-course above them, lean out to the extent of fully 2 feet, and that the three gable ends have an inclination in the same direction of about 6 inches. Upon looking for the effect of such a divergence from the perpendicular of these pillars upon the work inside the arcade, one is surprised to see how little there is to indicate that such a great movement has taken place, for, instead of huge gaps in the groining, which we would have expected to see, there are only as far as can be discerned from the ground some

slight openings in the cells. Coupling this fact with the fact that the three gables lean over at a less angle than the pillars below them, and that some of the work in connection with these gables inside the roof is nearly perpendicular, I am disposed to think that the pillars began to settle and lean outward at a very early period, even perhaps before the gables were erected, and certainly before the groining."

Now if the vaulting was done after the façade leaned out 2 feet, how can Peterborough prove that a vault may spread 2 feet without collapsing? So far, so good. Now comes the point of interest. Mr. Statham, who is "familiar" with my publications in American magazines, cheerfully returns to the charge with the following passage in his review of the Edinburgh Catalogue: "With a very slow and gradual settlement it is quite possible that an arch may accommodate itself to the movement to an extent which would, on first consideration, hardly be expected. And we can name one notable instance of it, that of the portico of Peterborough. Those who saw it before the repairs¹ may remember that in spite of the moving out of the front arcade, the contemporary vault between it and the main building showed no large or noticeable rupture—nothing in the least comparable to the extent of divergence of the arcade from the perpendicular. But we forget that Mr. Goodyear has not turned his attention to English architectural monuments, etc., etc., etc."

Thus once more Mr. Statham illustrates his "familiarity" with my publications and incidentally his ignorance of Mr. Pearson's important document.

Let it be well noted that I have never advanced any thesis about the Peterborough façade; it is *The Builder* which cited it as an instance proving that a vault might not collapse when the wall went over 2 feet.

Moreover, Mr. Statham's familiarity with my publications is once more illustrated by his remark in regard to my work on English monuments, my neglect of which he now reflects on for the second time. In his article of Aug. 13, 1904, he suggests that I should "condescend" to study English Gothic. May I ask if he has seen the publication "On the Margin of Builder's Error at Wells, Salisbury, Norwich, Ely, Lincoln and Durham?" Perhaps his is the kind of "familiarity" which breeds contempt.

So far our reply to *The Builder* deals with misrepresentations which we must hope are not deliberate, with errors of fact and quotation in the matters considered which are deplorable, and with loose statements, illogical conclusions and unpardonable ignorance of the publications which the review has attacked.

All these things are quite consistent with the possibility that I am thoroughly in the wrong in the conclusions drawn from the investigation which is described by the Catalogue and by related publications. Because *The Builder* has published a weak and foolish review, it does not follow that the Edinburgh Exhibition has been a valuable contribution to the study of Mediaeval buildings. It simply follows that the opinion of *The Builder* does not count in the further discussion of the investigation.

I would, however, add this: Hitherto it has been impossible to get the evidence before the architectural world. Small plates in magazine articles are unsatisfactory at the best and are altogether inadequate when problems and details of masonry construction are involved. The expense of publishing a large number of drawings and photographs of any size has been prohibitive. In Edinburgh there have been nearly 300 exhibits, many of them 25 inches by 35 inches, and this is absolutely the first satisfactory presentation of the subject-matter under discussion. The ground for argument, then, must in future be shifted to this Exhibition and to the forthcoming volume, which is one of its results.

The vital point at issue for the moment therefore is this: Do the architects who have seen the Exhibition think it is worth while for other architects to examine it? On this head the Edinburgh and Glasgow architects will speak for themselves. They have, in fact, already spoken, and they have spoken with remarkable unanimity. As far as the Architectural Association of Edinburgh is concerned, they have spoken officially and definitely, to the effect that the Exhibition is worth examining. Under these circumstances a reviewer of the Exhibition who refuses to examine it is, by virtue of that refusal, thrown out of court, and his opinion is not worth a moment's consideration.

I asked at the opening of this letter whether there were weighty opinions in regard to this investigation which might be balanced against Mr. Statham's. I do not propose to cite even one individual, though I might cite many, as agreeing with

¹And who did not read Mr. Pearson's Report? (Note by W. H. G.)

my conclusions, but I do propose to show that many experts and associations of experts are at one that the investigation is of such importance as to merit serious consideration. Against Mr. Statham's dogmatic and supercilious contempt for the whole matter I put these facts:

The Exhibition in Edinburgh has had support, either financial or sympathetic, from the Royal Institute of British Architects, the Glasgow Institute of Architects, the Glasgow Architectural Association, the Aberdeen Society of Architects, the President of the Royal Scottish Academy, the President of the R. I. B. A., the presidents of the Architectural Association (London), of the Leeds and Yorkshire, Liverpool, Manchester, Birmingham and Cardiff Architectural Societies; from Sir Aston Webb, R.A., Professor Simpson, Prof. Baldwin Brown and a host of intelligent laymen.

As to corroborations of my observations, the certificate of Commendatore Pietro Saccardo for the constructive facts, as held to exist in St. Mark's at Venice, and the certificate of the architect in charge of repairs for the Pisa Cathedral have been published in the Edinburgh Catalogue and cover all the facts which are held to be constructive in those buildings. The certificate of the architect in charge of S. Ambrogio at Genoa is also published in the Catalogue for the constructive facts held to establish the existence of a Renaissance leaning façade at Genoa. The certificate of the official architect of the City of Nimes has been published, covering the constructive facts observed in the Maison Carré at Nimes. Baron Henry de Geymüller, the architectural editor of Burekhardt's "*Cicerone*," has avowed his conversion to the thesis that the obliquities of the Pisa Cathedral are constructive. C. J. MacCarthy, City Architect of Dublin, has published an illustrated essay wholly favorable to my observations in Italian churches so far as they had been made known at the date of this essay, read before the Royal Institute of Architects of Ireland and published in the *Irish Builder* of Feb. 1, 1899. "*The Dictionary of Architecture*," edited for the American branch of the Macmillan Company by Dr. Russell Sturgis, contains an elaborate article on "Architectural Refinements," in which my name figures conspicuously as an authority on Mediæval work. Messrs. Heins & La Farge, who are the architects of the Episcopal Cathedral in New York (Mr. Heins being also the official architect of the State of New York), have introduced the Pisan refinement of varying size of arches into their design for this cathedral. Messrs. Gordon, Traey & Swartwout, of New York, have publicly announced their purpose of constructing vertical curves in the Episcopal Cathedral of Denver. Prof. Charles Eliot Norton, the Nestor of American art historians, is an avowed friend and supporter of the investigation. As for the very numerous reviews in architectural journals, none have been uniformly adverse except those in *The Builder*. With rare exceptions, all have been favorable without qualification. The *New York Evening Post* and the *New York Nation*, which are among the American journals of highest standing, have never given the investigation an unfavorable notice. Their articles have been numerous and are always written by experts. The leading art journal of Italy, *L'Arte*, reviewed the investigation in 1900 with an article of 4,000 words, which was favorable in every particular. The *Scotsman* and *Glasgow Herald*, in long articles written by architects, have welcomed the Edinburgh Exhibition as likely to bring about a complete revisal of the ordinary view of Gothic work. Personal recognitions, too, have not been wanting, such as the Honorary Master of Arts degree conferred on me by the University of Yale as a testimony of its appreciation of this investigation and an honorary membership in the Society of Architects of Rome, conferred also in 1904. I am far from suggesting that such an honor argues a universal acceptance by the Roman architects of all the results which I have announced, but it shows that in their opinion I have made important contributions to the study of Italian buildings. When this honor was conferred I had only five colleagues in this membership, and they were the Marquis de Vogué; Rohault de Fleury; Paul Wallot; Riccardo Velasquez y Bosco, Professor of Architectural History in Madrid, and Giuseppe Urioste y Velada, of Madrid. The fact that the Roman Society has limited its honorary membership to six names, and that I am the only English-speaking member, is not without significance.

There is still something to be said in this direction. In his adverse critique of Aug. 13, 1904, the editor of *The Builder* asserted the existence of perspective illusions in Mediæval architecture and even used them as an argument against the existence of the "widening refinement" in vertical lines. Presumably Mr.

Statham did not know that for twenty-five years I stood alone in the contention that perspective illusions were wide-spread in Mediæval building. In 1870 there was one solitary mention of one single Mediæval building in Europe as showing perspective illusion. In 1874 I announced that these illusions were found all over Europe. These illusions are recognized by Auguste Choisy and by Camille Enlart in their recent publications and are now accepted even by *The Builder*. Strange to say, we stand together in this most important point regarding Mediæval building. I am too well aware of the isolation in which I stood for twenty-five years on this subject to mind a little isolation in more recent observations. Time will tell whether I am in the right in other matters, as time has already told in the very first contention which I advanced for Mediæval building.

We come now to some few matters of detail which need clearing up in the article in *The Builder*. I have raised the question in my preamble, whether the reviewer's learning and comprehension of architectural and optical effects make his opinion in this matter one of weight or importance.

That Mr. Statham must have considerable learning is self-apparent, but it does not follow that he is an authority on the Greek Curves. Let us examine the case in some detail. We are told in this review that "the tendency of long horizontal or vertical lines in architecture is to look hollow; hence the entasis in the Greek column and the curve upward of the Parthenon steps."

How can a vertical line look hollow? The apparent concavity of a column is only established for columns which have a diminution. It has never been established for columns with parallel sides. This point has been explained by Thiersch in "*Optische Täuschungen auf dem Gebiete der Architektur*." Moreover, the good authorities add to their account of the entasis the statement that it does more than correct a concavity, that the curve is visible and was meant to be so. This is probably the first occasion, even in would-be critical literature, in which the entasis and the horizontal curves have been united in one explanation. Mr. Statham's ideas of the correction theories are rather confused, but let us discard his confusion of ideas and pin him to the wall on the point of the horizontal curves.

Did Penrose ever say that there was a tendency in long horizontal lines to look hollow? Certainly not. Penrose said that the entablature looks hollow *under the gable*, and was consequently curved, that the stylobate under the gables was curved to correspond. But when Penrose comes to the long horizontal lines on the flanks, he has no theory of correction based on the idea that a long horizontal line looks hollow or on any other idea. This is the reason that his gable theory has never been considered seriously by any Continental expert.

Did Vitruvius ever say there was a tendency in long horizontal lines to look hollow? Certainly not. Vitruvius said that the podium would appear to dish, if it were not curved upward. All horizontal lines and surfaces below the level of the eye tend to dish, and Vitruvius was probably speaking from the standpoint of a spectator standing on the platform, and the asserted fact holds optically here, of course. But Vitruvius indicates that the entablatures were curved to harmonize with the stylobate. He does not mention any optical concavity in these lines above the level of the eye.

Who are the foremost optical authorities on the Greek Curves? Beyond debate, Thiersch and Hauck.

Did Thiersch ever say that there was a tendency of long hollow lines to look hollow? Certainly not. Otherwise he would never have constructed his elaborate theory to explain the statement of Vitruvius, the theory which again was supplanted by the work of Guido Hauck.

Did Hauck ever say there was a tendency of long horizontal lines to look hollow? Certainly not. He explains that the curve of all horizontal lines above the level of the eye falls as it recedes, and his theory of the Greek Curves moves from the contention that they were intended to accent this appearance in connection with the narrowing of spaces in the columns next the angle of a Greek temple.

Hoffer was the first man who ever published on Greek Curves. Did he say that there was a tendency in a long horizontal line to look hollow? Certainly not. He preceded Hauck in the explanation that all horizontal lines above the level of the eye optically show curves rising towards the centre, and contended that the Greek Curves were intended to accent this curvilinear perspective.

Did Boutmy or Burnouf ever say that there was a tendency in

a long horizontal line to look hollow? Certainly not. They were the leading optical experts of France on this subject.

Did Burekhardt, or Kugler, or Schnaase ever say that there was a tendency in a long horizontal line to look hollow? Certainly not. Where, then, is this statement to be found? It does not appear in any standard authority on the Greek Curves. The idea appears to be working its way into some popular compendiums, and it is probably in them that Mr. Statham found it. It is perhaps a short and easy misapprehension of the explanations of Penrose or Vitruvius adapted to the popular comprehension which thinks that every horizontal line ought to look straight.

As an instance of the muddle-headed way in which *The Builder* presents its case, we contrast its treatment of the Egyptian curves in plan, which were surveyed by Mr. Pennethorne in the second temple court at Medinet Habou, with its treatment of the curves in plan of the Cloister of the Celestines at Bologna, which are illustrated in the Edinburgh Catalogue. Of the former *The Builder* says: "It would have been a logical refinement, indeed one is surprised not to have found it in the Parthenon." Of the latter *The Builder* says: "We have a view along the Cloister of the Celestines, Bologna, with a tape stretched along to show that the line is slightly hollow . . . it is the worse, not the better for being hollow." Now in both instances the curves in plan are found on all sides of a four-sided court, and in both cases they are all convex in plan to the centre of the court. If the Medinet Habou curves were photographed along the inner side of the top of the parapet the curves would naturally be "hollow," being photographed on their inner sides. If such a curve had been used in the Parthenon and a photograph were made of a line of columns on the inside of the portico the curve would be "hollow." In the case of the criticised illustration for Bologna, the Catalogue says of No. 6 (p. 1) "Curve in plan. Interior View." But the next number says "Curve in plan. Exterior View of the same curve," and here the same curve is convex instead of being "hollow." There is also an illustration for this exterior curve which is convex to the centre of the court, as at Medinet Habou. It is self-evident that whenever access can be had to both sides of a curve in plan it must be seen or photographed as concave or "hollow" on one side and convex on the other. But Mr. Statham says that the Egyptian instance would have been "a logical refinement," and "one is surprised not to have found it in the Parthenon." Of the Mediæval instance, which is identical, we are told that "it is the worse, not the better, for being hollow." Here as an architectural editor who appears to forget that curves in plan must have two sides, and that both these sides may be accessible and visible. It makes little difference whether Mr. Statham's argument is one of unprincipled recklessness or one of muddle-headed stupidity (in fact it might easily be both); his matter is still calculated to have its effect on readers who do not know the exhibits or the merits of the case. As an effort which is carefully calculated to have an effect, irrespective of truth, his essay might deserve considerable praise. The difficulty is that, in making the courteous concessions which one naturally makes for the man's honesty of purpose, he appears so impossibly stupid that one hesitates in forming an opinion as to what may be the real explanation of his handling of the subject. For readers who do not understand the exact subject-matter at issue, Mr. Statham has written a slashing and successful review. For those who do understand the subject-matter, he offers a sad illustration of the development in antiquarian research of a spirit which could hardly be tolerated even in a political partisan.

The Builder then continues, in speaking of the Cloister of the Celestines: "In our opinion it [the curve] is merely a case of careless setting out." The Catalogue says (p. 2): "These curves are uniform on all sides of the Court and they begin at the foundations." *The Builder* thus formally advocates the view that four curves in plan on four sides of a Court may all be convex to the centre as a result of careless setting out, but it is careful not to make the case plain to its readers that the curves are found in uniform direction on all four sides. The reader of *The Builder* will naturally take its view as correct, not knowing the true conditions.

The Builder says: "Mr. Goodyear shows us triumphantly the fact that the façade of St. Mark's generally taken as flat, has a horizontal curve inward of 10 inches. Suppose it has, what the better is it for that. It is simply making a natural optical defect worse." This "natural optical defect" is the supposed "tendency of long horizontal lines to look hollow." It has already been shown that no optical authority on ancient curves has ever suggested that this tendency exists. The lower front façade of St. Mark's certainly does not look hollow on its upper line. I have examined this

line time and time again and always with the conviction that it is oblique in elevation from the centre downward in both directions. However this may be, the curve in plan of the lower façade of St. Mark's certainly cannot be brought inside any theory of optical correction, but this is the whole bone of contention of the investigation which is represented by the Edinburgh Catalogue, as far as the Mediæval curves are concerned. The Catalogue says of the curves at Bologna (p. 5): "The only available explanation of these curves must, therefore, be an historical tradition of an artistic perception (one or both) which conceived of the curve as inherently more beautiful and interesting than the straight line. It is also evident that the optical contradictions of effect for various heights of one given curve must tend to produce a certain effect of vibration, of 'life.'" The Certificate of Commendatore Saccardo says (p. 77): "It is likewise known that the principal façade of our Basilica is constructed with an inward curve in plan." This is the only vital point at issue. It is the general position of the Edinburgh Catalogue that if a sufficient number of constructive instances be cited the theories about curves and all other refinements will take care of themselves, and that the establishing of these constructive facts is, for the present, the important issue. The personal likes and dislikes of Mr. Statham, based on the examination of some small Catalogue illustrations, will probably find their proper level whenever the constructive facts are generally admitted and considered with reference to their effects in the original monuments.

There is one feature of the Greek refinements, generally held to be established by the measurements and conclusions of Penrose, which is rejected by the editor of *The Builder* in the following terms: "Some minor details, such as the slight difference in the metope openings, which Penrose measured and figured, we have always declined to believe in as intentional or of set purpose, because they display no guiding motive or principle and serve no intelligible purpose; we can only think that Penrose, logical and clear-headed as he was, suffered to some extent from the weakness incident even to able men," etc., etc.

It is interesting that Mr. Statham should never even have heard of the generally accepted and thoroughly intelligible reason for the variations of the metope spaces, but let us accept his point of view and consider the results. Penrose has given good reasons for fixing the margin of builder's error in the Parthenon at one-fiftieth part of a foot (0.02) and for announcing the 4-inch variations in the metope spacings as intentional. The difference of 0.02 in 101 feet "points out the degree of error which may have arisen from the inaccuracy of workmanship in the Parthenon." If, however, Mr. Statham is correct the "margin of builder's error" in the Parthenon must be 4 inches in somewhere about 4 feet. In other words, while Penrose states that margin to be about 0.02 Mr. Statham maintains that it is about 4 inches. Now, the margin of builder's error at Wells is 0.03, with two exceptions, which rise only to 0.08. At Salisbury the extreme variation in opposite arches of one bay is 0.04, and the extreme variation in sequent bays is 0.09. In Norwich Cathedral the margin of error is 0.02, with one exception of 0.39. At Ely the extreme error in opposite arches is 0.22. At Lincoln it is 0.34. At Durham it is 0.08.

Thus, the unlooked-for result of Mr. Statham's contention would be to prove that the Mediæval builders of England were, in many cases, more accurate than the Greek builders of the Parthenon. The same result holds for Mediæval Italy, where the limit of builder's error has been fixed for many churches at less than 4 inches. If, then, Mr. Statham is prepared to admit that Mediæval buildings were frequently superior in accuracy to the Greek, should he not pause before he sweeps away the suggestion of deliberate "asymmetries" as unworthy of consideration?

The Builder says: "There is no historical connection between the refinements of the Greeks and those which Mr. Goodyear claims for the Mediæval and Renaissance architects." The Catalogue preface expressly states that it was the Renaissance style which overthrew the Mediæval refinements. The Catalogue also specifies Renaissance survivals of such refinements as being of extreme rarity.

The Builder says: "Between the Greeks and the Mediæval period is an interregnum of absolute intellectual darkness; a gulf across which nothing could be handed down." Such a statement could be penned only by some one ignorant of what is the common property of every student of Byzantine history. It also betrays ignorance of the studies of the Classic revival in Byzantine art and of the disposition of recent scholars to connect the Classic revival, as represented by Nicolò of Pisa, with the remarkable (though little known) Byzantine sculpture of South Italy.

The Builder says: "Everything is pressed into service by Mr. Good-year's theory; he sees curves every-where."

The Builder says: "Illustration No. 174, showing the front of the north gallery of St. Mark's, is labeled 'Curve in Elevation.' There is no such thing as a curve to be seen."

Who is more reliable, the editor, possibly looking at a 4½ by 5½-inch cut, and certainly refusing to look at a 25 by 35-inch photograph, or the architect who was daily in the church for forty years and who is writing a certificate for publication?

The Builder says: "There is no evidence of intention."

The Builder says of the bending verticals: "St. Mark's is a church tumbling about every way from bad foundations and we are asked to believe that all this is the result of forethought and contrivance."

The Builder says: "St. Mark's is a church tumbling about every way from bad foundations."

The depressed vaulting over the entrance gallery is the only one which is claimed to have settled at the crown, and it is the only one of those spanning the nave for which repairs have been undertaken or are proposed. None of the arches supporting the domes have settled at the crown, and these are the ones to which Commendatore Saccardo's certificate refers. The anxieties of the present architects in charge, aside from the vaulting at the entrance, are mainly based upon some instances of shrinkage of the wall masonry back of the casing, due to the use of large quantities of mortar. As to the pavement, whatever may be thought of its undulations, and many of them are distinctly accidental, it should be remembered that these undulations are in surfaces sustaining no weight, and for obvious reasons not as carefully founded as the lines of the walls and piers which support the domes and vaultings. The absence of undulations in the lines of piers and walls speaks for carefully constructed foundations. Until the Venetian architects in charge have announced that the church is suffering from bad foundations, it may be as well for an editor in London to reserve his judgment on this point.

The Builder says: "Looking through Mr. Goodyear's catalogue and his comments, it seems that any deviation from the straight line anywhere, whether inward or outward, is to be taken as evidence of artistic purpose; any bad setting of a plan or any break or irregularity in a plan, possibly due to some local difficulty in the site, is to be regarded as an instance of the adjustment of lines for architectural effect."

And again: "But what is there consistent or intelligible in the medley of distortions of all kinds which Mr. Goodyear brings before us . . . There is no principle whatever in them."

The Builder says: "A series which looks regular but is found on measuring not to be quite so, only conveys the impression of clumsy or careless workmanship."

[Rather hard judgment, one would think, on the inter-columniations of the Parthenon as measured by Penrose.]

Then there is the matter of the "widening effect" in Mediæval verticals which The Builder says would counteract perspective, but in this, as in other matters, I have given sufficient answer in the *Architectural Record* for December, 1904, to which I refer any one who thinks it worth while to follow up further so nebulous a case as Mr. Statham's.

I am sir, yours obediently,

W. H. GOODYEAR.

The Catalogue says: "Curves in elevation are extremely unusual in mediæval building, being almost wholly confined to the Pisa Cathedral and St. Mark's at Venice, as far as known to these surveys" (p. 35).
Commendatore Pietro Saccardo says (p. 77 of *The Catalogue*): "The parapets of the galleries . . . are distinctly curved in elevation and with a rising convexity."

Commendatore Saccardo says: "The occurrence is too uniform to be accidental."

Commendatore Saccardo, whose surveys of the foundations have been published by Boito and by Mothes, says: "The interior piers supporting the larger domes lean inward (in the downward direction), thus considerably increasing the chord of the arch as compared with the distance between the bases, without any settlement or distortion of the arch, which proves that they had been originally built in this manner."

The architects now in charge say that the foundations are in excellent condition and very carefully laid, consisting of nine vertical feet of massive blocks of masonry resting on piles (and not on a mud raft, as is the case with the Doge's Palace).

The Scotsman, of Sept. 2, voices the situation correctly when it says: "It is not suggested by Mr. Goodyear that every crooked wall or every deflected column or every discrepancy of spacing in doors or windows or arches is intentional. The suggestion made is that we have been in the habit of attributing wholly to accident what now appears to be largely deliberate. When the two main factors are eliminated, i. e., carelessness either in setting off or in construction, and settlement, bulging or deflection of walls or piers, or other variations from the normal caused by insufficient foundations, earthquakes or other causes acting through the lapse of years—there remains a considerable residuum which is difficult, if not impossible, of explanation, by any cause except intention, on the part of the builders."

"The aim was, no doubt, those effects which actually result and which may be summarized as (1) an avoidance of hardness and monotony; (2) a pleasant mystification of the eye; (3) perspective illusions resulting in an added grace or interest."

Auguste Choisy says (Vol. II., p. 412, of his recent *Histoire de l'Architecture*): "D'une manière générale les architectes du moyen âge évitent la froide régularité. S'ils admettent pour l'ensemble un parti symétrique ils savent rompre la monotonie de ces détails qui se diversifient à l'infini."

P. S.—The following references to works dealing more particularly with Greek refinements and the optical considerations involved in them may be desirable:

Hoffer: *Wiener Bauzeitung*, 1838.

Thiersch: "*Optische Täuschungen auf dem Gebiete der Architektur*"; *Zeitschrift für Bauwesen*, Vol. xxiii, 1873.

Guido Hauck: "*Die Subjective Perspektive und die Horizontalen Curven des Dorischen Styls*."—Stuttgart, Konrad Witter; 1879.

Boutmy: "*Philosophie de l'Architecture en Grèce*," 1870; republished later as "*Le Parthenon et le Génie Grec*."

Burnouf in *Revue de l'Architecture*, 1875; also

Schnaase: "*Geschichte der Bildenden Künste*."

Kugler: "*Geschichte der Baukunst*."

Burckhardt: "*Cicerone*."

ILLUSTRATIONS.

THE THOMPSON MEMORIAL CHAPEL: WILLIAMS COLLEGE, WILLIAMSTOWN, MASS. MESSRS. FRANCIS R. ALLEN & CHARLES COLLINS, ARCHITECTS, BOSTON, MASS.

SECTIONS OF THE SAME.

HACIENDA OF MRS. PHEBE HEARST, REAR VIEW, PLEASANTON, CAL. THE LATE A. C. SCHWEINFURTH, ARCHITECT.

GATEWAY TO THE SAME HACIENDA.

DINING-ROOM IN THE SAME HACIENDA.

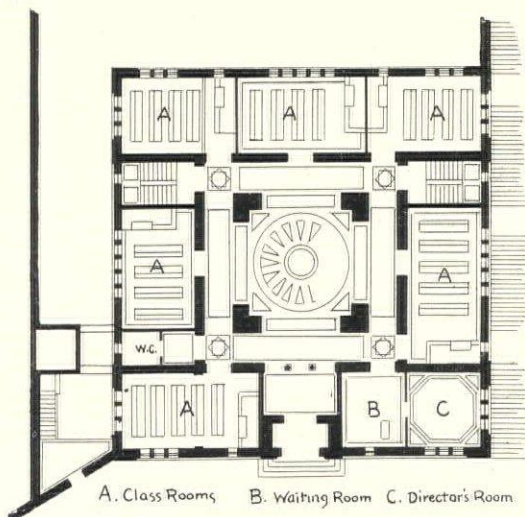
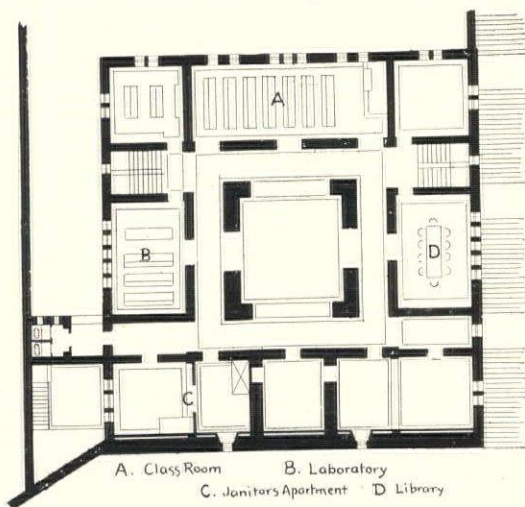
EL EMPERRADO AND FRONT VIEW OF THE SAME HACIENDA.

Additional Illustrations in the International Edition.

THE AMERICAN INSURANCE COMPANY'S BUILDING, NEWARK, N. J. MR. CASS GILBERT, ARCHITECT, NEW YORK.

SCHOOL-HOUSE: "LA NOUVELLE MEDERSA," ALGIERS, ALGERIA. M. PETIT, ARCHITECT.

Unfortunately, we have mislaid the copy of *La Construction Moderne* containing the description of this interesting building, and all we can recall now is that particular pains were taken



to make the building as cool and free from the glare of tropical sun as possible, and that in the lower story this desirable end

was assisted by the lay of the land, some of the rooms falling below the ground level of the site.

HOUSE OF HERR RICHARD SCHULTZE, ARCHITECT, SCHLACHTENSEE, GERMANY.

These views are copied from *Blätter für Architektur*.

NORTH FRONT: ROYAL LAW COURTS, BERLIN, PRUSSIA. HERREN P.

THOEMER AND O. SCHAMLZE, ARCHITECTS.

This and the following plate are copied from *Zeitschrift für Bauwesen*.

NORTHWEST TOWER OF THE SAME.

ST. OSWALD'S CHURCH-HOUSE, OSWESTRY, ENGLAND. MR. E. C. FRERE, ARCHITECT.

This illustration is copied from *The Architect*.

CHOIR-STALLS IN THE CHURCH OF THE ABBAYE D'AVORBODE.

This illustration is copied from *L'Emulation*.

CHURCH AT SPRINGFIELD, WOLVERHAMPTON, ENGLAND. MR. C. R. ASHBEE, ARCHITECT.

This plate is copied from *The Building News*.

CHURCH OF SS. ANDREW AND PATRICK, ELVEDEN, ENGLAND. MR.

W. D. CARÖE, ARCHITECT.

This subject is copied from *The Bristol Architect*.

NOTES AND CLIPPINGS.

A CASE OF SUCCESSFUL PROFIT-SHARING.—The United States Consul at Victoria, B. C., reports a scheme of profit-sharing, conducted by the British company operating the street railways and lighting plants in that section, which is working well. After paying 4 per cent. on the stock the balance of net earnings is divided into three parts, two of which go to the stockholders and one to employes of more than a year's standing in equal amounts to each—a track-greaser receiving as much as goes to the general manager of the company in London. In 1903, the first year of trial, a sum equaling \$25 per employe, was divided; the next year \$35, and for this year the division, which has just been made, amounts to \$40.—*Exchange*.

VELASQUEZ'S "VENUS WITH THE MIRROR."—Belated efforts are being made for the retention of Velasquez's Venus in England. The Treasury officials have been consulted respecting the possibility of obtaining a government grant for the purchase of the picture with or without private subscription. The price paid for the "Venus with the Mirror" is reported to be £36,500, but the syndicate now owning it has refused £50,000, and is expecting to get £70,000, if not more. The Trustees of the National Gallery might have had it for less than the syndicate paid for it, but, although informed that it would soon be in the market, neglected to secure it. By a similar lack of energy they allowed the chance of buying Titian's portrait of Ariosto for £10,000 to pass and eventually were forced to pay £30,000, with the help of the generous subscriptions of Mr. Astor and other patrons of art.—*C. I. B. in N. Y. Tribune*.

LIGHTHOUSES AS PERSONAL MEMORIALS.—In view of the many terrible shipping disasters that are taking place, as usual at this time of the year, along the storm-beaten coasts of America and of Europe, especially of the British Isles and of France, it may be timely to put forward a recommendation that memorials to famous citizens should take the form, not of statues that are altogether abominable from an artistic point of view, nor yet of meaningless granite shafts, purposeless columns or arches that are invariably out of keeping with their surroundings, but should find expression in lighthouses. Several have been constructed on the most dangerous portions of the French coasts of Normandy and of Brittany as memorials to famous soldiers whose names they bear, names that are blessed on many a stormy night by sailors at sea and by their anxious relatives on land.

One of the most notable of these lighthouses is that at Penmarch, on the coast of Finistere, and which is known as the Eckmuhl lighthouse. It owes its existence to the enlightened generosity of the late Marquise de Blocqueville, who, at her death, bequeathed to the French Government a sum of \$80,000 for the construction of the lighthouse. She was the only daughter and heiress of one of the first Napoleon's finest generals, Marshal Davoust, Prince of Eckmuhl and Duke of Auerstadt, and was

of the opinion that there could be no better monument to her illustrious father than one which would save the lives of sailors at sea. The lighthouse has an electric beacon, projecting rays over the sea to a distance of sixty miles, and likewise contains a very powerful fog-horn, worked by compressed air.

The marquise was one of the beauties of the court of King Louis Philippe, and likewise a conspicuous figure in Parisian society throughout the Second Empire and until her death. She was one of the few great ladies of Paris who remained in the French capital during the Commune of 1871, and when some of the insurgents came to her mansion to plunder she pointed to her father's portrait, calling their attention to the fact that he was not merely a hero of the Empire, but likewise of the French people. The men were moved by her behavior, and after she had given them food and money they went away, taking steps, however, to preserve her from any further molestation as long as the Commune lasted. When it came to a close she not only concealed one or two of the chiefs from the federal authorities, but likewise allowed them a pension until their death.—*Marquise de Fontenoy in N. Y. Tribune*.

NELSON COLUMN, TRAFALGAR SQUARE.—During the recent commemorative decoration of the column, the opportunity was taken to again examine the condition of the fabric. It is found that the column is in need of being repointed, and that the arm of the figure is cracked, though not very seriously, above the elbow. The necessary repairs will be executed by the Office of Works, and the capital of the column, which was filled with pigeons' nests, will be cleaned. The column was built, in 1839-52, by W. Railton, who, in his design (chosen in competition in January, 1839), followed the proportions of a Corinthian column of the Temple of Mars Ultor, at Rome. It is constructed of granite from Foggin Tor, Devonshire; the graduated stylobate of the pedestal rests upon the frustum of a brickwork pyramid, 48 feet square at base and 13 feet high, which is supported by a 6-foot layer of concrete in a stratum of clay about 12 feet below the surface. The contractors, Grissel & Peto, devised a special form of scaffolding for the building operations. The capital was cast from old guns in the Woolwich Arsenal foundry from full-sized models prepared by C. H. Smith. No plugs were fixed into the work, the foliage being secured to the bell of the cap by means of three large metal belts laid in grooves. The statue, carved by E. H. Baily, R. A., and with scrupulous care in every detail, is in two blocks of Craigleith carboniferous sandstone, given by the Duke of Buccleuch. With its plinth it measures 17 feet in height, and was raised on November 3-4, 1843. The column is 145 feet 6 inches high to the top of the capital; its diameter increases from 10 feet 1¾ inches at the base to 11 feet 7¼ inches at the summit. The four bronze reliefs are by W. F. Woodington, "Battle of the Nile"; C. E. Carew, "Death of Nelson"; J. Ternouth, "Bombardment of Copenhagen," and Watson and Woodington, "Battle of St. Vincent." The column cost £23,000; the statue, capital and reliefs cost £25,000, and Railton was paid £2,000. The four lions, by Sir Edwin Landseer, R. A., were uncovered on January 31, 1867. His studies for the lions, first sketched in the Zoölogical Gardens, were bequeathed by the late Mr. T. G. Hill to the National Gallery. In Ternouth's bas-relief, on the east side, the figure of the sailor supporting a wounded boy is modeled after the figure and features of Thomas Hopper, architect. Some minor repairs of the stonework were made in 1896, upon a report by Mr. Harrison, the "steeplejack" of Sheffield. Mr. W. Larkins made the present initial examination of the structure.—*The Builder*.

A NEW PROCESS OF REGENERATING RUBBER.—A European process of regenerating old rubber has for its principle the separation of the caoutchouc proper contained in vulcanized rubber from the mineral and other matter which have been incorporated into it, such as sulphur, etc. The first operation consists in dissolving the vulcanized rubber in one of the usual solvents, using petroleum preferably either alone or with benzene added to it. After treating for a certain time the insoluble matter is separated by filtering under pressure, or by a centrifugal machine. The solution when separated from the insoluble matter is evaporated to the consistence of syrup under a reduced pressure and is then taken up by acetone. The liquid which is thus obtained is first boiled and then decanted off and the rubber is again taken up by an alcoholic soda solution. After boiling and pouring off a second time, the rubber is treated with boiling alcohol. After the alcohol is taken off the rubber is washed with water and then dried by superheated steam, which removes the last trace of alcohol and water it may contain.—*Scientific American*.

The American Architect and Building News

VOL. LXXXVIII.

SATURDAY, DECEMBER 30, 1905.

No. 1566.

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A NATIONAL gallery of fine arts established and conducted by a series of "executive orders" would be an interesting curiosity, but it could hardly be anything more. We have already recorded the action of President Roosevelt in the matter of the Harriet Lane Johnson paintings, and have now to mention that he has written a letter taking to task the Regents of the Smithsonian Institution because they have not at once accepted the offer of the Chinese, Japanese and Whistler collection offered by Mr. C. S. Freer, of Detroit. As usual, the President's letter bristles with unnecessary superlatives. Mr. Freer's offer is "magnificently generous," and the conditions he imposes are, "of course, eminently proper," because "the gift is literally beyond price," seeing that these collections are "unique," containing, as they do, "hundreds of the most remarkable pictures by the best known old masters of China and Japan." If the Regents are unmoved by this warmth, the President informs them he will be "obliged to take some other method" to secure to the nation this "literally priceless" gift. If the matter were not really of serious interest, these fantastic utterances would be merely laughable; but there is too much chance that the novel doctrine of doing unwarrantable acts by "executive orders" may do a serious mischief in this particular case, and we feel we ought to do our part toward presenting the other side.

ADMITTING that the Freer collections are "unique" and "priceless," it is none the less true that there are hundreds of other collections just as unique and just as priceless, and many, perhaps all, might eventually be offered to the Government on the conditions named by Mr. Freer—conditions which are generous or ungenerous according to one's point of view. Mr. Freer names as his chief conditions that care and maintenance of his collection, in unenlarged and undiminished state, shall be given in perpetuity within a building which he will erect at a cost of not less than half a million of dollars, and that "collections and building shall always bear my [his] name in some modest and appropriate form." Now what are these collections which are to remain unaltered so

long as the Government endures? They consist in a sprinkling of Whistler's oil paintings, his "Peacock Room," a fairly complete set of his etchings—of which there are other collections practically as complete elsewhere—and a collection of drawings by Japanese and Chinese artists which can be accepted as unique, curious and interesting, and probably as having a considerable general art value. But, all told, they can provide but a modest furnishing for a half-million-dollar building, all the rest of whose vacancy can but resound with Mr. Freer's name. The desire to perpetuate one's name, which takes on so many varied aspects, is an amiable one, and generally does no harm; but in this particular case we hold that harm will result, since the acceptance of Mr. Freer's gift would establish an unfortunate precedent, and we do not believe that Washington should be "improved" by, or a national Gallery of Fine Arts be constituted of, a series of buildings, however grouped or wherever placed, each containing a separate and miscellaneous collection which must be kept undisturbed in perpetuity for the real glory of the name of the collector. Mrs. Johnson demanded a separate and "unheated" gallery for her beloved paintings; Mr. Freer demands a separate building of a stated cost, and subsequent seekers for posthumous glory are not likely to be more modest. The President's uninstructed exhortations fly in the face of the judgment of modern museologists, who every day more and more doubt the wisdom of accepting gifts and collections of which the maintenance in undisturbed perpetuity is a condition precedent.

THE various museums of fine art seem just now to be in a very disturbed condition. The affairs of the Metropolitan Museum are fairly in the way of satisfactory adjustment and progress, but the Boston institution is for the moment headless and struggling with questions involving general principles of purpose and management. At the same time the Pennsylvania Academy of Fine Arts is the scene of a struggle to secure a place on the directorate for Mr. Harrison S. Morris, who, after having for some years been managing director—and a most successful one—retired from the board early this year, but who now seeks re-election and justification at the coming annual election.

IT is a relief to know that Mr. Isaac A. Hopper has placed his resignation as Superintendent of Buildings of New York in the hands of the Mayor-elect. It is not easy to comprehend how a builder of Mr. Hopper's proved capacity has been able during so short a term of office to create in the community so general and seemingly so well-deserved a doubt of both his ability and his integrity of purpose. If he is purely the victim of chance, he has our commiseration.

WE learn that the competitive designs for the Carnegie Peace Palace are not to be handed in until April 15 next, a month later than was originally suggested in discussing the programme

A TOO-VAULTING AMBITION.

DISCONTENT is a sort of mental crow-bar that reformers, real or factitious, have at divers times found ready to their hand when they felt that the car of progress needed to be pried out of the ruts of routine and convention. But the spirit of discontent marks the reformer no more truly than it signalizes the mere iconoclast and aimless mischief-maker, while its possession makes each class equally vociferous with the other, and mere clamor, as every one knows, often makes a great impression upon the unthinking public. The members of the Society of Beaux-Arts Architects, a small—if select—body of young men, are discontented, and because of this have found themselves inspired to adopt the rôle of reformer and have vocalized their ambitions. The newspaper editors, whose ears are always attentive to clamor, have hearkened, and to the complaints of the aggrieved have added certain glosses of their own and have then spread the crude and ill-digested results broadcast in a final form that the original sponsors of the reform perhaps hardly recognize. The result in this case is that the public is given to understand that, over-night as it were and without warning, a vast and beneficent revolution has been accomplished, the first fruit of which is the birth of a "National School of Architecture," to be managed by the members of the Society of Beaux-Arts Architects—or by some of them, while the second offspring, promised to see the light after the shortest possible period of gestation and parturition, is to be an "American Style of Architecture"! Further, the public gains the understanding that the sponsors and conductors of the several existing schools of architecture, having been weighed and found wanting by the reformers, have been invited to abandon their work and surrender it, with all equipments and endowments, into their more competent—if younger and less-experienced—hands. Never, seemingly, was a great, perhaps a needed, reform so easily accomplished!

The members of the Society of Beaux-Arts Architects, of which Society the present writer has been a member since its foundation, are not, of course, responsible for all the exaggerated statements that have appeared in the daily press, but they have a large responsibility for it and presumably have no desire to shirk it. They have a right, if it please them, to entertain a spirit of discontent whether it be well or be ill-founded, but they have a justifiable right to undertake a reform only in the case that the foundation be sound, not if they are proceeding from faulty premises. It is because, to the writer, the premises seem so mistaken, so full of flaws, that there may be a usefulness in attempting a discussion before the work of erecting an ambitious system of instruction in architecture is actually begun, before much breath is spent upon a bubble which, though it may glitter, may be so easily punctured and collapse.

The Society is dissatisfied with the results accomplished by the architectural schools, is convinced that the system—really sufficiently various—therein followed is wrong, and asserts that the chairs of architecture should be filled not by professors and teachers who give their whole time to educational effort but by practising architects who will, and can, give to the task but a part of their

time. Thus baldly stated—and the gospel of discontent consists mainly of these three chapters—the contention bristles with misapprehension and false premises. The profession generally, and not this particular Society alone, has long expressed a selfish dissatisfaction with the architectural schools, because these did not turn out finished *draughtsmen*, ready, immediately after graduation, to take up daily office-work in a manner superior to that habitual with the office-bred draughtsman and commensurate with their assumed greater intellectual capacity. Here is one false premise. The aim of the architectural schools is not to produce draughtsmen, but to educate eventual architects, and the success or failure of their undertaking can, we think, be established by enquiring whether the majority of their pupils—say, five years after graduation—are to be found working as draughtsmen or practising independently as architects. Further, the complaints filed against the schools take no account of the extremely difficult and unusual condition with which the conductors are confronted, a condition which, in a less degree, has been an ailment afflicting all professional schools, but one which in recent years some of the higher universities have made head against by admitting to their professional schools those only who already hold a bachelor's degree. In the architectural schools always, and still, we find college graduates of twenty-two or three beginning their architectural studies on an equality with high-school graduates of seventeen or eighteen, and for this uneven and ill-matched material a course of instruction has to be devised that will, so far as practicable, do even-handed justice to all. Give the teaching-force a class of college graduates or a class of high-school graduates to handle and it is as possible that the resulting output might be better as it is certain that the methods would not be what they now have to be, because of the necessity of handling as a class material of such uneven quality. The too-common fault-finding of the profession comes from those who do not understand the real problem or begin to appreciate how successfully the school teaching-force is answering to its opportunities.

Equally unreasonable is the sneering remark directed at the members of the teaching-force who often have been roundly rated—behind their backs—for presuming to give instruction which, it is alleged, only practising architects are competent to give. These thoughtless critics conveniently forget that at this moment several professors of architecture are still in active practice, while others before entering on their professorial duties had had a longer career in practice than, say, most of the members of the Society of Beaux-Arts Architects.

Whether or no a given man may be a good teacher of architecture depends upon other things than the length or activity of his practice, other things even than the command of more learning than is possessed by the average man. It is the humble drill-sergeant, not the colonel, who turns out the perfect soldier. There is many an architect in active and successful practice who, whether because he can't or because he won't, is quite incapable of becoming a satisfactory instructor of architectural students. What, within a few years, has happened at Cornell has distinctly a bearing on this point. There the authorities

felt that a change was desirable and they twice sought as the head of their school of architecture a practising architect, only twice to find that, for one reason or another, these practising architects, after a short experience, preferred to throw up their jobs and return to the active practice of their profession. Poets are not the only ones who have to be born, and certain occupants of chairs of architecture are not less rightfully in their places because their practical experience as practising architects has been somewhat slight.

Suppose, for a moment, that the Society of Beaux-Arts Architects carries out its real programme, not the newspaper one: it will surely be found that, of those of its members who undertake to give instruction, the ones who make most impression upon the pupils and do them the most good are not the members who swing the largest and most successful offices, but simply and baldly those endowed by nature with the pedagogic sense, and particularly those who take an interest in the human material they are trying to mould and influence. There is a great deal of insincerity in this criticism of teachers, and it is a false premise to assume that, after a practising architect becomes a teacher or professor, he at once loses those practical qualities of mind and perception once sharpened amid the conduct of affairs. Speaking of insincerity, it seems not outside the limits of possibility that this educational movement on the part of the Society of Beaux-Arts Architects is lacking in desirable elements of sincerity; that, in place of being a liberal and broad-minded philanthropic educational movement, it is really a narrow and intensely selfish one.

Go back a few years only—for the Society is not very old and the fashion of flocking in numbers to Paris is not very antiquated—and what do we find? We find this, in the years before the Society was established: we find, coming back to practise in America, a small body of young men who went to Paris to study their profession while their architectural gristle was still green and the marrow of their habits still fluid. During their years of absence, gristle and marrow had set and become indurated with foreign growths and fibre. Their absence had been long enough to cause them to forget what habits and forms of American office practice they ever knew. In consequence, they found themselves handicapped: they could not make the draughtsman they employed understand what was meant by the jargon of *atelier* terms that had become habitual to themselves. As a remedy, the earlier of these returning *émigrés* first imported French draughtsmen, former companions in the Paris school, and so long as it was merely a matter of having instructions understood and followed, so long as it was merely a matter of making drawings, the remedy was efficient; but when it came to carrying out the work in building-materials, the French draughtsmen were even more heavily handicapped than their Gallicized American employers. The second remedial step, which followed logically, was the founding of the Society of Beaux-Arts Architects and the establishing of the classes it conducts, wherein draughtsmen can be trained to understand, at second hand, the ideas and methods to which their employers have become habituated during their own period of for-

ign pupillage—ideas and methods which are French, not American, ideas and methods which it is an impertinence to foist upon the public or on the raw material of the profession as "American."

The members of the Society of Beaux-Arts Architects are convinced, enthusiastic, combative, discontented—but, on the average, young and not very numerous. If by working together, on an organized scheme, they can succeed in overshadowing all the other architects, variously educated, in New York City, and can create a standard type or "school," in the sense that one speaks of the "School of the Isle de France," for instance, one would think the achievement a sufficiently ambitious one to which to aspire, and that they would be content to allow other "schools" of design and practice to grow up in other parts of the country, centering about the present established institutions of architectural education, and hence would not attempt to reduce the entire output to the deadly uniformity which a National School of Architecture, if successful, would certainly accomplish.

There is much in the educational undertakings of this Society that deserves commendation and support, particularly the attempt—whether actually merely self-interested or really philanthropic—to give effective instructional aid to those whose lack of means debar them from a three or four years' course in a regular architectural school.

What we cannot understand at all, however, is the sort of supineness or pusillanimity with which the conductors of the architectural schools seem impelled to yield to the encroachments of these self-elected educators, and seem inclined to confess abjectly that they have all along been working mistakenly and in the dark.

At the present moment the entire educational community is involved in an animated discussion of that chiefest of educational matters—foot-ball, and it seems to be the consensus of opinion that the root of the evil is to be found in the fact that the game would die if publicity and gate-money should be eliminated, and that, hence, these must be maintained, no matter how many players are killed and maimed.

In like way, we believe that "gate money," as it were, is at once the cause of the success the Society has hitherto had, and that at the same time it constitutes the germ of a very vicious growth. This urging of youth to perform in public for applause and honors publicly bestowed, the too-zealous pursuit of which is felt to be so injurious to the final usefulness of the foot-ball gladiators and their backers, is just as mistaken when gladiators of a different fibre are urged to make "show drawings" with an eye single to catching the applause of that smaller public before whom they perform.

The usefulness of cloistral study and a more secluded effort has not yet been disproved by the Society of Beaux-Arts Architects.

As to the broad general question whether the tenets, theories and practices of a given profession are best taught by those who give their time to practice, not to study, there is much that can be said on either side. It is needful to recall, for instance, that the best artists are

not always the best drawing-masters; that the best pleaders are not those who know the most law. It is well, too, to remember that, until comparatively recent times, the matter of architectural education in England has remained exclusively in the hands of the practising architect, and the result has been—what? There has been produced a body of expert and practical draughtsmen—none better to be found anywhere, but the members of the Society of Beaux-Arts Architects will be amongst the first to protest that, whatever the method of instruction, there have been produced in England few architects and less architecture—judged by Beaux-Arts standards.

Instruction in engineering in this country does not rest in the hands of practising engineers, but exclusively in the hands of school men and professional teachers, who may or may not have had long practice in the field. Yet the graduates from these schools make their marks amongst the ablest of the engineers of all nations. It is the same with the law schools as with the engineering schools. In the case of the medical schools there seems at first sight a difference, and the fact that so many occupants of chairs of therapeutics, anatomy, gynecology, surgery, etc., are carrying on active private practices makes it appear as though it really were practising physicians who had perceived the need for, and hence had undertaken to supply, instruction in medicine. The true fact is—as true in the case of medicine as it is with the other professions—that it is the general educational body, faculty or corporation, that undertakes to supply education. The curious fact that so large a percentage of the teaching force of medical schools is still engaged in private practice can only be accounted for by remembering that those bound by the Hippocratic oath are men apart—men who acknowledge demands of conscience and principle that do not affect others—men who, having in large degree mastered the secrets of life and death, feel they have no moral right to hold their hand and abstain from relieving human suffering simply because a few hours of their time—well-paid hours, too—are occupied in delivering lectures at a medical school. The medical profession has not taken, and never will take, possession of the medical schools or found a national school of medicine in the sense that the would-be architectural reformers understand such matters.

As to architectural instruction, it is a false premise to assume that, to-day as in the past, the body of practising architects is or has been without influence on the various architectural schools. Apart from the fact that in the appointment of the members of the teaching force the college faculties and corporations consult freely with the practising members of the profession, it may easily be shown that there is no architectural school that does not attempt to avail itself of such aid and counsel as the practising body is willing to give. There is none of these schools that does not habitually invite practising architects to deliver courses of lectures on selected topics, and, alas! there is not one of the schools that has not had to regret, now and again, having extended such invitations, so painfully ineffective have been the results of the most painstaking and well-intentioned of efforts; for again and again it has been proved that, occasionally,

men who have become noted as practising architects did not know how in the lecture-room to impart the desired and expected information, and this simply because they were lacking in the pedagogic sense.

Although it is certain that the methods employed in the schools might be bettered, it is as certain that no one of them is not continuously making efforts to produce better results. And it is equally certain that the average graduate from an architectural school may as rightfully be entrusted unaided with the conduct of a large building enterprise as that the average graduate from a law school be allowed to manage a great corporation case, or a new graduate from a medical school be put in sole charge of a sick patient upon whose life or death millions depend. Practising lawyers and physicians do not expect the schools in which they are interested to turn out full-fledged practitioners, competent in every particular. Why, then, should practising architects regard the architectural schools with less kindly eyes? We do not assume to argue that these schools are "all right," but we are certain that they are not so far astray as some people would have it appear.

THE SCHOOL OF ARCHITECTURE, COLUMBIA UNIVERSITY.

AMONG recent changes in the organization and administration of the School of Architecture of Columbia University which has chiefly attracted attention is the establishment of what is commonly called "the atelier system," under which the University maintains, in addition to the draughting-room in its own buildings, two others near the offices, respectively, of M. C. F. McKim and Mr. Thomas Hastings, under the general supervision of these distinguished architects. But this is only one feature of the reorganization of the instruction in architecture. Of even greater importance, from an educational point of view, is the adoption of the system of "points" in the requirements of the curriculum and the registration of work done by the student. By this system a standard of quality is substituted for a standard of quantity, and this is a vital and fundamental change of principle. It was first introduced, tentatively, in the work in advanced design, two years ago, but has now been applied to the entire curriculum of the School of Architecture, abolishing, finally and completely, the old tradition of an inflexible four years' course and the "passing mark of 6." As far back as in 1899 or 1900 Professor Ware, then at the head of the school, had announced his determination to bring about this result. He sought to encourage, in every possible way, the idea that the four years' course was merely an administrative convenience, and that the student who failed to "graduate with his class" was often the wise man who preferred doing his work well and deliberately, to doing it hurriedly and ill. Before his resignation, in 1902, he had made some inroad upon the ancient superstition. But it required a radical change of administrative method to accomplish the reform, and the solution of the problem was found in the registration of proficiency by points or credits. These are given for proficiency in each branch of study, the number depending mainly on the number of hours per week devoted to the study. In all lecture subjects proficiency is determined, as formerly, by recitations, examinations and class-work; but in drawing and design it is determined by juries specially convoked at specified times to pass upon the work submitted in the various grades.

In the work in Design, which is, of course, in some sense the crowning work of the curriculum, there is considerable latitude in the number of points attainable. The jury awards "passes," "mentions" and "special mentions"—a rare distinction—counting, respectively, two, three and four points each in the case of the regular problems, and two and three points each in the case of all one-day sketch problems. Ten points are required in Advanced Design, and five each in Elementary and Intermediate Design. Thus, in Advanced Design a student may make his points in various ways—*e. g.*, by obtaining "passes" on five major problems, or on four major problems and two sketch problems; or by winning a special mention and three passes on major prob-

lems; or a mention and three passes on major problems and one pass on a sketch problem, and so on. A failure to win a pass on one design can, therefore, only be made up by superior work on the other problems or on two sketch-designs; for passes are obtained on sketch-problems only by distinctly superior work. If a failure on one or more problems is not thus made up by superior work on others, it cannot be made up during the year at all, and the student must either "pass" on a long-vacation problem or register again the following year, until the necessary points are acquired. Thus the whole tendency is to put a premium on superior work, and the perfunctory performance of a given *quantum* of work in a given time is no longer the goal striven for. The pernicious incubus of "back work" to be "made up" in addition to the current work of the year, which was formally a cause of divided attention and constant floundering in half-done and inferior work, has been done away with forever.

The constitution of the jury is an important factor in the success of the system. The executive head of the school, *ex officio*, and one representative of each of the three ateliers, constitute a majority of the jury, and assure a due regard for scholastic standards and for the point of view from which the problem has been treated by the instructors. Two or three architects from outside the School—seldom or never the same for two consecutive problems—assure breadth of view and prevent the judgments from falling into academic ruts.

Columbia gives no medals or prizes for this regular under-

graduate work. The mentions and special mentions are therefore not material rewards, and the incentive to winning them is partly honorary, partly practical because of their value in hastening the attainment of the desired end. They are highly prized; and since they are not limited in number, fewer or more being awarded according as there are fewer or more designs of high grade, the rivalry among the students takes the form of a healthy and generous emulation rather than of a competition for prizes, with its attendant jealousies. No man is shut out of the coveted honor simply because another man has won it. Already the School is reaping the good results of this system, in work of a higher average character than has ever heretofore been produced by the corresponding classes of students; and in a quite new spirit of enthusiasm and hard work which is highly encouraging and very stimulating to the students. The old class-formation, with the attendant "intellectual lock-step," has been completely broken up, and men are promoted from one grade of design to another not upon a given date, but so soon as the requisite points have been won, whenever that may be. The final degree is awarded whenever the total requisite of 129 points in all subjects has been reached, and a man may graduate at any time in the year.

The system as now adopted in the School of Architecture is based, in principle, upon the practice of the *École des Beaux-Arts*; but the details and method of its administration have been worked out by the staff of the School, out of the experience of its tentative and partial application during the past two years.

THE ANCIENT ART OF NORTH AFRICA.—III.¹

CONSTANTINE.

THE Vandal system of construction has certain advantages, as it enables the builder to obtain the best possible materials at the least possible cost; and, when the master-builder happens to be an autocrat, the result is likely to be an

The Palace of the Bey at Constantine, now the headquarters of the provincial Government and the military staff, is an example of this style of Vandalism.

The exterior requires no comment, being merely a mass of



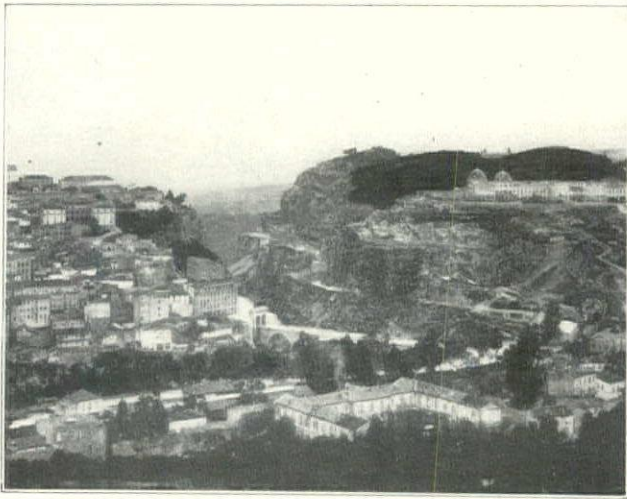
CORRIDORS IN THE PALACE OF AHMED BEY, CONSTANTINE, ALGERIA.

imposing edifice, with a semblance of antiquity, built by modern workmen with little labor, and probably less remuneration.

ugliness. But when once the threshold is passed, one comes upon a series of cloisters of most elegant Moorish design enclosing picturesque gardens.

¹Continued from page 108, No. 1553.

The Palace was begun in 1826 upon the site of a miserable slum by El-Haj-Ahmed. He commissioned a Genoese, named Schiafferio, to import marbles from Italy which had to be carried from the coast by mules; but falling out with the Dey of Algiers, the work was stopped for a time. In 1830 the Dey fell;



CONSTANTINE: VIEW SHOWING BRIDGE, GORGE AND CORNICHE ROAD.

and El-Haj-Ahmed, becoming sole master of the province of Constantine, he set to work destroying everything which came in his way in order to procure the necessary material for his palace. Marble columns and capitals (many of them, of course, having already been stolen by former dispoilers of Roman

which was entirely destroyed. Naturally the building of the palace was accomplished in a very short time, six years sufficing to erect what might have required generations of workmen, had all the carving of marble and wood been done expressly for the work.

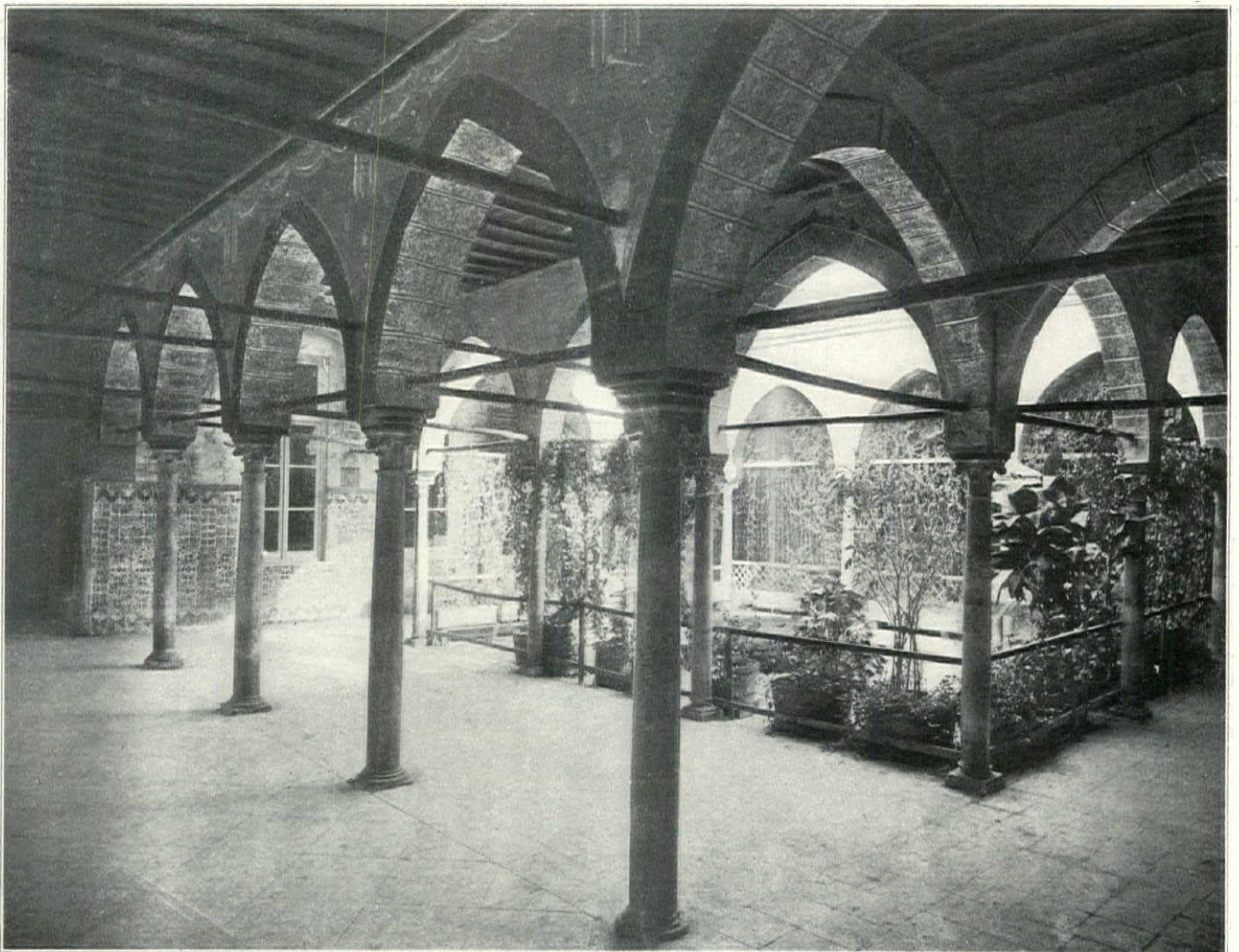
The style of the columns of the different cloisters indicates the various sources from which they were obtained. Some are of



ROMAN AQUEDUCT, NEAR CONSTANTINE.

the most elegant design, round, twisted, square, and octagonal, their capitals and bases displaying as much variety as the shafts.

The lower part of the walls is covered with choice old Moorish tiles; but the fresco-painting above them is as hideous as they are beautiful. The story of the painter, as told by the con-



ATRIUM IN THE PALACE OF AHMED BEY, CONSTANTINE, ALGERIA.

buildings), beautiful encaustic tiles, carved woodwork of Moorish design, and ancient pavements were torn from the old houses of the city, notably from the summer palace of Salah Bey,

cierge, is that he was a Christian condemned to death, but, being allowed to finish his work before his execution, he managed to stretch out the business until the fall or death of the

Bey. The painting is that of an ignoramus as regards art, and the designs are ridiculous—curious views of fortresses, cities, ports full of vessels, surrounded by borders of fruit and flowers, and looped-up draperies. But this conglomeration of absurdities detracts little from the general beauty of the palace, as they are above the level of the eye, and mostly upon the darkened walls; destruction by means of damp is also making them still less effusive.

Walking round the cloisters one sees some exquisite corners with latticed windows, the harem especially; but as the palace is the residence of the general of division, and as many of its rooms are occupied as Government offices, it is impossible to visit the interior. In a niche of one of the corridors there is a fine white marble statue of the mother of Caracalla, said to be the only perfect one found in Algeria.

There were formerly subterranean passages under the city, but they have recently been completely blocked up. In 1858 some of them were explored and one was discovered somewhat similar to those of the interior of the Tombeau de la Chrétienne. There had always been a tradition among the Arabs that the city was built upon vaults, partly for strength and partly to obtain storing places, as, Constantine being entirely constructed upon a peninsula cut off from the surrounding country except by one narrow neck of land, there were no means of obtaining provisions during a siege. These passages were visited in 1837 and found to be a perfect labyrinth blocked up in places by stones, earth and the dirt of ages, so that it was considered wise to close them up almost entirely.

In a small enclosure opposite the public garden there is a large collection of Roman remains of statues, stelæ, friezes, columns, etc., and it is remarkable that many of the tombstones are to the memory of centenarians, some fifteen of them giving the ages of the deceased as from 100 to 131 years!

The only approach to the city from the east is by a remarkable bridge over the Rummel. This river encircles the city on two sides and is forced, or has forced itself through a narrow gorge in some places no more than 15 feet wide, and ending in a cascade. At one end of the ravine there is, of course, a "pont du Diable," and certainly the neighboring rock from which poor faithless Arab wives are said to have been thrown justifies the name. Near it also, an inscribed stone on the rock records rather illegibly the names of several Christians who suffered martyrdom in A.D. 289—Marius, Jacobus, Rusticus, and others.

The bridge which spans the ravine was originally built by the Romans upon some natural eminences in the river which formed foundations for arches and piers; but very little remains of Roman work. A curious bas-relief of a woman treading upon two elephants may be seen upon the central pier of the aqueduct which passes under the bridge. A description of the bridge is given by the Arab geographer of the eleventh century, El-Bekri. He describes it as of two stories of arches supported by piers, which are pierced at their summits by small apertures to enable the water to pass during extraordinarily high floods. As recently as 1740 Shaw describes it as a masterpiece, the gallery and the columns of the arches being adorned with cornices and festoons, ox-heads and garlands, and the key-stones with caducei and other figures. In 1765 it was seen by Bruce and described and drawn in his "Footsteps," p. 49. The bridge was restored by Don Bartolommeo, an architect of Minorca, in 1793, with remains from other Roman buildings, and thus it remained until 1857, when one of the piers and two arches suddenly gave way. Restoration was pronounced impossible, so it was battered down by artillery and rebuilt with an iron girder. The view from the Corniche road, just beyond the bridge, is superb, looking over undulating valleys ending in chains of mountains.

The Cathedral of Notre Dame was originally a mosque. It contains some exquisite colored plaster-work and encaustic tiles, one side chapel being a gem of Moorish architecture. The *mimbar* is still used as a pulpit. The mosque of Jamâa-el-Kebir was built upon the ruins of a Roman temple and several inscriptions remain, one to the Goddess of Concord and another to Venus; but the construction of the Rue Nationale caused the destruction of part of the mosque and the minaret.

The Jamâa Sidi-el-Kettani mosque contains some fine marble columns and tiles, and a beautiful *mimbar* decorated with agate and colored marbles, but all the mosques have been restored in modern times and most of them have lost their minarets; one, however, 80 feet high, is of great beauty. It is octagonal, with a projecting covered gallery at the top, similar to several in Tunis.

S. BEALE.

BOOKS AND PAPERS

BELIEVERS that art is of all peoples and many climes should hope that Mr. Cram is right in the feeling that Mutsuhito, the present Mikado of Japan, is not only most loyal to his fathers and his people, "the very incarnation of Japan," but as superlatively wise in matters of art as he has shown himself in more practical matters, and that, hence, he will in time speak that word which shall forever put a stop to the debasing of Oriental art through the influence of Occidental fashion. If this word be not spoken, Mr. Cram holds that the chapter of Japanese art, a chapter that has remained open and uninterrupted for thirteen centuries—while western art at its best calls for a chapter covering three centuries only—is closed "inexorably."

Although, owing to the fact that this record of "impressions" is made up in great part of a series of detached papers published in various periodicals at different times, the reader is annoyed by coming upon here and there a disagreeable repetition of ideas and phrases which would have been avoided if the work had been built up as one operation, the author has been well advised in bringing the papers together in book form. We could wish, though, that he had illustrated his points at times with sketches of his own, and had not relied so wholly on photographic illustration, for, owing to lack of care and skill in printing, the fifty-odd plates are needlessly flat and spiritless.

It is not often that a traveller in search of impressions is willing to do more than skim them from the surface; but, short as his stay in the country necessarily was, our author used his time to good advantage and was willing later to give time and study to the digestion of his own observations, and to the examination and study of the conclusions that had been reached by others. Because of this he has been able to present his matter in an orderly manner, very different from the random speculating of the hasty traveller, and the reader feels that, should he ever feel inclined to take up the serious study of Japanese art, here is to his hand an introduction that is not only agreeably written, but is evidently trustworthy as to the sequence of facts, and at least deserving of respectful consideration when it comes to the matter of principles and theories.

Appreciation of Japanese art is not a spontaneous growth, it has to be cultivated carefully; but the modern Occidental has now reached a fair comprehension of the beauties of the output of the minor arts of Japan. He has, too, some, but a less adequate, knowledge of one of the three fine arts—painting, while of sculpture he has still less, and of architecture practically none at all. This is a quite natural result, since the embodiment of the canons of Oriental art have aspects quite unlike those which the perceptions of Occidental architects have become habituated to considering. In other words, we feel that, while an American architect may secure a fairly just appreciation of European architectural chefs d'œuvre through the aid of books and photographs, he can begin to understand Japanese architecture only after he has himself visited that wonderful group of islands, and all Mr. Cram's command of language cannot make the reader believe that Japanese architecture really is—as, of course, logically it must be—quite as high in the scale of true art as he would have us believe. The truthfulness of this deduction our author quite unintentionally admits when he writes: "If a man wants to see what good art can mean and be when it is unspotted by modernism, he must go, not to Italy, or to France, or England, but to the Buddhist temples of Japan." That's just it: he must not read books and study photographs; he must simply and boldly "go."

A PERUSAL of the "Cyclopedia of Drawing"² shows that its contents are fairly divided among the subjects embraced in the work, and that it contains little or nothing which one would rather have left out: which is only another way of saying that it covers its subjects about as well as could be done in two volumes of between five and six hundred pages each.

Volume I. forms a fairly complete reading course in archi-

¹"*Impressions of Japanese Architecture and the Allied Arts.*" By Ralph Adams Cram, Fellow of the American Institute of Architects, Member of the Society of Arts, London; Fellow of the Royal Geographical Society. New York: 1905. The Baker & Taylor Company. Price, \$2.00, net.

²"*Cyclopedia of Drawing.*" Edited by Alfred E. Zapf, S.B. Published by the American School of Correspondence, Chicago. Two vols., half red, morocco, pp. 555 and 592, and index. Price, \$10.

tectural drawing. The first 168 pages satisfactorily cover the elements of mechanical drawing, and the author, Ervin Kenison, Department of Mechanical Drawing, Massachusetts Institute of Technology, evidently prepared his paper with particular reference to the needs of students in architecture. The remaining papers are "Shades and Shadows," by Harry W. Gardner, Assistant Professor of Architecture, Massachusetts Institute of Technology; "Perspective Drawing," by William H. Lawrence, Associate Professor of Architecture, Massachusetts Institute of Technology; "Freehand Drawing," by Herbert E. Everett, Department of Architecture, University of Pennsylvania; "Pen-and-Ink Rendering," by David A. Gregg, Department of Architecture, Massachusetts Institute of Technology; "Rendering in Wash," by Herman V. von Holst, Chicago, and "Architectural Lettering," by Frank Chouteau Brown, Boston. All the writers have succeeded in making their articles clear and readable, and have provided an adequate number of well chosen illustrations.

Few men are so well able to render architectural drawings in pen-and-ink (or in pencil) as Mr. D. A. Gregg. Probably his free and effective style, although so strongly individual, is as good as could be chosen to set before the student. It should surely prevent one's acquiring that finickiness into which the tyro, left to himself or following less bold examples, is so prone to fall. By explicit instruction laid down in the text, by showing various renderings of the same subject and by illustrating what to avoid as well as what to seek, Mr. Gregg has produced a very practical paper.

Mr. Frank Chouteau Brown's well-known book on lettering points him out as eminently well equipped to prepare an instructive paper on architectural lettering. His brief chapter of forty-six pages covers the subject quite adequately. The analysis of Classic and Renaissance alphabets is particularly good, and the suggested freehand alphabets are simple yet artistic, and of a sort to combine well with architectural drawings.

Volume II. deals chiefly with mechanical drawing for engineers and with machine design; but some hundred and fifty pages relating to sheet metal work are well worth study by the architectural draughtsman.

ILLUSTRATIONS.

THE WETZEL BUILDING, NOS. 2 AND 4 EAST 44TH STREET, NEW YORK, N. Y. MESSRS. HILL AND STOUT, ARCHITECTS, NEW YORK, N. Y.

FRONT ELEVATION OF THE SAME.

PLANS OF THE SAME.

DETAILS OF UPPER STORIES OF THE SAME.

DETAILS OF LOWER STORIES OF THE SAME.

RECEPTION-ROOM IN THE SAME.

SALESROOM IN THE SAME.

"JOY" AND "THE LITTLE PAN": TERMES FOR AN ITALIAN GARDEN. MR. J. S. HARTLEY, SCULPTOR, NEW YORK, N. Y.

Additional Illustrations in the International Edition.

CHRIST EPISCOPAL CHURCH, BLOOMFIELD, N. J. THE LATE WILLIAM HALSEY WOOD, ARCHITECT.

NOTES AND CLIPPINGS.

THE NATIONAL MONUMENT TO VICTOR EMMANUEL AT ROME.—The Minister of Public Works has appointed three architects (Signori Pio Piacentini, Gaetano Koch and Manfredo Manfredi) to continue this unfinished work of Count Sacconi, who died a short time ago. The selection seems to be disapproved in many quarters.

THE COLLÈGE MAZARIN, PARIS.—The meeting of the Five Academies, which was held last month, over which M. Detaille, the painter, presided, was memorable, for it could be regarded as a centenary. It is usually supposed that it was in 1806 the Collège Mazarin was assigned to the service of the Institut de France. But the Academicians consider it was 1805, for on October 29 of that year an address was presented to Napoleon congratulating him on his victories. Every visitor to Paris knows the Palais de l'Institut, which is opposite the Louvre. On the site formerly stood the buildings notorious as the Grand et Petit Hôtel de Nesle.

Many strange traditions are related of the inmates, and especially of Jeanne de Bourgonne. When the buildings were removed it was proposed by Francis I. to erect a college on the site. That design was never realized, but long afterward Cardinal Mazarin, when dying, left money for a college to be erected for ecclesiastical students from specified countries. It obtained, in consequence, the name of the College of the Four Nations. The building was erected from the designs of Levan. Mazarin's tomb was placed in the chapel of the college, which is now used for the public meetings, the tomb having been transferred to Versailles. During the Revolutionary period the college was used as a prison, and then as a place of meeting for the Committee of Public Safety. Napoleon, as we have said, decided that the building should be used for the Institut, and Vaudoier obtained the commission to carry out the changes which were necessary.—*The Architect.*

THE FAILURE OF MUNICIPAL OWNERSHIP ABROAD.—Prof. F. H. Roberts, of the University of Colorado, who has been making for the Governor of Colorado an official investigation of the operating by European municipalities of public-utility services, speaks of his observations as follows:

"From all that I could make out, the entire municipal ownership system in England and on the Continent is unbusinesslike in the extreme. In the first place, nearly all the towns are failing to make provision for depreciation of the plants—lighting, street railway, water, whatever they are operating—in order to make a better showing for the scheme at present. For instance, in a number of towns the sinking fund set aside is 1 per cent. or even lower. Seven or 8 or even 10 per cent. is set aside by conservative business concerns in this country, and they are not putting by any more than they deem necessary. In Glasgow, where the street railways are making a great success under municipal ownership—on paper—I found that the city government did much of the work which ought to have been charged to the street-car company. In certain new work that the street-car company had to do to put its lines into a locality not yet tapped, the workmen employed by the city tore down buildings that stood in the way, and even repaved the streets. Not a cent was charged against the street railway company. In many of the English towns the municipal-ownership scheme has caused the tax-rate to soar year by year, until now it has become a terrible burden. Some of the towns have sustained such a drain that householders are obliged to pay a tax of half the amount of rent they give their landlords. For instance, if the renter pays £72 a year in rent, he will pay £36 a year in taxes. This burden is more than men can stand for long, and the end is bound to be revolution or something closely bordering upon it."

CONCRETE BUILDINGS IN LIVERPOOL.—Notwithstanding the usefulness of "destructor" clinker as an aggregate in concrete-making, municipal authorities often experience difficulty in disposing of this product in a remunerative manner. Liverpool is a case in point, for in that city, out of some 50,000 tons of clinker produced annually, about 15,000 tons have to be deposited in the sea at the cost of the ratepayers. With the laudable object of reducing this waste both of money and of good material, the city engineer has applied destructor clinker to the manufacture of concrete foundations and paving blocks, and more recently in building workmen's dwellings of clinker concrete, with a small proportion of steel reinforcement. The first building of the kind is a three-storied block, covering an area of about 234 square yards, in which the foundations consist of concrete piers 12 feet deep supporting flat arches, the walls and floors of separate concrete slabs and the balconies, stairs, parapet walls and chimney-tops of concrete specially moulded to the required form. All the slabs, blocks and other moulded parts were made at the corporation workshops and carted to the site ready for erection. Openings for doors, windows and fireplaces were moulded in the slabs, mortises and tenons being formed on the edges, so that the parts of the building could be securely jointed with cement mortar. Although the system of construction is certainly novel, it has objections. The weight of the slabs, ranging up to 11 tons each, necessitates heavy tackle for handling, and the completed structure cannot be anything like so firmly connected as monolithic concrete work, to say nothing of concrete-steel construction. Further, unless a regular demand can be established for slabs and blocks of given dimensions, the cost of moulds must be excessively high.—*The Builder.*